The Abstract Book of the 6th International and 27th National Congress of Physiology and Pharmacology of Iran



The Abstract Book of the 6th International and 27th National Congress of Physiology and Pharmacology of Iran, Physiology and Pharmacology 2026; 30 (Supplement 1): 1-1109. http://dx.doi.org/10.22034/phypha.30.supple1

Physiology and Pharmacology 30 (2026) Supplement 1, 1-1109

6th International and 27th National Congress of Physiology and Pharmacology of Iran, Mashhad University of Medical Sciences
http://dx.doi.org/10.22034/phypha.30.supple1

Message from the Congress Secretary

In the name of God

Dear distinguished professors, researchers, students, and colleagues, it is my great pleasure to reflect on the successful completion of the 6th International and 27th National Congress of Physiology and Pharmacology of Iran, held from February 4 to 6, 2026, at the Shohada-ye Salamat Conference Complex, Mashhad University of Medical Sciences, in the holy city of Mashhad, Iran. This congress brought together distinguished scientists, researchers, clinicians, educators, and students, providing an outstanding platform for the exchange of scientific knowledge, the presentation of recent research achievements, and the promotion of interdisciplinary collaboration in the fields of physiology, pharmacology, toxicology, neuroscience, and other related biomedical sciences.

Hosting this scientific event in the holy city of Mashhad, in the vicinity of the Holy Shrine of Imam Reza (peace be upon him), added a unique cultural and spiritual dimension to the congress and further strengthened the spirit of scientific collaboration and academic exchange among participants.

The scientific program, comprising keynote lectures, plenary and parallel scientific sessions, as well as oral and poster presentations, reflected the diversity, depth, and high quality of current research. It also fostered stimulating scientific discussions and created valuable opportunities for establishing new collaborations and advancing future research initiatives.

I would like to express my sincere gratitude to all members of the Scientific and Organizing Committees, keynote speakers, session chairs, reviewers, sponsors, participants, and all those whose dedication, expertise, and enthusiastic support were instrumental in the successful organization of this congress.

I sincerely hope that the scientific interactions and collaborations established during this congress will continue to inspire innovative research, strengthen interdisciplinary partnerships, and contribute to further advances in physiology, pharmacology, and the broader field of biomedical sciences.

Thank you for your invaluable contributions and participation. I wish you continued good health, lasting success, and excellence in your scientific endeavors.

Mohammad Hossein Boskabady, MD, PhD

Congress Secretary
The 6th International and 27th National Congress of Ph ysiology and Pharmacology of Iran

About the Congress

The **6th International and 27th National Congress of Physiology and Pharmacology of Iran** was held from **February 4 to 6, 2026**, at the **Shohada-ye Salamat Conference Complex, Mashhad University of Medical Sciences**, in Mashhad, Iran. Organized under the auspices of the **Iranian Society of Physiology and Pharmacology**, this biennial congress serves as one of the Iran's premier scientific forums, bringing together scientists, clinicians, educators, researchers, and students to exchange knowledge, present the last scientific advances, and strengthen collaboration across the biomedical sciences.

The congress was designed to provide a multidisciplinary platform for the dissemination of basic, translational, and clinical research, while fostering innovation in physiology, pharmacology, toxicology, neuroscience, medicinal plants, and other biomedical disciplines. It also aimed to foster interdisciplinary collaboration, strengthen national and international scientific partnerships, encourage innovation in education and healthcare, and support early-career researchers by providing opportunities to present their research and engage in scientific discussion.

The scientific program featured keynote lectures, scientific symposia, oral and poster presentations, and panel discussions covering a broad spectrum of contemporary research topics. These sessions provided valuable opportunities for participants to share novel findings, discuss emerging challenges, and explore future directions in biomedical research.

Beyond its scientific program, the congress developed stronger academic networks among universities, research institutes, and healthcare centers, encouraging scientific dialogue, knowledge exchange, and interdisciplinary cooperation. Through these interactions, the meeting contributed to advancing research, education, and scientific collaboration in physiology, pharmacology, and related biomedical sciences.

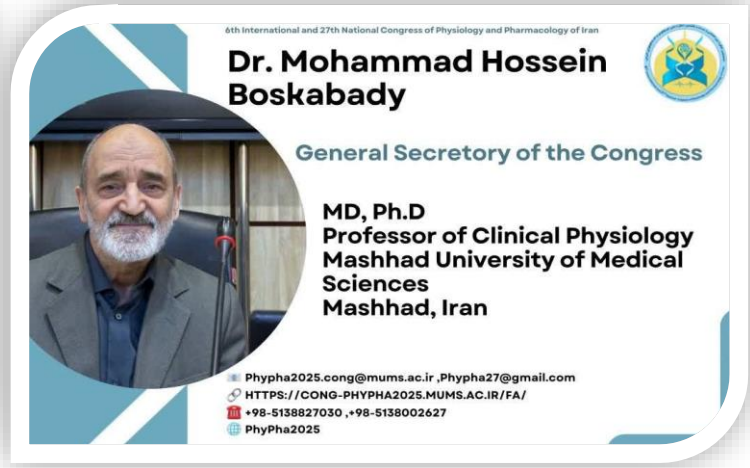
The Organizing Committee sincerely acknowledges the valuable contributions of all keynote speakers, invited lecturers, presenters, reviewers, session chairs, committee members, sponsors, and participants, whose dedication, expertise, and unwavering support were instrumental in the successful organization of this congress.

Scientific Topics

The congress covered a broad spectrum of scientific disciplines, including:

- Cellular and Molecular Studies in Physiology, Pharmacology, Neuroscience, Biochemistry, Nutrition, and Related Biomedical Sciences
- Stem Cells and Regenerative Medicine
- Cancer Biology and Neoplastic Diseases
- Neuroscience
- Cognitive Sciences, Psychiatric Disorders, and Substance Use Disorders
- Pain, Inflammation, Immunology, and Infectious Diseases
- Respiratory, Cardiovascular, Hematological, and Hemostatic Disorders
- Gastrointestinal, Endocrine, and Metabolic Disorders
- Renal Physiology and Water–Electrolyte Homeostasis
- Toxicology and Poisoning
- Pediatric and Geriatric Medicine
- Reproductive Physiology and Pharmacology
- Dietary Supplements, Vitamins, and Minerals
- Applied Physiology, Clinical Pharmacology, and Clinical Trials
- Musculoskeletal Disorders and Connective Tissue Diseases
- Exercise and Aerospace Physiology
- Pharmacogenomics
- Innovations in Physiology and Pharmacology Education, Artificial Intelligence, and Modern Educational Approaches


6th International and 27th National Congress of Physiology and Pharmacology of Iran
Dr. Mahmoud Mohammadzadeh Shabestari
President of the Congress
MD, Cardiologist
President of Mashhad University of Medical Sciences
Mashhad, Iran
Phypha2025.cong@mums.ac.ir ,Phypha27@gmail.com
HTTPS://CONG-PHYPHA2025.MUMS.AC.IR/FA/
+98-5138827030 ,+98-5138002627
PhyPha2025


6th International and 27th National Congress of Physiology and Pharmacology of Iran
Dr. Mohammad Hossein Boskabady
General Secretory of the Congress
MD, Ph.D
Professor of Clinical Physiology
Mashhad University of Medical Sciences
Mashhad, Iran
Phypha2025.cong@mums.ac.ir ,Phypha27@gmail.com
HTTPS://CONG-PHYPHA2025.MUMS.AC.IR/FA/
+98-5138827030 ,+98-5138002627
PhyPha2025


6th International and 27th National Congress of Physiology and Pharmacology of Iran
Dr. Abolfazl Khajavi Rad
Deputy Secretory of the Congress
MD, Ph.D
Professor of Clinical physiology
Mashhad University of medical Sciences
Mashhad, Iran
Phypha2025.cong@mums.ac.ir ,Phypha27@gmail.com
HTTPS://CONG-PHYPHA2025.MUMS.AC.IR/FA/
+98-5138827030 ,+98-5138002627
PhyPha2025


6th International and 27th National Congress of Physiology and Pharmacology of Iran
Dr. Mohammad Taher Boroushaki
Executive Secretory of the Congress
Pharm D, Ph.D
Professor of Pharmacology
Mashhad University of Medical Sciences
Mashhad, Iran
Phypha2025.cong@mums.ac.ir ,Phypha27@gmail.com
HTTPS://CONG-PHYPHA2025.MUMS.AC.IR/FA/
+98-5138827030 ,+98-5138002627
PhyPha2025


6th International and 27th National Congress of Physiology and Pharmacology of Iran
Dr. Hamid Reza Sadeghnia
Scientific Secretory of the Congress
Pharm D, Ph.D
Professor of Pharmacology
Mashhad University of Medical Sciences
Mashhad, Iran
Phypha2025.cong@mums.ac.ir ,Phypha27@gmail.com
HTTPS://CONG-PHYPHA2025.MUMS.AC.IR/FA/
+98-5138827030 ,+98-5138002627
PhyPha2025

6th International and 27th National Congress of Physiology and Pharmacology of Iran

President of the congress:
Dr. Mohammadzadeh Shabestari M.

Executive Secretory of the Congress:
Dr. Boroushaki MT.

- **Publications and Website:**
  Dr. Hosseinian S.
  Dr. Gholamalizadeh H.
- **Logistics and Protocol:**
  Dr. Shafei MN.
- **Audio-Visual Section:**
  Dr. Hosseini A.
- **International Affairs:**
  Dr. Ghorbani A.
  Dr. Rezaei R.

General Secretory of the congress:
Dr. Boskabady MH.

Deputy Secretory of the Congress:
Dr. Khajavi Rad A.

- **Secretariat and Public Relations :**
  Dr. Asgharzadeh F.
  Dr. Ghorani Sirjani V.
  Dr. Beigoli S.
  Ms. Nasrpour Navaei M.
  Ms. Asghari S.Z.
- **Financial Affairs:**
  Dr. Rahimi HR.
  Dr. Rastegar Moghaddam S.HR.
  Dr. Khajavi Rad A.
  Dr. Vahdati N.
  Dr. Hosseini S.J.

Scientific Secretory of the Congress:
Dr. Sadeghnia HR.

- **Keynote Lectures:**
  Dr. Hosseinzadeh H.
  Dr. Mahmoudabadi M.
  Dr. Ramesh Rad M.
  Dr. Khazaei M.
- **Scientific Sessions:**
  Dr. Karimi Gh.
  Dr. Mehri S.
  Dr. Gholamnezhad Z.
  Dr. Kazerani HR.
  Dr. Parham A.
- **Posters:**
  Dr. Rouhbakhsh A.
  Dr. Mousavi S.H.
  Dr. Alavi M.S.
- **Workshops:**
  Dr. Hosseini S.M.
  Dr. Razavi B.M.
  Dr. Jalili-Nik M.
- **Panels and Symposia:**
  Dr. Moghimi A.
  Dr. Vafaee F.
  Dr. Sepehrinezhad A.
  Dr. Forouzanfar F.
- **Continuing Education:**
  Dr. Imenshahidi M.
  Dr. Niazmand S.

Organizing Committee

- **Secretariat and Public Relations**
  Dr. Fereshteh Asgharzadeh
  Dr. Vahideh Ghorani Sirjani
  Dr. Sima Beigoli
  Ms. Motahareh Nasrpour Navaei
  Ms. Seyedeh Zahra Asghari

- **Financial Affairs**
  Dr. Hamid Reza Rahimi
  Dr. Seyed Hamid Reza Rastegar Moghaddam
  Dr. Abolfazl Khajavi Rad
  Dr. Naser Vahdati
  Dr. Seyyed Javad Hosseini

- **Publications and Website**
  Dr. Sara Hosseinian
  Dr. Hanieh Gholamalizadeh

- **Logistics and Protocol**
  Dr. Mohammad Naser Shafei

- **Audio-Visual Section**
  Dr. Azar Hosseini

- **International Affairs**
  Dr. Ahmad Ghorbani
  Dr. Ramin Rezaei

- **Keynote Lectures**
  Dr. Hossein Hosseinzadeh
  Dr. Maryam Ramesh Rad
  Dr. Maryam Mahmoudabadi
  Dr. Majid Khazaei

- **Scientific Sessions**
  Dr. Gholamreza Karimi
  Dr. Soghra Mehri
  Dr. Zahra Gholamnezhad
  Dr. Hamid Reza Kazerani
  Dr. Abbas Parham

- **Posters**
  Dr. Ali Rouhbakhsh
  Dr. Seyed Hadi Mousavi
  Dr. Mohaddeseh Sadat Alavi

- **Workshops**
  Dr. Seyed Mahmoud Hosseini
  Dr. Bibi Marjan Razavi
  Dr. Mohammad Jalili-Nik

- **Panels and Symposia**
  Dr. Ali Moghimi
  Dr. Farzaneh Vafaee
  Dr. Ali Sepehrinezhad
  Dr. Fatemeh Forouzanfar

- **Continuing Education**
  Dr. Mohsen Imenshahidi
  Dr. Saeed Niazmand

Scientific Committee

Dr. Mohammad Hossein Boskabady
Mashhad University of Medical Sciences, Iran
Dr. Mousa Reza Hajzadeh
Mashhad University of Medical Sciences, Iran
Dr. Seyed Mahmoud Hosseini
Mashhad University of Medical Sciences, Iran
Dr. Majid Khazaei
Mashhad University of Medical Sciences, Iran
Dr. Abolfazl Khajavirad
Mashhad University of Medical Sciences, Iran
Dr. Mohammad Naser Shafiee
Mashhad University of Medical Sciences, Iran
Dr. Maryam Mahmoudabadi
Mashhad University of Medical Sciences, Iran
Dr. Saeed Niazmand
Mashhad University of Medical Sciences, Iran
Dr. Zahra Gholamnejad
Mashhad University of Medical Sciences, Iran
Dr. Sara Hosseinian
Mashhad University of Medical Sciences, Iran
Dr. Fereshteh Asgharzadeh
Mashhad University of Medical Sciences, Iran
Dr. Vahideh Ghorani Sirjani
Mashhad University of Medical Sciences, Iran
Dr. Seyed Hadi Mousavi
Mashhad University of Medical Sciences, Iran
Dr. Hamid Reza Sadeghnia
Mashhad University of Medical Sciences, Iran
Dr. Mohammad Taher Boroushaki
Mashhad University of Medical Sciences, Iran
Dr. Ahmad Ghorbani
Mashhad University of Medical Sciences, Iran
Dr. Azar Hosseini
Mashhad University of Medical Sciences, Iran
Dr. Mohaddeseh Sadat Alavi
Mashhad University of Medical Sciences, Iran
Dr. Reza Shafiee Nik
Mashhad University of Medical Sciences, Iran
Dr. Heydar Parsaei
Mashhad University of Medical Sciences, Iran
Dr. Hassan Rakhshandeh
Mashhad University of Medical Sciences, Iran
Dr. Vahid Reza Askari
Mashhad University of Medical Sciences, Iran
Dr. Vafa Baradaran Rahimi
Mashhad University of Medical Sciences, Iran
Dr. Soghra Mehri
Mashhad University of Medical Sciences, Iran
Dr. Hossein Hosseinzadeh
Mashhad University of Medical Sciences, Iran
Dr. Gholamreza Karimi
Mashhad University of Medical Sciences, Iran
Dr. Naser Vahdati
Mashhad University of Medical Sciences, Iran
Dr. Mohsen Iman Shahidi
Mashhad University of Medical Sciences, Iran

Dr. Ali Rouhbakhsh
Mashhad University of Medical Sciences, Iran
Dr. Seyed Ahmad Mohajeri
Mashhad University of Medical Sciences, Iran
Dr. Bibi Marjan Razavi
Mashhad University of Medical Sciences, Iran
Dr. Zhila Taherzadeh
Mashhad University of Medical Sciences, Iran
Dr. Zahra Teyrani Najjaran
Mashhad University of Medical Sciences, Iran
Dr. Maryam Ramesh Rad
Mashhad University of Medical Sciences, Iran
Dr. Seyed Adel Moallem
Mashhad University of Medical Sciences, Iran
Dr. Mehdi Belali Mood
Mashhad University of Medical Sciences, Iran
Dr. Seyed Reza Mousavi
Mashhad University of Medical Sciences, Iran
Dr. Anahita Alizadeh
Mashhad University of Medical Sciences, Iran
Dr. Mohammad Moshiri
Mashhad University of Medical Sciences, Iran
Dr. Bamdad Riyahi
Mashhad University of Medical Sciences, Iran
Dr. Bita Dadpour
Mashhad University of Medical Sciences, Iran
Dr. Alireza Ghasemi Toosi
Mashhad University of Medical Sciences, Iran
Dr. Ali Gorji
Mashhad University of Medical Sciences, Iran
Dr. Farzaneh Vafaee
Mashhad University of Medical Sciences, Iran
Dr. Fatemeh Forouzanfar
Mashhad University of Medical Sciences, Iran
Dr. Hamed Ghazavi
Mashhad University of Medical Sciences, Iran
Dr. Arezoo Rajabian
Mashhad University of Medical Sciences, Iran
Dr. Ali Sepehrinejad
Mashhad University of Medical Sciences, Iran
Dr. Mahmoud Mahmoudi
Mashhad University of Medical Sciences, Iran
Dr. Mozhgan Mohammadi
Mashhad University of Medical Sciences, Iran
Dr. Jalil Tavakol Afshari
Mashhad University of Medical Sciences, Iran
Dr. Hossein Haghir
Mashhad University of Medical Sciences, Iran
Dr. Alireza Ebrahimzadeh Bideskan
Mashhad University of Medical Sciences, Iran
Dr. Abbas Mohammadipour
Mashhad University of Medical Sciences, Iran
Dr. Shabnam Mohammadi
Mashhad University of Medical Sciences, Iran
Dr. Hamid Reza Rahimi
Mashhad University of Medical Sciences, Iran

Dr. Mohammad Reza Abbaszadegan
Mashhad University of Medical Sciences, Iran
Dr. Majid Mojarad
Mashhad University of Medical Sciences, Iran
Dr. Barat Ali Meshkani
Mashhad University of Medical Sciences, Iran
Dr. Mohammad Jalil Nik
Mashhad University of Medical Sciences, Iran
Dr. Mohammad Soukhtanloo
Mashhad University of Medical Sciences, Iran
Dr. Mohammad Reza Zarindast
Tehran University of Medical Sciences, Iran
Dr. Ali Mohammad Alizadeh
Tehran University of Medical Sciences, Iran
Dr. Mehri Kadkhodaei
Tehran University of Medical Sciences, Iran
Dr. Seyed Morteza Karimian
Tehran University of Medical Sciences, Iran
Dr. Behjat Seifi
Tehran University of Medical Sciences, Iran
Dr. Mahdieh Faghihi
Tehran University of Medical Sciences, Iran
Dr. Maryam Zahmatkesh
Tehran University of Medical Sciences, Iran
Dr. Mansour Keshavarz
Tehran University of Medical Sciences, Iran
Dr. Ghorbangol Ashabi
Tehran University of Medical Sciences, Iran
Dr. Alireza Imani
Tehran University of Medical Sciences, Iran
Dr. Esmaeil Riyahi
Tehran University of Medical Sciences, Iran
Dr. Maryam Farahmandfar
Tehran University of Medical Sciences, Iran
Dr. Fatemeh Nabavizadeh Rafsanjani
Tehran University of Medical Sciences, Iran
Dr. Mina Ranjbaran
Tehran University of Medical Sciences, Iran
Dr. Mohsen Parviz
Tehran University of Medical Sciences, Iran
Dr. Parisa Habibi
Tehran University of Medical Sciences, Iran
Dr. Farzaneh Kianian
Tehran University of Medical Sciences, Iran
Dr. Kamran Rakhshan
Tehran University of Medical Sciences, Iran
Dr. Ahmad Reza Dehpour
Tehran University of Medical Sciences, Iran
Dr. Mehdi Khoob Shoorakai
Tehran University of Medical Sciences, Iran
Dr. Mohammad Sharifzadeh
Tehran University of Medical Sciences, Iran
Dr. Hamed Shafaroodi
Tehran University of Medical Sciences, Iran
Dr. Azra Tabatabaei Malazy
Tehran University of Medical Sciences, Iran
Dr. Nasim Vosoughi
Tehran University of Medical Sciences, Iran
Dr. Seyedeh Elaheh Mousavi
Tehran University of Medical Sciences, Iran
Dr. Razieh Mohammad Jafari
Tehran University of Medical Sciences, Iran
Dr. Anahita Torkaman Bouterabi
Tehran University of Medical Sciences, Iran
Dr. Farahnaz Jazayeri Joneghani
Tehran University of Medical Sciences, Iran
Dr. Saeed Vahedi
Tehran University of Medical Sciences, Iran
Dr. Abbas Haghparast
Shahid Beheshti University of Medical Sciences, Iran
Dr. Asghar Ghasemi Varnamkhasti
Shahid Beheshti University of Medical Sciences, Iran
Dr. Mahyar Jan Ahmadi
Shahid Beheshti University of Medical Sciences, Iran
Dr. Bahram Rasoulian
Shahid Beheshti University of Medical Sciences, Iran
Dr. Jalal Zarrin Ghalam Moghadam
Shahid Beheshti University of Medical

Sciences, Iran
Dr. Rasoul Ghasemi
Shahid Beheshti University of Medical Sciences, Iran
Dr. Homeira Zardouz
Shahid Beheshti University of Medical Sciences, Iran
Dr. Narges Hosseinmardi
Shahid Beheshti University of Medical Sciences, Iran
Dr. Homa Shardi Manaheji
Shahid Beheshti University of Medical Sciences, Iran
Dr. Somayeh Nik Nazar
Shahid Beheshti University of Medical Sciences, Iran
Dr. Fatemeh Goshadroo
Shahid Beheshti University of Medical Sciences, Iran
Dr. Sareh Asadi
Shahid Beheshti University of Medical Sciences, Iran
Dr. Naghi Shahabi Majd
Shahid Beheshti University of Medical Sciences, Iran
Dr. Farzaneh Eskandari
Shahid Beheshti University of Medical Sciences, Iran
Dr. Pegah Javadpour Nari
Shahid Beheshti University of Medical Sciences, Iran
Dr. Shima Davoudi
Shahid Beheshti University of Medical Sciences, Iran
Dr. Mona Rahdar
Shahid Beheshti University of Medical Sciences, Iran
Dr. Roxana Karbaschi
Shahid Beheshti University of Medical Sciences, Iran
Dr. Zohreh Tavassoli
Shahid Beheshti University of Medical Sciences, Iran
Dr. Ali Jafari Soha
Shahid Beheshti University of Medical Sciences, Iran
Dr. Sakineh Khatoon Hajiseyah
Shahid Beheshti University of Medical Sciences, Iran
Dr. Abolhassan Ahmadiani
Shahid Beheshti University of Medical Sciences, Iran
Dr. Hassan Niknejad
Shahid Beheshti University of Medical Sciences, Iran
Dr. Marjan Nassiri Asl
Shahid Beheshti University of Medical Sciences, Iran
Dr. Leila Dargahi
Shahid Beheshti University of Medical Sciences, Iran
Dr. Mehrdad Feyzi
Shahid Beheshti University of Medical Sciences, Iran
Dr. Majid Motaghinejad
Shahid Beheshti University of Medical Sciences, Iran
Dr. Masoumeh Jorjani
Shahid Beheshti University of Medical Sciences, Iran
Dr. Hamid Reza Jamshidi
Shahid Beheshti University of Medical Sciences, Iran
Dr. Siavash Parvardeh
Shahid Beheshti University of Medical Sciences, Iran
Dr. Seyed Ali Ziaee
Shahid Beheshti University of Medical Sciences, Iran
Dr. Ali Haeri
Shahid Beheshti University of Medical Sciences, Iran
Dr. Babak Gholami
Shahid Beheshti University of Medical Sciences, Iran
Dr. Fatemeh Mahboubi Fard
Shahid Beheshti University of Medical Sciences, Iran

Dr. Mohammad Hadi Farajoo
Shahid Beheshti University of Medical Sciences, Iran
Dr. Khojasteh Joharchi
Shahid Beheshti University of Medical Sciences, Iran
Dr. Mohammad Abbas Sheikholeslami
Shahid Beheshti University of Medical Sciences, Iran
Dr. Zhila Behzadi
Shahid Beheshti University of Medical Sciences, Iran
Dr. Fereshteh Motamedi
Shahid Beheshti University of Medical Sciences, Iran
Dr. Abbas Foroutan
Shahid Beheshti University of Medical Sciences, Iran
Dr. Hojatollah Abbaszadeh
Shahid Beheshti University of Medical Sciences, Iran
Dr. Mohammad Javan
Tarbiat Modares University, Iran
Dr. Saeed Semnanian
Tarbiat Modares University, Iran
Dr. Seyed Javad Mirnajafi-Zadeh
Tarbiat Modares University, Iran
Dr. Yaghoub Fathollahi
Tarbiat Modares University, Iran
Dr. Esmat Radmanesh
Abadan University of Medical Sciences, Iran
Dr. Sahar Golabi
Abadan University of Medical Sciences, Iran
Dr. Maryam Jafarthameri
Abadan University of Medical Sciences, Iran
Dr. Hoda Mojiri Foroushani
Abadan University of Medical Sciences, Iran
Dr. Mohammad Reza Palizvan
Arak University of Medical Sciences, Iran
Dr. Mehdi Sadegh
Arak University of Medical Sciences, Iran
Dr. Masoumeh Gholami
Arak University of Medical Sciences, Iran
Dr. Abbas Alimoradian
Arak University of Medical Sciences, Iran
Dr. Maral Ramezani
Arak University of Medical Sciences, Iran
Dr. Iraj Mirzaei Dizgah
AJA University of Medical Sciences, Iran
Dr. Seyed Mehdi Mirghazanfari
AJA University of Medical Sciences, Iran
Dr. Parvin Zareian
AJA University of Medical Sciences, Iran
Dr. Mohsen Chamanara
AJA University of Medical Sciences, Iran
Dr. Mohammad Reza Aslani
Ardabil University of Medical Sciences, Iran
Dr. Mohammad Amani
Ardabil University of Medical Sciences, Iran
Dr. Masoumeh Dadkhah
Ardabil University of Medical Sciences, Iran
Dr. Shahab Bahlouli
Ardabil University of Medical Sciences, Iran
Dr. Keyvan Amirshahrokhi
Ardabil University of Medical Sciences, Iran
Dr. Alireza Shirpoor
Urmia University of Medical Sciences, Iran
Dr. Shiva Roshan Milani
Urmia University of Medical Sciences, Iran
Dr. Firooz Ghaderi Pakdel
Urmia University of Medical Sciences, Iran
Dr. Roya Naderi Saatlou
Urmia University of Medical Sciences, Iran
Dr. Morteza Ghasemnejad Baranji
Urmia University of Medical Sciences, Iran
Dr. Hamid Soraya
Urmia University of Medical Sciences, Iran
Dr. Samaneh Sepahi
Urmia University of Medical Sciences, Iran
Dr. Shaghayegh Haghjou Javanmard
Isfahan University of Medical Sciences, Iran
Dr. Hojatollah Alaei
Isfahan University of Medical Sciences, Iran

Dr. Ziba Rajaei Khoozani
Isfahan University of Medical Sciences, Iran
Dr. Zahra Pezeshki Najafabadi
Isfahan University of Medical Sciences, Iran
Dr. Mohsen Minaiyan
Isfahan University of Medical Sciences, Iran
Dr. Valiollah Hajhashemi
Isfahan University of Medical Sciences, Iran
Dr. Mohammad Rabbani Haghigi
Isfahan University of Medical Sciences, Iran
Dr. Abbas Jafarian Dehkordi
Isfahan University of Medical Sciences, Iran
Dr. Mehdi Nematbakhsh
Isfahan University of Medical Sciences, Iran
Dr. Mehdi Goodarzyvand
Alborz University of Medical Sciences, Iran
Dr. Gholamreza Bayat
Alborz University of Medical Sciences, Iran
Dr. Marjan Hosseini
Alborz University of Medical Sciences, Iran
Dr. Bahareh Tavakkolifar
Alborz University of Medical Sciences, Iran
Dr. Azadeh Khalili
Alborz University of Medical Sciences, Iran
Dr. Hamid Reza Pazouki Toroudi
Iran University of Medical Sciences, Iran
Dr. Tourandokht Baluchnejad Mojarad
Iran University of Medical Sciences, Iran
Dr. Mahmoud Yousefifard
Iran University of Medical Sciences, Iran
Dr. Saeed Changizi Ashtiani
Iran University of Medical Sciences, Iran
Dr. Saeed Mehrzadi
Iran University of Medical Sciences, Iran
Dr. Ali Mohammad Sharifi
Iran University of Medical Sciences, Iran
Dr. Monirh Motvalian
Iran University of Medical Sciences, Iran
Dr. Azam Hosseinzadeh
Iran University of Medical Sciences, Iran
Dr. Farzaneh Faraji Shahrivar
Iranshahr University of Medical Sciences, Iran
Dr. Mola Mohammadi
Iranshahr University of Medical Sciences, Iran
Dr. Behzad Foroutan
Iranshahr University of Medical Sciences, Iran
Dr. Enayat Anvari
Ilam University of Medical Sciences, Iran
Dr. Maryam Maleki
Ilam University of Medical Sciences, Iran
Dr. Iraj Ahmadi
Ilam University of Medical Sciences, Iran
Dr. Naser Abbasi
Ilam University of Medical Sciences, Iran
Dr. Zeinab Cheraghi
Ilam University of Medical Sciences, Iran
Dr. Maryam Ghasemi Kasman
Babol University of Medical Sciences, Iran
Dr. Manouchehr Ashrafpour
Babol University of Medical Sciences, Iran
Dr. Fereshteh Pourabdolhossein
Babol University of Medical Sciences, Iran
Dr. Ali Akbar Moghadamnia
Babol University of Medical Sciences, Iran
Dr. Hossein Najafzadeh Varzi
Babol University of Medical Sciences, Iran
Dr. Mahmoud Baradaran
Babol University of Medical Sciences, Iran
Dr. Maryam Pasban
Bojnurd University of Medical Sciences, Iran
Dr. Hedayat Sahraei
Baqiyatallah University of Medical Sciences, Iran
Dr. Alireza Mohammadi
Baqiyatallah University of Medical Sciences, Iran
Dr. Mohammad Taghi Mohammadi
Baqiyatallah University of Medical Sciences, Iran
Dr. Gholam Hossein Meftahi
Baqiyatallah University of Medical Sciences, Iran
Dr. Sedigheh Amir Esmaeili

Bam University of Medical Sciences, Iran
Dr. Majid Askaripour
Bam University of Medical Sciences, Iran
Dr. Reza Dehghani
Bam University of Medical Sciences, Iran
Dr. Khalil Pourkhalili
Bushehr University of Medical Sciences, Iran
Dr. Zahra Sedaghat
Bushehr University of Medical Sciences, Iran
Dr. Mehdi Sadeghi
Bushehr University of Medical Sciences, Iran
Dr. Ramin Seyedian
Bushehr University of Medical Sciences, Iran
Dr. Sasan Zaeri
Bushehr University of Medical Sciences, Iran
Dr. Mohammad Reza Khazdir
Birjand University of Medical Sciences, Iran
Dr. Khadijeh Farokhfal
Birjand University of Medical Sciences, Iran
Dr. Mohsen Fouadoddini
Birjand University of Medical Sciences, Iran
Dr. Kobra Naseri
Birjand University of Medical Sciences, Iran
Dr. Zahra Kiani
Birjand University of Medical Sciences, Iran
Dr. Reza Badalzadeh
Tabriz University of Medical Sciences, Iran
Dr. Rana Keyhanmanesh
Tabriz University of Medical Sciences, Iran
Dr. Khalil Hajiasgharzadeh
Tabriz University of Medical Sciences, Iran
Dr. Fereshteh Farajdokht Alizadeh
Tabriz University of Medical Sciences, Iran
Dr. Saeed Khamneh
Tabriz University of Medical Sciences, Iran
Dr. Mohammad Reza Alipour
Tabriz University of Medical Sciences, Iran
Dr. Fariba Mirzaei Bavil
Tabriz University of Medical Sciences, Iran
Dr. Aysa Rezabakhsh
Tabriz University of Medical Sciences, Iran
Dr. Nasrin Maleki Dizaji
Tabriz University of Medical Sciences, Iran
Dr. Farimah Beheshti
Torbat Heydariyeh University of Medical Sciences, Iran
Dr. Seyed Mohammad Ahmadi Soleimani
Torbat Heydariyeh University of Medical Sciences, Iran
Dr. Hassan Azhdari Zarmehri
Torbat Heydariyeh University of Medical Sciences, Iran
Dr. Samaneh Kakhki
Torbat Heydariyeh University of Medical Sciences, Iran
Dr. Alireza Sarkaki
Ahvaz Jundishapur University of Medical Sciences, Iran
Dr. Mohammad Badavi
Ahvaz Jundishapur University of Medical Sciences, Iran
Dr. Seyed Ali Mard
Ahvaz Jundishapur University of Medical Sciences, Iran
Dr. Akram Ahangarpour
Ahvaz Jundishapur University of Medical Sciences, Iran
Dr. Ali Asghar Hemmati
Ahvaz Jundishapur University of Medical Sciences, Iran
Dr. Alireza Molayeri
Ahvaz Jundishapur University of Medical Sciences, Iran
Dr. Hadi Kalantar
Ahvaz Jundishapur University of Medical Sciences, Iran
Dr. Hamid Reza Khalili
Ahvaz Jundishapur University of Medical Sciences, Iran
Dr. Hassan Ali Abedi
Jahrom University of Medical Sciences, Iran
Dr. Safar Zarei
Jahrom University of Medical Sciences, Iran

Dr. Afsaneh Ranjbar
Jahrom University of Medical Sciences, Iran
Dr. Akbar Anaie Goodary
Jiroft University of Medical Sciences, Iran
Dr. Yousef Baghcheghi
Jiroft University of Medical Sciences, Iran
Dr. Mahdieh Hedayati Moghadam
Jiroft University of Medical Sciences, Iran
Dr. Farzaneh Shakeri
North Khorasan University of Medical Sciences, Iran
Dr. Zakiyeh Keshavarzi Pourtafti
North Khorasan University of Medical Sciences, Iran
Dr. Bahram Bibak
North Khorasan University of Medical Sciences, Iran
Dr. Ali Akbar Arouj
Dezful University of Medical Sciences, Iran
Dr. Donya Nazari Nia
Dezful University of Medical Sciences, Iran
Dr. Mojtaba Dowlatshahi
Dezful University of Medical Sciences, Iran
Dr. Behnam Ghorbanzadeh
Dezful University of Medical Sciences, Iran
Dr. Soheila Alboghobish
Dezful University of Medical Sciences, Iran
Dr. Ali Shamsizadeh
Rafsanjan University of Medical Sciences, Iran
Dr. Mohammadollah Tavakkoli
Rafsanjan University of Medical Sciences, Iran
Dr. Ayat Kaeidi
Rafsanjan University of Medical Sciences, Iran
Dr. Gholamreza Bazmandegan
Rafsanjan University of Medical Sciences, Iran
Dr. Mahsa Hasanipour
Rafsanjan University of Medical Sciences, Iran
Dr. Maryam Belaran
Zabol University of Medical Sciences, Iran
Dr. Fatemeh Khojasteh
Zabol University of Medical Sciences, Iran
Dr. Sariyeh Shahraki
Zabol University of Medical Sciences, Iran
Dr. Babak Barmaki
Zabol University of Medical Sciences, Iran
Dr. Sima Saravani
Zabol University of Medical Sciences, Iran
Dr. Tahereh Safari
Zahedan University of Medical Sciences, Iran
Dr. Saeedeh Saadat
Zahedan University of Medical Sciences, Iran
Dr. Hamed Fanaei
Zahedan University of Medical Sciences, Iran
Dr. Mohammad Ali Mirshkar
Zahedan University of Medical Sciences, Iran
Dr. Habib Ghaznavi
Zahedan University of Medical Sciences, Iran
Dr. Farzaneh Farajian Mashhadi
Zahedan University of Medical Sciences, Iran
Dr. Ehsan Sabouri
Zanjan University of Medical Sciences, Iran
Dr. Mohsen Alipour
Zanjan University of Medical Sciences, Iran
Dr. Fatemeh Moradi
Zanjan University of Medical Sciences, Iran
Dr. Sina Andalib
Zanjan University of Medical Sciences, Iran
Dr. Mohammad Reza Jafari
Zanjan University of Medical Sciences, Iran
Dr. Hamed Ghayoumi
Zanjan University of Medical Sciences, Iran
Dr. Mohammad Mohammadzadeh
Sabzevar University of Medical Sciences, Iran
Dr. Hossein Salmani
Sabzevar University of Medical Sciences, Iran

Dr. Samad Nazemi
Sabzevar University of Medical Sciences, Iran
Dr. Bahareh Amin
Sabzevar University of Medical Sciences, Iran
Dr. Omid Gholami
Sabzevar University of Medical Sciences, Iran
Dr. Habib Yaribeygi
Semnan University of Medical Sciences, Iran
Dr. Ali Rashidipour
Semnan University of Medical Sciences, Iran
Dr. Abbas Ali Vafaei
Semnan University of Medical Sciences, Iran
Dr. Bahador Bagheri
Semnan University of Medical Sciences, Iran
Dr. Mehdi Khaksari
Shahroud University of Medical Sciences, Iran
Dr. Hossein Khastar
Shahroud University of Medical Sciences, Iran
Dr. Hamid Kalalian Moghadam
Shahroud University of Medical Sciences, Iran
Dr. Alireza Masoudi
Shahroud University of Medical Sciences, Iran
Dr. Mehrdad Shahrani Kerani
Shahrekord University of Medical Sciences, Iran
Dr. Fariba Houshmand
Shahrekord University of Medical Sciences, Iran
Dr. Sohreh Shabani
Shahrekord University of Medical Sciences, Iran
Dr. Hossein Amini Khooei
Shahrekord University of Medical Sciences, Iran
Dr. Ahmad Mohammadi Farani
Shahrekord University of Medical Sciences, Iran
Dr. Elham Saghaei
Shahrekord University of Medical Sciences, Iran
Dr. Fatemeh Safari
Yazd Shahid Sadoughi University of Medical Sciences, Iran
Dr. Mohammad Ebrahim Rezvani Bafrouei
Yazd Shahid Sadoughi University of Medical Sciences, Iran
Dr. Mansour Esmaeili Dehaj
Yazd Shahid Sadoughi University of Medical Sciences, Iran
Dr. Alireza Karimollah
Yazd Shahid Sadoughi University of Medical Sciences, Iran
Dr. Samaneh Jahanabadi
Yazd Shahid Sadoughi University of Medical Sciences, Iran
Dr. Mohsen Zabihi
Yazd Shahid Sadoughi University of Medical Sciences, Iran
Dr. Maryam Mousavi
Shiraz University of Medical Sciences, Iran
Dr. Masoud Haghani
Shiraz University of Medical Sciences, Iran
Dr. Seyed Mostafa Sheid Mousavi
Shiraz University of Medical Sciences, Iran
Dr. Omid Reza Firoozi Fard
Shiraz University of Medical Sciences, Iran
Dr. Nader Tanideh
Shiraz University of Medical Sciences, Iran
Dr. Leila Moezi
Shiraz University of Medical Sciences, Iran
Dr. Manzar Banoo Shojaei Fard
Fasa University of Medical Sciences, Iran
Dr. Hiva Alipanah
Fasa University of Medical Sciences, Iran

Dr. Kazem Javanmardi
Fasa University of Medical Sciences, Iran
Dr. Mojtaba Farjam
Fasa University of Medical Sciences, Iran
Dr. Seyed Amin Kouhpayeh
Fasa University of Medical Sciences, Iran
Dr. Hashem Haghdoost Yazdi
Qazvin University of Medical Sciences, Iran
Dr. Mohammad Hossein Esmaeili
Qazvin University of Medical Sciences, Iran
Dr. Mohammad Soufiabadi
Qazvin University of Medical Sciences, Iran
Dr. Ehsan Ali
Qazvin University of Medical Sciences, Iran
Dr. Yazdan Naderi
Qazvin University of Medical Sciences, Iran
Dr. Hamid Farahani
Qom University of Medical Sciences, Iran
Dr. Azam Moslehi
Qom University of Medical Sciences, Iran
Dr. Hamid Heydari
Qom University of Medical Sciences, Iran
Dr. Samira Khani
Qom University of Medical Sciences, Iran
Dr. Mahmoud Salami Zavareh
Kashan University of Medical Sciences, Iran
Dr. Seyed Alireza Talaei Zavareh
Kashan University of Medical Sciences, Iran
Dr. Gholam Ali Hamidi
Kashan University of Medical Sciences, Iran
Dr. Mehdi Nouraldini
Kashan University of Medical Sciences, Iran
Dr. Hamid Reza Banafsheh
Kashan University of Medical Sciences, Iran
Dr. Azam Mesdaghinia
Kashan University of Medical Sciences, Iran
Dr. Alireza Abed
Kashan University of Medical Sciences, Iran
Dr. Esmaeil Izadpanah
Kurdistan University of Medical Sciences, Iran
Dr. Mohammad Raman Moloudi
Kurdistan University of Medical Sciences, Iran
Dr. Masoud Alasvand Zarasvand
Kurdistan University of Medical Sciences, Iran
Dr. Ehsan Motaghi Dastenaei
Kurdistan University of Medical Sciences, Iran
Dr. Vahid Sheibani
Kerman University of Medical Sciences, Iran
Dr. Mohammad Shabani
Kerman University of Medical Sciences, Iran
Dr. Mohammad Khaksari Haddad
Kerman University of Medical Sciences, Iran
Dr. Shadan Saberi
Kerman University of Medical Sciences, Iran
Dr. Seyed Iman Fatemi Raberi
Kerman University of Medical Sciences, Iran
Dr. Mehrnaz Mehrabani
Kerman University of Medical Sciences, Iran
Dr. Gholamreza Sepehri
Kerman University of Medical Sciences, Iran
Dr. Hamid Najafipour
Kerman University of Medical Sciences, Iran
Dr. Nader Shahrokhi
Kerman University of Medical Sciences, Iran
Dr. Siavash Joukar
Kerman University of Medical Sciences, Iran
Dr. Zahra Soltani
Kerman University of Medical Sciences, Iran
Dr. Hamideh Bashiri
Kerman University of Medical Sciences, Iran
Dr. Mahmoud Reza Heydari
Kerman University of Medical Sciences, Iran
Dr. Hooshang Najafi
Kermanshah University of Medical Sciences, Iran
Dr. Ali Pourmotabed
Kermanshah University of Medical

Sciences, Iran
Dr. Farshad Moradpour
Kermanshah University of Medical Sciences, Iran
Dr. Ali Ashraf Goodini
Kermanshah University of Medical Sciences, Iran
Dr. Sajjad Fakhri
Kermanshah University of Medical Sciences, Iran
Dr. Gholamreza Bahrami
Kermanshah University of Medical Sciences, Iran
Dr. Samira Shirooei
Kermanshah University of Medical Sciences, Iran
Dr. Hamid Sepehri
Golestan University of Medical Sciences, Iran
Dr. Soghra Hessam
Golestan University of Medical Sciences, Iran
Dr. Seyed Mehran Hosseini
Golestan University of Medical Sciences, Iran
Dr. Vahid Khori
Golestan University of Medical Sciences, Iran
Dr. Hossein Amini
Golestan University of Medical Sciences, Iran
Dr. Maryam Moghimian
Gonabad University of Medical Sciences, Iran
Dr. Reza Mohebati
Gonabad University of Medical Sciences, Iran
Dr. Abbas Ali Abbasnejad
Gonabad University of Medical Sciences, Iran
Dr. Parvin Babaei
Guilan University of Medical Sciences, Iran
Dr. Mahmoud Abedinzadeh
Guilan University of Medical Sciences, Iran
Dr. Seyed Mohammad Taghi Razavi Toosi
Guilan University of Medical Sciences, Iran
Dr. Kambiz Rahampour
Guilan University of Medical Sciences, Iran
Dr. Nematollah Ahangar
Guilan University of Medical Sciences, Iran
Dr. Bahram Soltani Tehrani
Guilan University of Medical Sciences, Iran
Dr. Azadeh Motavalian
Guilan University of Medical Sciences, Iran
Dr. Afshin Nazari
Lorestan University of Medical Sciences, Iran
Dr. Mehrnoush Moghaddasi Jahromi
Lorestan University of Medical Sciences, Iran
Dr. Naser Pazhouhi
Lorestan University of Medical Sciences, Iran
Dr. Bahram Dolfan
Lorestan University of Medical Sciences, Iran
Dr. Amin Hasanvand
Lorestan University of Medical Sciences, Iran
Dr. Moslem Mohammadi
Mazandaran University of Medical Sciences, Iran
Dr. Esmaeil Akbari
Mazandaran University of Medical Sciences, Iran
Dr. Saeed Bagheri Mohammadi
Mazandaran University of Medical Sciences, Iran
Dr. Mohsen Rashidi
Mazandaran University of Medical Sciences, Iran
Dr. Mohammad Seyedabadi
Mazandaran University of Medical Sciences, Iran
Dr. Saeed Samarghandian
Neyshabur University of Medical Sciences, Iran

Dr. Farnaz Oghabaei
Neyshabur University of Medical Sciences, Iran
Dr. Sahar Fanoudi
Neyshabur University of Medical Sciences, Iran
Dr. Farhad Ghadiri Soufi
Hormozgan University of Medical Sciences, Iran
Dr. Esmaeil Ghani
Hormozgan University of Medical Sciences, Iran
Dr. Shahla Sohrabipour
Hormozgan University of Medical Sciences, Iran
Dr. Mohammad Fathalipour Raeini
Hormozgan University of Medical Sciences, Iran
Dr. Parisa Sarkouhi
Hormozgan University of Medical Sciences, Iran
Dr. Alireza Komaki
Hamadan University of Medical Sciences, Iran
Dr. Siamak Shahidi
Hamadan University of Medical Sciences, Iran
Dr. Iraj Salehi
Hamadan University of Medical Sciences, Iran
Dr. Rasoul Haddadi
Hamadan University of Medical Sciences, Iran
Dr. Davood Ahmadi Moghadam
Hamadan University of Medical Sciences, Iran
Dr. Vahideh Montazeri
Smart University of Medical Sciences, Iran
Dr. Jamshid Mohammadi
Yasuj University of Medical Sciences, Iran
Dr. Gheydafeh Akbari
Yasuj University of Medical Sciences, Iran
Dr. Alireza Fallahzadeh
Yasuj University of Medical Sciences, Iran
Dr. Hossein Sadeghi Mansourkhani
Yasuj University of Medical Sciences, Iran
Dr. Mohammad Sharif Talebianpour
Yasuj University of Medical Sciences, Iran
Dr. Majid Kianmehr
Esfarayen Faculty of Medical Sciences, Iran
Dr. Ali Veisi
Behbahan Faculty of Medical Sciences, Iran
Dr. Farzaneh Karimifard
Behbahan Faculty of Medical Sciences, Iran
Dr. Raham Armand
Behbahan Faculty of Medical Sciences, Iran
Dr. Firoozeh Badreh
Behbahan Faculty of Medical Sciences, Iran
Dr. Marzieh Pashmforoosh
Behbahan Faculty of Medical Sciences, Iran
Dr. Amin Mokhtari Zaer
Torbat-e Jam Faculty of Medical Sciences, Iran
Dr. Zahra Samadi
Chabahar Faculty of Medical Sciences, Iran
Dr. Morteza Bakhshesh
Khomein University of Medical Sciences, Iran
Dr. Hadi Yousefi
Khoy University of Medical Sciences, Iran
Dr. Mehrdad Roghani
School of Medicine, Shahed University, Tehran, Iran
Dr. Mohsen Khalili
School of Medicine, Shahed University, Tehran, Iran
Dr. Mohammad Reza Vaez-Mahdavi
School of Medicine, Shahed University, Tehran, Iran
Dr. Mohsen Nasseri
School of Medicine, Shahed University, Tehran, Iran
Dr. Jamshid Narenjkar Esfahani
School of Medicine, Shahed University, Tehran, Iran
Dr. Behnaz Rahimi
Saveh University of Medical Sciences, Iran
Dr. Mehdi Ahmadi

Sarab Faculty of Medical Sciences, Iran
Dr. Fazeh Hosseinzadeh
Sarab Faculty of Medical Sciences, Iran
Dr. Faryal Savari
Shushtar Faculty of Medical Sciences, Iran
Dr. Abbas Salmani
Gerash University of Medical Sciences, Iran
Dr. Mahtab Ghanbari
Gerash University of Medical Sciences, Iran
Dr. Abbas Ali Abbasnejad
Gonabad University of Medical Sciences, Iran
Dr. Amir Hossein Zarifkar
Larestan University of Medical Sciences, Iran
Dr. Bilal Mosaferi
Maragheh University of Medical Sciences, Iran
Dr. Sadegh Seyedi
Maragheh University of Medical Sciences, Iran
Dr. Mojtaba Ziaei
Maragheh University of Medical Sciences, Iran
Dr. Arash Khorami
Maragheh University of Medical Sciences, Iran
Dr. Maedeh Arabiyan
Rajaie Cardiovascular Medical and Research Center, Iran
Dr. Hamid Gholamipour Badie
Pasteur Institute of Iran
Dr. Mohammad Sayyah
Pasteur Institute of Iran
Dr. Sahar Kiani
Academic Center for Education, Culture and Research (ACECR), Iran
Dr. Farshad Homayouni Moghadam
Academic Center for Education, Culture and Research (ACECR), Iran
Dr. Sara Pahlavan
Academic Center for Education, Culture and Research (ACECR), Iran
Dr. Amir Hossein Abdolghaffari
Academic Center for Education, Culture and Research (ACECR), Iran
Dr. Hassan Fallah Hosseini
Academic Center for Education, Culture and Research (ACECR), Iran
Dr. Saeed Kianbakht
Academic Center for Education, Culture and Research (ACECR), Iran
Dr. Mahmoud Alboyeh
Ministry of Health and Medical Education, Iran
Dr. Seyed Alireza Hosseini
Ministry of Health and Medical Education, Iran

Keynote speakers



Professor Randy Schekman

Affiliation
Department of Molecular and Cell Biology,
Howard Hughes Medical Institute,
University of California, Berkeley, USA

Biography
Professor Randy W. Schekman is Professor of Molecular and Cell Biology at the University of California, Berkeley, and an Investigator of the Howard Hughes Medical Institute. He was awarded the 2013 Nobel Prize in Physiology or Medicine for his pioneering discoveries of the molecular mechanisms regulating vesicle trafficking in cells. His research has fundamentally advanced our understanding of intracellular transport, protein secretion, and membrane biology. Professor Schekman is a member of the U.S. National Academy of Sciences and has received numerous prestigious international awards.



Professor Margaret McCarthy

Affiliation
Department of Pharmacology, University of Maryland School of Medicine, USA

Biography
Professor Margaret M. McCarthy is an internationally recognized neuroscientist whose research focuses on how immune, endocrine, and social systems interact to shape neural development and behavior. Her work has transformed our understanding of the biological basis of sex differences in the brain. She has published extensively in leading journals and has received numerous national and international honors for her outstanding contributions to neuroscience.



Professor Saeed Semnanian

Affiliation
Department of Physiology, Faculty of Medical Sciences, Tarbiat Modares University, Iran

Biography
Professor Saeed Semnanian is a distinguished physiologist whose research interests include pain physiology, neurophysiology, and synaptic plasticity. He has made significant contributions to advancing physiological sciences in Iran through innovative research, academic leadership, and mentorship of graduate students and young investigators.



Professor Masoumeh Jorjani

Affiliation
Department of Pharmacology, School of Medicine, Shahid Beheshti University of Medical Sciences, Iran

Biography
Professor Masoumeh Jorjani's research focuses on neuroprotection and neuroregeneration, particularly in spinal cord injury. Her work on astaxanthin and combination therapies in rodent models has provided new insights into multitarget approaches for nervous system disorders.



Professor Marjan Nassiri Asl

Affiliation
Department of Pharmacology, School of Medicine, Shahid Beheshti University of Medical Sciences, Iran

Biography
Professor Marjan Nassiri Asl is a pharmacologist with expertise in neuropharmacology. Her research explores non-pharmacological approaches, including diet and probiotics, as complementary strategies for epilepsy management. She has authored numerous publications and is actively involved in translational research and academic education.

Professor Lj. Gojković-Bukarica



Affiliation
Department of Clinical Pharmacology, Faculty of Medicine, University of Belgrade, Serbia

Biography
Professor Lj. Gojkovic-Bukarica's research focuses on cardiovascular pharmacology and the beneficial effects of natural compounds. He has published extensively on the vascular effects of polyphenols, with particular emphasis on resveratrol.



Professor Minke Tang

Affiliation
School of Chinese Materia Medica, Beijing University of Chinese Medicine, China

Biography
Professor Minke Tang specializes in the pharmacology of natural products and traditional Chinese medicine. His research on Panax notoginseng and other herbal extracts has contributed to understanding their neuroprotective effects, particularly in epilepsy and neurological disorders.



Professor Mohammad Javan

Affiliation
Department of Neuroscience, Faculty of Medical Sciences, Tarbiat Modares University, Iran

Biography
Professor Mohammad Javan is a biomedical engineer and neuroscientist working at the interface of bioengineering and neuroscience. His research aims to develop innovative therapeutic and technological solutions for brain disorders.



Professor Hossein Hosseinzadeh

Affiliation
Department of Pharmacodynamics and Toxicology, School of Pharmacy, Mashhad University of Medical Sciences, Iran

Biography
Professor Hossein Hosseinzadeh is an expert in pharmacodynamics and toxicology with extensive research on medicinal plants and natural products. He has authored numerous books and scientific papers and is committed to promoting scientific integrity, pharmacological research, and academic excellence.



Professor Shakeeb Hassan Moosavi

Affiliation
School of Biological and Medical Sciences, Oxford Brookes University, Sectioned Kingdom

Biography
Professor Shakeeb Hassan Moosavi's research explores the neural mechanisms of breathlessness and the use of brain stimulation to understand and modulate respiratory sensations in health and disease.



Professor Mohammad Reza Vaez-Mahdavi

Affiliation
Department of Physiology, Shahed University

Biography
Professor Mohammad Reza Vaez-Mahdavi's research addresses the biological embedding of social inequalities and insecurities and their impact on health and behavior. His interdisciplinary work integrates social science perspectives with medical research.

	Keynote speakers			
Date/ Time	**No**	**Name**	**Affiliation**	**Title of Presentation**
Day 1 (4th February) Time: 10:30-12:00	Key.S1	Professor Randy Schekman	Department of Molecular and Cell Biology, Howard Hughes Medical Institute, University of California, Berkeley	Genes, cells, and discovery in basic science and disease
	Key.S2	Professor Margaret McCarthy	School of Medicine, University of Maryland	How the immune, endocrine and social systems collaborate to sculpt neural development
Day 2 (5th February) Time: 8:00 -12:00	Key.S3	Professor Saeed Semnanian	Professor of Physiology, Tarbiat Modares University	Promotion of Fundamental Sciences
	Key.S4	Professor Marjan Nassiri Asl	Professor of Pharmacology, School of Medicine, Shahid Beheshti University of Medical Sciences	Beyond Medication: The Potential of Diet and Probiotics in Epilepsy
	Key.S5	Professor Masoumeh Jorjani	Department of Pharmacology & Neurobiology Research Center, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran	Multitarget Neuroprotection in Spinal Cord Injury: Astaxanthin and Combination Therapy in Rodent Models
	Honoring the Pioneers			
	Key.S6	Professor Minke Tang	School of Chinese Materia Medica, Beijing University of Chinese Medicine, Beijing 102488, China	Panax notoginseng flower extract attenuates pentylenetetrazole-induced epilepsy by restoring glutamate homeostasis
	Key.S7	Professor Lj. Gojkovic-Bukarica	Institute of Clinical Pharmacology, Pharmacology and Toxicology, Faculty of Medicine, University of Belgrade, Serbia	The vascular effects of red wine polyphenol resveratrol
	Key.S8	Professor Mohammad Javan	Tarbiat Modares University, Faculty of Medical Sciences	Bioengineering the Brain: Therapeutic and Technological Applications
Day 3 (6th February) Time: 8:00 -12:00	Key.S9	Professor Mohammad Reza Vaez-Mahdavi	Clinical Trial Research Center, Shahed University, Tehran, Iran	Biological Embedding of Social Inequalities and Insecurities: Perspectives from Social Dysfunction, Health, and Behavior
	Key.S10	Professor Shakeeb Hassan Moosavi	School of Biological and Medical Sciences, Faculty of Health, Science, and Technology, Oxford Brookes University	Brain stimulation to explore mechanisms of breathlessness
	Key.S11	Professor Hossein Hosseinzadeh	Professor of Pharmacodynamy and Toxicology, Mashhad University of Medical Sciences	Citation Boosting: Doping or Product Promotion

Day 1 (4th February); Time: 10:30 - 12:00

Symposium: Neuropharmacology & Neurogenetics

Symposium Chair: Manijeh Motevalian

No	Speakers	Presentation Title
SP101	Manijeh Motevalian	Investigation of the Protective Effects of Aripiprazole on Methylphenidate-induced Neurotoxicity in Rats
SP102	Amin Ataie	Piperine Prevents Scopolamine-Induced Cognitive Impairment via its Antioxidant and Anti-Inflammatory Roles; Suggesting Potential Modulation of Necroptosis-Related Genes Including MLKL and TNF-α
SP103	Golnaz Mirhosseini	Effect of compound extract of Portulaca olerace, Urtica dioica and Boswellia serrata on multiple sclerosis in rats
SP104	Rasul Saberi	Pioglitazone enhances cognitive performance in a rat model of cholinergic impairment induced by scopolamine: oxidative stress and neuroinflammation
SP105	Maedeh Jafari	Downregulation of liver-expressed antimicrobial peptide 2 in the rat amygdala during the acquisition of seizures in the electrical kindling
SP106	Forouzan Amerizadeh	Identification of Prognostic Hub Genes in Glioblastoma Using Transcriptomic and Protein Interaction Network Analysis
SP107	Seyed Mahdi Sadati	Identifying Key Genes and Approved Medications Associated with Major Depressive Disorder Using Network Analysis and Systems Biology
SP108	Faezeh Montazeri Mogaddam	Salivary Transcriptomic Biomarkers for Glioblastoma: PIK3R1, PLXDC2, PBX3, and miR-320a-3p Expression Analysis
SP109	Mohaddeseh Sadat Alavi	Levetiracetam protects OLN-93 cells against glutamate toxicity: An In vitro study
SP110	Seyed Hamidreza Rastegar Moghaddam	Potential impacts of grape seed extract on hippocampal learning and memory impairment in aged mice

Day 1 (4th February); Time: 10:30 - 12:00

Symposium: Renal Physiology

Symposium Chair: Abolfazl Khajavi Rad

No	Speakers	Presentation Title
SP111	Abolfazl Khajavi Rad	The impact of propolis and bone marrow mesenchymal stem cells on renal function in diabetic nephropathy in male Wistar rats
SP112	Saeed Samarghandian	Protective Effect of Berberine Nanoemulsion on Bisphenol A-Induced Nephrotoxicity in Rats During the Prepubertal Stage
SP113	Majid Askaripour	Effect of MSC-derived conditioned medium on function, oxidative stress, and inflammation in Movento-induced kidney injury in male rats
SP114	Ramin Ataei	The synergistic reno protective effects valproate sodium and metformin in diabetic nephropathy mice model through attenuating the expression of pro-inflammatory and enhancing the expression of Sirt1 and Bcl-2
SP115	Batool Zarei	Saffron nephroprotective effects against medications and toxins: A review of preclinical data
SP116	Hajaralsadat Hosseini-Dastgerdi	Obesity and Renal Sympathetic Function
SP117	Mahdiyeh Ahmadi	Investigating the effect of adalimumab on the renal toxicity disorders caused by cisplatin in rats
SP118	Samira Choobani	Comparison of the Effect of Losartan and Telmisartan on Renal Blood Flow Response to Ang II in Male and Female Rats
SP119	Mohadese Pooramin	Effect of Cordycepin on Methotrexate-Induced Nephrotoxicity in Male Rats
SP120	Pouran Ghahramani	Modulation of Renal Ischemia-Reperfusion-Induced Oxidative Stress and Pulmonary Injury by Propargylglycine and Sodium Hydrosulfide
SP121	Sara Hosseinian	The effect of folic acid on hypothyroidism-associated kidney damage in rat

Day 1 (4th February); Time: 10:30 - 12:00

Symposium: Clinical Trial on Pharmacology

Symposium Chair: Khojasteh Joharchi

No	Speakers	Presentation Title
SP122	Khojasteh Joharchi	Minocycline, an old antibiotic with new applications
SP123	Mojtaba Ziaee	Efficacy and Safety of Okra in Type 2 Diabetes: A Randomized Double-Blind Placebo-Controlled Trial
SP124	Farrokh Ramesh	The Effect of Verapamil on TXNIP Gene Expression, GLP1R mRNA, FBS, HbA1c, and Lipid Profile in T2DM Patients Receiving Metformin and Sitagliptin
SP125	Farzaneh Farajian Mashhadi	Topical Nigella sativa oil versus diclofenac gel for knee osteoarthritis: A randomized open-labeled active-controlled clinical trial
SP126	Mohammad Mahdi Vahedi	Study of Royal Jelly effect on serum levels of IL-4, TNF- α, TGF-B, and IFN-γ in multiple sclerosis patients in comparison with Omega-3; A double-blind, randomized, clinical trial
SP127	Hassan Boskabadi	Comparison of pro-oxidant antioxidant balance between physiologic jaundice and healthy neonates
SP128	Raheel Bayat	Prevalence of ADHD among adults in Afghanistan
SP129	Aysa Rezabakhsh	Challenges and Progress in Cell Therapy for Heart Failure: A Glance at Current Clinical Trials

Day 1 (4th February); Time: 13:30 - 15:00

Symposium: Traumatic Brain Injury

Symposium Chair: Ali Siahposht-Khachaki

No	Speakers	Presentation Title
SP130	Ali Siahposht-Khachaki	The role of exosomes in the recovery of traumatic brain injury
SP131	Sedigheh Amiresmaili	Optimal Timing of Exercise for Enhanced Learning and Memory: Insights From CA1 and CA3 Regions in Traumatic Brain Injury Model in Male Rats
SP132	Ladan Amirkhosravi	Estrogen and Progesterone in Lung Injury Induced by Traumatic Brain Injury: The role of Oxidative Stress and Inflammation
SP133	Amin Bahaoddini	Sympathectomy: A Suggestive method for dominative of post stroke Cardiac Arrhythmia
SP134	Maryam Hooshmand	Administration of Monophosphoryl Lipid A Immediately After Traumatic Brain Injury Prevents Spatial and Avoidance Memory Deficits and Neuroinflammation

Day 1 (4th February); Time: 13:30 - 15:00

Symposium: Neurophysiology

Symposium Chair: Fereshteh Pourabdolhossein

No	Speakers	Presentation Title
SP135	Fereshteh Pourabdolhossein	Lactobacillus pentosus and plantarum intervention reduces neurological symptoms and enhances myelin repair in experimental autoimmune encephalomyelitis (EAE) model in rats
SP136	Samaneh Dehghan	Encapsulated MSC-Derived Exosomes Enhance Axonal Regeneration and Functional Recovery After Optic Nerve Crush in Mice
SP137	Elham Parand	Alteration in Glial Cells' Response Contributes to Diminished Remyelination in an Aged Animal Model of Multiple Sclerosis
SP138	Sahar Kiani	Indigenization and Production of Smart Brain-spinal cord Interface with the Aim of Motor Rehabilitation in Animal Models with Spinal Cord Injury
SP139	Ladan DaeiRezaei	Anti-inflammatory Effects of Curcumin Carbon Dots in Animal Model of Demyelination Induced by Lysolecithin
SP140	Hamed Shiri	Direct differentiation of adipose mesenchymal stem cells to neural progenitors using Sox2 overexpression
SP141	Leila Hosseini	Combined therapy with cerebrolysin and enriched environment ameliorated the behavioral and cognitive deficits in a mouse model of posttraumatic stress disorder
SP142	Reyhaneh Doost	Deferiprone Modifies Microglial Polarization in Optic Nerve Demyelination

Day 1 (4th February); Time: 13:30 - 15:00		
Symposium: Exercise Physiology		
Symposium Chair: Hossein Shirvani		
No	**Speakers**	**Presentation Title**
SP143	Hossein Shirvani	Exercise Pills: Promising Pharmacology or Impossible Dream?
SP144	Hamid Marefati	Role of Specialized Pulmonary Rehabilitation Programs in Improving Cardiopulmonary Efficiency in Chronic Obstructive Pulmonary Disease
SP145	Ataollah Movahed	High-intensity interval training (HIIT) and lactate protect against sleep deprivation-induced memory impairment: role of the PKA-CREB-BDNF-Cofilin signaling pathway
SP146	Esmail Karami	Correlations Between Dopaminergic and Adrenergic Markers and Motor Performance Following Acute REM Sleep Deprivation: Modulatory Effects of Exercise and Caffeine
SP147	Soheil Aminizadeh	Swimming exercise training (SET) and MitoQ supplementation can mitigate the atrophy and inflammation process in skeletal muscle of male Wistar rats with spinal cord injury (SCI): NF-κB/MuRF-1/Proteasome pathway
SP148	Zahra Gholamnezhad	Modulatory effects of moderate exercise on lipopolysaccharide-induced cardiac injury in rats
SP149	Mahmoud Soltani	The Effect of Two Selected Training Methods Combined with Vitamin D Supplementation on Plasma Levels of Neurotrophin-3/4, Neuregulin-1, and Selected Functional Factors in Patients with Multiple Sclerosis
SP150	Mohammadreza Sokhanvar	Pilates-Driven Neuroimmune Rebalancing: Enhancing Reward Circuit Function and Cognitive Recovery During Human Addiction Withdrawal
SP151	Atena Alifarsangi	Effect of Exercise, MitoQ, and Their Combination on microRNA and Oxidative Stress in Women with Multiple Sclerosis

Day 1 (4th February); Time: 13:30 – 15:00		
Symposium: Reproductive Biology & Gynecology		
Symposium Chair: Sareh Karimi		
No	**Speakers**	**Presentation Title**
SP152	Sareh Karimi	Magnetic hyperthermia improves survival and quality of vitrified ovarian tissue in a sheep model
SP153	Malihe Mahmoodinya	The Effect of Intralipid Injection Immunotherapy on pregnancy outcome in frozen embryo transfer in Repeated Implantation Failure (A Randomized Controlled Trial)
SP154	Arash Abdi	Therapeutic potential of mesenchymal stem cells transplantation in non-alcoholic fatty liver disease of polycystic ovary syndrome
SP155	Fereshte Torabi	Protective effects of chitosan nanoparticles loaded with platelet lysate on ovarian recovery and IVF outcomes in a mouse premature ovarian failure model
SP156	Narges Ashoori	Effect of N-acetylcysteine on the sperm biochemical parameters and expression of HSPA70 and caspase-3-genes in asthenoteratospermic infertile males undergoing cryopreservation
SP157	Zahra Davtalab Tousi	Evaluation of bacterial infections leading to IVF failure in infertile individuals
SP158	Azadeh Shahrokhi Raeini	Individual and synergistic effects of vericiguat with estrogen on metabolic parameters in ovariectomized rats with dietary obesity
SP159	Maryam Saborirad	Effect of Gallic Acid on Sex Hormones and Oxidative Stress Parameters in Testicular Injury Induced by Torsion/Detorsion in Rats
SP160	Fatemeh Karimi	The effect of exosomes extracted from PRP before and after freezing on sperm quality in individuals with asthenoteratospermia
SP161	Seyyedeh Zahra Asghari	Protective Effects of Hydrogen-Rich Water on Biochemical Parameters of Spermatogenesis in High-Fat Diet Rats
SP162	Saeide Mansoori	Exploring the effects of Urolithin B on the critical mechanisms of metastasis and angiogenesis in triple-negative breast cancer

Day 1 (4th February); Time: 15:30 - 17:00		
Symposium: Cardiovascular Physiology		
Symposium Chair: Mohammad Badavi		
No	**Speakers**	**Presentation Title**
SP163	Mohammad Badavi	Redox-Dependent Functional Plasticity of the Cardiovascular System under Metabolic, Toxic, and Ischemic Stress
SP164	Seyed Hadi Mousavi	Hypertension Treatment: A Comprehensive Review of the 2025 AHA/ACC Guidelines
SP165	Roya Hosseini	Assessment of Sleep Disturbance in Patients with Coronary Artery Disease: Emphasis on Interview-Administered Sleep Questionnaire and Circadian Melatonin Profiling
SP166	Mohsen Naseri	Effect of Pardihan® syrup on Immune thrombocytopenic purpura (ITP)
SP167	Abolfazl Akbari	Injection of Resistin into Paraventricular Nucleus Produced Cardiovascular Responses by Stimulation of Glutamatergic Transmission within Rostral Ventrolateral Medulla
SP168	Zohreh Arab	Endothelial dysfunction in COVID-19
SP169	Mehdi Mashayekh	Preclinical Evaluation of Tranexamic Acid Prophylaxis to Reduce Intra-abdominal Haemorrhage After Surgically Induced Hepatosplenic Trauma
SP170	Yasamin Kamkardel	Ethyl Acetate and Aqueous Fractions of *Ziziphus jujuba* Prevent Acute Hypertension Induced by Angiotensin II in Rats

Day 1 (4th February); Time: 15:30 – 17:00		
Symposium: Natural Products		
Symposium Chair: Hamid Najafipour		
No	**Speakers**	**Presentation Title**
SP171	Hamid Najafipour	Myrtenol and pulmonary complications: Simple and niosomal, systemic and inhalational applications and its mechanisms of actions
SP172	Sima Beigoli	The evaluation characterization, cytotoxicity, and antibacterial activities of amorphous calcium phosphate nanoparticles produced through green synthesis of pomegranate peel extract
SP173	Mohammad Amin Rajizadeh	The effects of Myrtenol inhalation on inflammatory and oxidative indices in lung tissue of cigarette smoked induced lung injury model
SP174	Kiarash Ghazvini	Oral Egg-Derived IgY as a Novel Adjunct Therapy for Helicobacter pylori-Associated Peptic Ulcers: A Randomized Clinical Trial
SP175	Soodeh Rajabi	Berberine ameliorated monocrotaline-induced pulmonary arterial hypertension with effect on PARP1 expression in rats
SP176	Mahboubeh Derakhshani	The Effects of the Qigongwan Herbal Compounds on Polycystic Ovary Syndrome: A Molecular and Network Pharmacology Investigation
SP177	Atena Mansouri	Formulation and Evaluation of a Boswellia-Based Nanoemulsion Gel for Topical Treatment of Psoriasis
SP178	Arefeh Salehi	Effects of polyphenols in green tea (Camellia sinensis) in the treatment of coronavirus disease - A systematic review article
SP179	Asma Rashki Ghalenoei	The Effect of Topical Aqueous Extract of Capparis decidua on Second-Degree Burn Wound Healing in Rats

Day 1 (4th February); Time: 15:30 – 17:00

Symposium: Developmental Physiology

Symposium Chair: Mohammad Shabani

No	Speakers	Presentation Title
SP180	Mohammad Shabani	Prenatal Stress: Unraveling the Impact on Brain Development
SP181	Iraj Aghaei	Psychological vs. Physical Prenatal Stress: Unique Influences on Cognitive Behavior
SP182	Moazameh Sadat Razavi Nasab	The Role of LDT and VTA Neuronal Hyperexcitability in Behavioral and Cognitive Impairments Due to Prenatal Stress
SP183	Monavareh Soti	Hippocampal Vulnerability to Prenatal Stress: Insights into Sex Differences
SP184	Mohammad Reza Afarinesh	The effect of non-specific tactile stimulation on altered responses of neurons in the somatosensory cortex of a rat model with autism induced by valproic acid
SP185	Farahnaz Taheri	Multifaceted Approaches to an Autism Model: From Pathophysiology to Interventions and Risk Factors
SP186	Fatemeh Kazemi	The Effect of Transcranial Direct Current Stimulation (tDCS) of the Temporo-Parieto-Occipital Junction and Dorsolateral Prefrontal Cortex on Selected Aspects of Sensory and Cognitive Processing in Children with Autism Spectrum Disorder
SP187	Ali Hosseini-Sharifabad	Protective effects of melatonin on prenatal restraint stress induced memory impairment in offspring rats

Day 1 (4th February); Time: 15:30 – 17:00

Symposium: Neurodegeneration & Neuroregeneration

Symposium Chair: Alireza Sarkaki		
No	**Speakers**	**Presentation Title**
SP188	Alireza Sarkaki	Inflammation and oxidative stress-induced brain injury in animal models of neurodegenerative disorders
SP189	Morteza Behnam-Rassouli	Evaluation of local platelet-rich plasma administration on sensory reinnervation following acellular nerve grafting in sciatic nerve injury
SP190	Esmail Riahi	Electrophysiological evaluation of sciatic nerve regeneration following transplantation of decellularized nerve scaffold and local PRP injection
SP191	Hananeh Ahmadnia	Behavioral analysis of nerve scaffold transplantation and local platelet-rich plasma injection for motor function recovery in wistar rats with sciatic nerve injury
SP192	Ali Moradi	Histological evaluation of sciatic nerve repair in wistar rats: effects of decellularized allografts, xenografts, and platelet-rich plasma
SP193	Simin Nazanezhad	A promising approach for peripheral nerve regeneration using thiolated chitosan hydrogel containing taurine
SP194	Ali Sepehrinezhad	Novel therapeutic approaches in neurodegenerative animal models: restoring cellular function via extracellular vesicles and targeted mitochondrial transplantation

Day 2 (5th February); Time: 10:30 - 12:00		
Symposium: Sleep		
Symposium Chair: Nayereh Askari		
No	**Speakers**	**Presentation Title**
SP195	Nayereh Askari	Chronobiome, Sleep Disorders, and Health: Rethinking Time-Based Interventions
SP196	Mohammad-Reza Vaez-Mahdavi	Socio-economic status and sleep disturbances
SP198	Marzieh Hatami	Artificial Intelligence in Sleep Assessment and Chronotherapy: Innovations and Future Directions
SP199	Reza Askari	Next-Generation Hypnotics: Mechanisms, Efficacy, and Future Directions in Precision Treatment of Insomnia
SP200	Sara Ghaffarpour	Impact of Sleep Disturbance on Immune Regulation: Relationship Between Poor Sleep Quality, Melatonin, and the CTLA-4 Immune Checkpoint in Sulfur Mustard–Exposed Veterans
SP201	Leila Nasiri	Sleep Disturbances and Melatonin Dysregulation in Chemical Veterans: Insights from the Pittsburgh Sleep Quality Index and Salivary Biomarkers
SP202	Maryam Salari	Protective effects of regular exercise & supplementary medicine on cognitive functions in modulating inflammation in sleep deprivation

Day 2 (5th February); Time: 10:30 - 12:00

Symposium: Commercializing Basic Science

Symposium Chair: Seyed Mahdi Rezayat

No	Speakers	Presentation Title
SP203	Seyed Mahdi Rezayat	From Idea to Product: Commercializing Basic Science Research
SP204	Seyed Mohammad Khatmi-Maab	Steps from Idea to Product
SP205	Mahmoud Reza Jafari	Bridging the Frontiers of Knowledge and Advanced Products
SP206	Fatemeh Gheybi	Bridging the Gap Between Idea, Research, and Product: The Role of Skill-Centricity and Experiential Learning
SP207	Seyed Ali Mousavi Shaegh	Barriers to the Commercialization of Innovative Ideas within the Academic Setting
SP208	Shima Tavakol	What Universities Should Teach Us About the Business Environment
SP209	Hannaneh Zarrinnahad	The Retention of Fundamental Science Graduates
SP210	Sina Mozaffari-Jovin	From Molecular and Cellular Knowledge to mRNA-Based Next-Generation Vaccines

Day 2 (5th February); Time: 10:30 - 12:00

Symposium: Student Symposium of PhyPha Association

Symposium Chair: Zakieh Sadat Sheikhalishahi

No	Speakers	Presentation Title
SP211	Zakieh Sadat Sheikhalishahi	Mechanistically approach to Heart Brain axis
SP212	Hadi Moatamed Jahromi	Assessment of Teriflunomide Treatment on Behavioral and Oxidative Stress Markers in a Rat Model of Traumatic Brain Injury
SP213	Hamideh Asadinejad	Electrophysiological Evaluation of Lutein's Dose-Dependent Effects on Hippocampal Synaptic Plasticity in the 2VO Rat Model of Vascular Dementia
SP214	Babak Aliyari	Physiological coupling of the heart–brain axis in response to itbs and ctbs
SP215	Ardeshir Nabizadeh	The psychotic heart: unraveling the brain-heart dialogue in psychosis
SP216	Hamidreza Choobdari	Synergistic cardioprotection: resistance exercise and hawthorn (crataegus oxyacantha) extract modulate oxidative stress following ischemia-reperfusion injury in diabetic rats
SP217	Masoumeh Gholami	Comparison of the effects of cuneiform (CnF) and pedunculopontine tegmental nuclei (PPT) on cardiovascular responses induced by chemoreflex stimulation in rats
SP218	Reihaneh Ghasemi Tarie	Empagliflozin Improves Cardiac Functional Parameters in a High-Fat Diet-Induced Metabolic Syndrome Model

Day 2 (5th February); Time: 13:30 - 15:00

Symposium: Electrophysiology

Symposium Chair: Seyed Javad Mirnajafizadeh

No	Speakers	Presentation Title
SP219	Seyed Javad Mirnajafizadeh	The role of pre- and post-synaptic mechanisms in anticonvulsant action of deep brain stimulation
SP220	Hamid Gholami Pourbadie	Modulation of Synaptic Plasticity and Cognitive Function in Rats by Rabies Glycoprotein C-Terminal Peptide
SP221	Mohammad Shabani	Alterations in Dopaminergic and Cholinergic Neuronal Excitability Induced by Prenatal Stress: Implications for Neurodevelopmental Disorders and Addiction
SP222	Mona Rahdar	Dorsal Hippocampal Vulnerability and 5-HT7 Receptor-Mediated Modulation: Linking Regional Electrophysiological Divergence to Therapeutic Response in Autism
SP223	Hanieh Riazi	Intra-Nasal Air-Puffing Ameliorates Cognitive Function in Acutely Sleep-Deprived individuals
SP224	Vahid Hajali	Combination Therapy in Alzheimer Disease
SP225	Shima Davoudi	Neural Over-excitability Linked to Kir4.1 Astrocytic Channel Loss in Valproate-Induced Autism
SP226	Zeinab Tanouri	Electrophysiological Characteristics and Clinical Outcomes in Children with Cardiac Arrhythmia Undergoing Electrophysiological Study and Ablation
SP227	Nastaran Golitabari	Neonatal NMDA blockade alters the LTP, LTD and cognitive functions in male and female Wistar rats

Day 2 (5th February); Time: 13:30 - 15:00

Symposium: Neuroscience

Symposium Chair: Abdolrahman Sarihi

No	Speakers	Presentation Title
SP228	Abdolrahman Sarihi	Epilepsy, cognitive impairments and dopaminergic system
SP229	Amir Shojaei	Participation of ventral tegmental area in social memory encoding in rats
SP230	Maryam Sharifi	The role of dopamine D2-like receptors on hippocampal long-term potentiation in control and kindled rats
SP231	Zahra Abdi	Post-Encoding Ventral Tegmental Area Inhibition Impairs Social Memory Consolidation in Rats
SP232	Alireza Komaki	Evaluation of the protective effect of ethyl vanillin on behavioral changes in a male rat model of Alzheimer's disease: The role of oxidative stress
SP233	Arshad Ghaffari-Nasab	Young plasma transfusion improves resilience to chronic stress in elderly rats through the AMPK/SIRT1/PGC-1α pathway in the hippocampus
SP234	Farideh Bahrami	Comparative Effects of rTMS and tACS on Sleep Architecture in Rats: An EEG-Based Study
SP235	Zohreh Tavassoli	Effects of Tonic and Phasic Ventral Tegmental Area Stimulation on Learning-Associated Cell Proliferation in the Dentate Gyrus

Day 2 (5th February); Time: 13:30 - 15:00		
Symposium: Regenerative Medicine		
Symposium Chair: Ali Mohammad Sharifi		
No	**Speakers**	**Presentation Title**
SP236	Ali Mohammad Sharifi	Pharmacology-driven tissue repair: advances in regenerative wound healing
SP237	Pezhman Hafez	Mitochondrial transfer: mechanisms, therapeutic potential, And regenerative applications
SP238	Rana Imani	Drug eluting scaffolds: integrating drug delivery with tissue regeneration
SP239	Ahmad Ghorbani	The impact of bioactive phytochemicals on stem cells and their applications in regenerative medicine
SP240	Naime Majidi Zolbanin	Huvec-derived exosomes deliver curcumin to suppress breast cancer cell migration
SP241	Iman Kamel Attar	Comparison between sodium valproate loaded chitosan with valproate encapsulated in liposome for the treatment of seizure in mouse
SP242	Farhad Manoochehri	Effect of α-bisabolol on srebp1c, caveolin-1, MCAD and apob100 gene expression in hepg2 cell line steatosis signaling pathway using 3D cell culturing
SP243	Elahe Mahdipour	Regenerative potential of menstrual blood-derived exosomes

Day 2 (5th February); Time: 13:30 – 15:00; Class: 2		
Symposium: Gastrointestinal Physiology		
Symposium Chair: Mohammad Khaksari Haddad		
No	**Speakers**	**Presentation Title**
SP244	Mohammad Khaksari Haddad	The liver as an endocrine organ: the hepatokines
SP245	Khalil Hajiasgharzadeh	Nicotine facilitates hepatic fibrosis in rats by upregulating the expression of alpha-4 and alpha-7 nicotinic acetylcholine receptors
SP246	Fatemeh Nabavizadeh	The effects of peptide IF7-conjugated dendrimer loaded with doxorubicin on colorectal cancer
SP247	Atieh Yaghoubi	Therapeutic effect of an anti-tuberculosis agent, isoniazid, and its nano-isoform in ulcerative colitis
SP248	Sahar Rahimi	Ameliorative Effect of Hepatocytes and Hepatocyte-Derived Exosomes on CCl_4-Induced Liver Fibrosis in Male Wistar Rats
SP249	Negin Saeedi	The role of gut microbiota in hippocampal synaptic plasticity alteration induced by chronic morphine administration
SP250	Alireza Raji-Amirhasani	Comparative Effects of Calorie Restriction and Time-Restricted Feeding on Reducing Hepatic Inflammation in Aged Rat
SP251	Fateme Mohamadi	The effect of Lactobacillus delbrueckii and Lactobacillus rhamnosus probiotics as a therapeutic supplement on improving histological scores in a mouse model of Inflammatory Bowel Disease
SP252	Khatereh Kharazmi	The therapeutic impact of Artrestan (Sacubitril/Valsartan) in the rat model of acetic acid-induced ulcerative colitis

Day 2 (5th February); Time: 15:30 - 17:00		
Symposium: Addiction Studies		
Symposium Chair: Hojatollah Alaei		
No	**Speakers**	**Presentation Title**
SP253	Hojatollah Alaei	Brain Reward System and DBS: Novel Therapies for Addiction
SP254	Fatemeh Azizi	Effect of Astragalus fasciculifolius on Morphine-Induced CPP and Hippocampal BDNF and TNF-α Expression Under Restraint Stress
SP255	Farahnaz Ataei	Effect of the Dopamine D2 receptor antagonist injection into the lateral habenula nucleus on the rate of morphine self-administration in male rats.
SP256	Zahra Jokar	The Effect of Gut Microbiota Disruption on Morphine-Associated Anxiety-like Behaviors in Mice
SP257	Mohammad Mazaheri	Transcranial Photobiomodulation in the Treatment of Addiction: eurobiological Mechanisms and Clinical Challenges
SP258	Kawsar Alami	Involvement of microglial cells in pain hypersensitivity and hippocampal nociplasticity following adolescent morphine exposure
SP259	Nasrin Houshmandi	The acute morphine injection effects on electrophysiological properties of the ventrolateral periaqueductal gray neurons in rats exposed to opioids during adolescence
SP260	Shima Mehrabadi	Baclofen Modulates TRPV1 via PKC in Spinal DRG of Morphine-Tolerant Rats
SP261	Mozhgan Ghobadi Pour	Use and Abuse of Morphine

Day 2 (5th February); Time: 15:30 – 17:00		
Symposium: Circadian Rhythms in Physiology		
Symposium Chair: Behzad Garmabi		
No	**Speakers**	**Presentation Title**
SP262	Behzad Garmabi	From Biological Clocks to Smart Algorithms: The Fundamentals of Circadian Rhythms and AI Applications
SP263	Shima Mohammadi	Melatonin Suppression–Mediated Circadian and Behavioral Disturbances
SP264	Hamed Ghazvini	The Empathic Clock: Integrating Affective States into Circadian-Aware Intelligent Systems
SP265	Bita Dadjou	Morning preference is associated with better Visual memory in Students
SP266	Leila Karimi-Zandi	From Prenatal Circadian Misprogramming to sleep disorders: A Two-Hit Model of Early Life Stress
SP267	Alieh Bashghareh	Circadian Modulation of BDNF as a Therapeutic Target After Cerebral Ischemia–Reperfusion
SP268	Kia Garmabi	Circadian Rhythms in Brain Functional Connectivity: Diurnal Variations in Resting-State fMRI Network Topology Between Morning and Evening Sessions
SP269	Saba Rahmati	Artificial Intelligence in the analysis of Circadian Rhythm Disorders and Polysomnography Data

Day 2 (5th February); Time: 15:30 – 17:00		
Symposium: Aging		
Symposium Chair: Mohammad Reza Vaez-Mahdavi		
No	**Speakers**	**Presentation Title**
SP270	Mohammad Reza Vaez-Mahdavi	The Embodiment of Inequality: Stress-Mediated Pathways to Accelerated Biological Aging
SP271	Nayereh Askari	From Neonatal Period to Aging: Synergistic Effects of Early-Life Stress on Behaviour, Cognition, and Expression of Inflammation-Related Genes in Female Rats
SP272	Hossein Hassanpour	Mitochondria and Accelerated Biological Ageing: Molecular Mechanisms
SP273	Leila Nasiri	Mitochondrial DNA Damage as a Marker of Accelerated Aging in Delayed Sulfur Mustard Toxicity
SP274	Maryam-Sadat Kalantar	Long-Term Dysregulation of Mitophagy-Related Gene Expression Following Sulfur Mustard Exposure: A Mechanism Leading to Accelerated Aging
SP275	Tahereh Jamali	Mitochondrial Membrane Permeability and Oxidative Stress in Age-Related Decline
SP276	Marzieh Mojtahed	DNA Repair Gene Changes in Chemical Veterans: Evidance of Accelerated Biological Ageing
SP277	Sara Ghaffarpour	Telomere Dysregulation and Oxidative DNA Damage in Long-Term Survivors of Sulfur Mustard Exposure

Day 2 (5th February); Time: 15:30 – 17:00

Symposium: Toxicology

Symposium Chair: Ramin Rezaee

No	Speakers	Presentation Title
SP278	Ramin Rezaee	Early-Life Dietary Exposure to Perfluorooctanoic Acid (PFOA) And Bisphenol Compounds Through Milk Consumption
SP279	Alireza Ghassemi Toussi	Legal aspects of pharmacy giving pregabalin to patients without a prescription
SP280	Amin Mokhtari-Zaer	*Curcuma Longa* attenuates paraquat-induced behavioral changes in rats exposed to inhaled paraquat through modulating oxidative stress and systemic inflammation
SP281	Sevda Shayesteh	Kynurenic Acid as a Potential Protective Agent in Experimental Eczematous Dermatitis
SP282	Majid Motaghinejad	Exploring the neuroprotective potential of Aprepitant against Nicotine-induced withdrawal syndrome and neurotoxicity: behavioral and molecular evidences
SP283	Iraj Ahmadi	Evaluation the multi-organs toxicity of methamphetamine (METH) in rats
SP284	Ramin Seyedian	Assessment of Pseudocerastes persicus Venom-Induced Hind Paw Edema and Antivenom Neutralization in Mice
SP285	Sadegh Mohades	Beyond Endocrine Disruption: Emerging Multi-Omics Insights into Bisphenol A (BPA) Toxicity and Personalized Risk Assessment
SP286	Mahmoud Hashemzaei	Cardioprotective effects of hesperidin on carbon monoxide poisoned in rats

Day 3 (6th February); Time: 10:30 - 12

Symposium: Education in physiology & Pharmacology

Symposium Chair: Majid Khazaei

No	Speakers	Presentation Title
SP287	Majid Khazaei	Physiology Education in MBBS Students: Challenges and Innovative Teaching Approaches
SP288	Seyed Masoud Hosseini	Comparison of two methods: online webinar and podcast presentation in teaching physiology topics to medical students
SP289	Melika Fayazi	The Impact of AI-Powered Adaptive Learning Systems on Personalized Instruction and Assessment in Pharmacology Education
SP290	Azam Norouzi	Comparison of the Impact of Traditional and AI-Based Formative Assessment on Knowledge and Satisfaction of Medical Students in at Mashhad University of Medical Sciences
SP291	Zeinab Tabatabaee	Game-Based Learning to Enhance Engagement in Basic Medical Sciences Education: An Interprofessional “Educational Battlefield” Case Study
SP292	Kobra Naseri	Effectiveness of Student-Generated Podcasts as a Supplementary Tool in Pharmacology Education: A Cross-Sectional Study
SP293	Alireza Keshavarz	Evaluation of Artificial Intelligence Algorithms in Enhancing Nurses’ Clinical Skills for Managing Drug Therapy–Related Complications
SP294	Fereshteh Asgharzadeh	Simulation Improves Practical Blood Physiology Skills in Pharmacy Students

Day 3 (6th February); Time: 10:30 - 12:00		
Symposium: Respiratory Physiology		
Symposium Chair: Mohammad Reza Aslani		
No	**Speakers**	**Presentation Title**
SP295	Mohammad Reza Aslani	The role of adipokines and inflammatory markers in respiratory diseases, studies based on clinical findings in patients with COPD
SP296	Mohammad Reza Khazdair	Protective effect of Melissa officinalis L. (lemon balm) and Rosmarinic Acid on Ovalbumin Induced lung injury in Rats
SP297	Farzaneh Kianian	A Novel Mouse Model of Ventilated Lung Ischemia-Reperfusion Injury: Minimizing Confounders and Enhancing Clinical Relevance
SP298	Mahboobeh Ghasemzadeh Rahbardar	Dyspnea in chemical war victims exposed to sulfur mustard: A review of respiratory distress in survivors
SP299	Sepideh Behrooz	Camel milk attenuates airway inflammation, oxidative stress, and Th1/Th2 imbalance in an ovalbumin-induced asthma rat model
SP300	Sahar Ghoflchi	Protective Effects of Leucomethylene Blue Against Acetaminophen-Induced Lung Toxicity in Rats
SP301	Mahdieh Farhanji	Lung injury induced by PQ aerosol was improved by safranal in rats
SP302	Vahideh Ghorani Sirjani	Natural products in COPD: insights from experimental and clinical evidence

Day 3 (6th February); Time: 10:30 - 12		
Symposium: Pharmacotherapy		
Symposium Chair: Gholamreza Karimi		
No	**Speakers**	**Presentation Title**
SP303	Gholamreza Karimi	Protein quality control during physiologic and pharmacologic stress
SP304	Hossein Miladi-Gorji	Raha Herbal Syrup and the behavioral-neuroendocrine disorders induced by opioid use disorder: A review article
SP306	Hassan Malekinejad	Aging and new strategies: In vivo and in vitro studies
SP307	Zahra Kiani	Synergistic Effect of Green-Synthesized ZnO-Ag@LAE Nanoparticles and Blue Light in Promoting Wound Healing
SP308	Atiyeh Kaveh	Comparison of Dexmedetomidine and Midazolam in Sedation of Children Under Mechanical Ventilation: A Randomized Controlled Trial
SP309	Nooshin Ahmadirad	The potential role of adrenergic antagonists (Propranolol and Prazosin) in treating Glioblastoma multiforme (GBM): in vitro and in vivo experiments

Day 3 (6th February); Time: 13:30 - 15

Symposium: Medicinal Plants

Symposium Chair: Hossein Hosseinzadeh		
No	**Speakers**	**Presentation Title**
SP311	Hossein Hosseinzadeh	Saffron and its Bioactive Compounds: From Color and Aroma to Therapeutic Applications
SP312	Bibi Marjan Razavi	Saffron as Red Gold in Cardiovascular Protection: From Molecular Mechanisms to Clinical Implications
SP313	Seyed Ahmad Mohajeri	Saffron in ophthalmology
SP314	Rasool Haddadi	Anticancer effects of silymarin-loaded ACA-HA/sulfonamide IR-MOF nanoplatform in CT-26 xenograft model
SP315	Mohammad Raman Moloudi	Effect of α- bisabolol on SREBP1C, Caveolin-1, MCAD and apoB100 gene expression in HepG2 cell line steatosis signaling pathway
SP316	Zahra Roshani	Preventive effects of Quercetin and Liraglutide on Isoproterenol-induced myocardial ischemia in hyperglycemic and hyperlipidemic Wistar rats
SP317	Abolfazl Akbari	Green synthesis of zinc nanoparticles from ginger contributes to the treatment of diabetic nephropathy
SP318	Mostafa Rashki	Pharmacological Synergy of Alhagi maurorum and Taranjabin: A Comprehensive Review of Immunomodulatory, Anti-inflammatory, and Antitumor Mechanisms
SP319	Motahareh Nasrpour Navaei	Curcuma longa bioactive compounds as modulators of oxidative stress and chronic disease
SP320	Pouya Youseflee	Frankincense extract improved learning and memory in rat model of cholinergic dysfunction
SP321	Leila Khaledi	Saffron effects on hippocampal glial fibrillary acidic protein and Olig2 gene expression and pathological changes in demyelinated rat by cuprizone

Day 3 (6th February); Time: 13:30 - 15:00		
Symposium: Traditional Medicine		
Symposium Chair: Mahdi Yousefi		
No	**Speakers**	**Presentation Title**
SP322	Mahdi Yousefi	Principles of Therapeutic Approach in Persian Medicine: A Systematic Analysis
SP323	Ali Reza Derakhshan	Botanical GLP-1 Enhancers in Hyperglycemia: A Mechanistic Review
SP324	Fatemeh Mahjoub	Integrative Approach on Obesity Management in Persian Medicine: A Review of Lifestyle Strategies, Herbal Medicines, and Manipulative Therapies
SP325	Maliheh Motevaselian	Integrative Approach: Management of Non-alcoholic Fatty Liver Disease (NAFLD) by Combining Persian Medicine Principles and Modern Scientific Evidence
SP326	Hassan Rakhshandeh	Evaluation of the Safety and Clinical Benefits of Celiac Support Capsules in Patients with Newly Diagnosed Celiac Disease
SP327	Fatemeh Masjedi	Naringenin Effects on Gene and MicroRNA Expression Regulating Steroidogenesis and Oxidative Stress in Granulosa Cells of Normal and Polycystic Ovaries
SP328	Sadegh Shokri	Hypertension from the Perspective of Traditional Persian Medicine: Foundations, Mechanisms, and Therapeutic Approaches

Day 3 (6th February); Time: 13:30 - 15:00

Symposium: Nutritional Pharmacology

Symposium Chair: Majid Ghayor-Mobarhan

No	Speakers	Presentation Title
SP329	Majid Ghayor-Mobarhan	Modulating Adipokines for Obesity: Insights from the Iranian National Obesity Registry (IRNOR)
SP330	Mohammad Safarian	Modulation of Circulating Adipokines by Glucagon-Like Peptide-1 Receptor Agonists: Implications for Metabolic Health
SP331	Amir Avan	Precision Nutrition at the Genomic Interface: Personalized Medicine and Pharmacogenomics
SP332	Reza Rezvani	Role of Adipocyte Dysfunction in Obesity Complications
SP333	Maryam Alinezhad-Namaghi	Effects of anti-obesity drugs on weight management in liver transplant recipients
SP334	Maryam Saberi-Karimian	Precision Nutrition to Modulate Adipokines in Obesity: Emerging Molecular Evidence
SP335	Tannaz Jamialahmadi	Alterations in Adipokine Profiles Following Bariatric Surgery and Their Role in Metabolic Improvement
SP336	Mostafa Shahraki Jazinaki	Impact of Turmeric/Curcumin Supplementation on Adipokines in Patients with Type 2 Diabetes and Prediabetes: A Systematic Review
SP337	Zahra Khorasanchi	The role of dietary regimes in maintaining neurological health: From dietary antioxidants to microbiota-modulating compounds

Day 3 (6th February); Time: 13:30 – 15:00

Symposium: Neuroinflammation

Symposium Chair: Seyed Mahmoud Hosseini

No	Speakers	Presentation Title
SP338	Seyed Mahmoud Hosseini	Angiotensin converting enzyme inhibition reduces neuroinflammation associated learning and memory impairment
SP339	Seyed Mohammad Ahmadi-Soleimani	Gut-Brain inflammatory challenge and cognitive consequences: A review of microbial, behavioral and biochemical investigations
SP340	Farimah Beheshti	Vitamin B1 Attenuates Anxiety- and Depression-Like Behaviors During Nicotine abstinence in Chronically Stressed Adolescent Rats: Involvement of Serotonin, Dopamine, Oxidative Stress, Amyloid-β, BDNF and Inflammatory Markers
SP341	Hossein Salmani	Angiotensin II AT1 receptor blockade during sepsis reduces long-term brain vulnerability to secondary inflammatory insults
SP342	Samad Nazemi	Therapeutic Effects and Anti-inflammatory Mechanism of Mesenchymal Stem Cell-Conditioned Medium in a Rat Model of Neuropathic Pain
SP343	Farzaneh Vafaee	NF κB–Mediated Neuroinflammation as the Primary Driver of Bilateral Hippocampal Alterations in Long Term Potentiation Following Left Intracerebral Hemorrhage
SP344	Arezoo Rajabian	Amelioration of neuroinflamnation and cholinergic dysfunction by herniarin: Insights into neuroprotection against acrylamide- induced neurotoxicity
SP345	Fatemeh Forouzanfar	Analgesic effect of apricot kernel oil on neuropathic pain induced by chronic constriction injury in rat sciatic nerve
SP346	Akbar Anaei Goudari	Neuronal nitric oxide synthase inhibition reduces brain inflammation associated learning and memory impairment
SP347	Mohammad Naser Shafei	Cardiovascular Responses to LPS-Induced Inflammation in the Dorsomedial Periaqueductal Gray of Rats
SP348	Sahar Fanoudi	Protective Effects of Levetiracetam in Cuprizone-Injured Oligodendrocytes OLN-93 Cell Line

Morning Session (10-12), Wednesday, February 4th, Neurophysiology/Neuropharmacology				
Name	**Title**	**Code**	**Time**	**Monitor**
Leila Hafazeh	Blocking histone methyltransferase activity supports improvements in a vascular dementia model	P100		1
Mahsa Lal dashty	N-Acetylcysteine Mitigates Hypothyroidism-Induced Cognitive Deficits in Adolescent Male Rats by Modulating Oxidative Stress, Inflammatory Markers, and BDNF Expression in Hippocampus	P101		2
Amirali Ebrahimbabaei	Alginate Nanoparticles Loaded With Cuminum cyminum Essential Oil Mitigate Cuprizone-Induced Demyelination in Rats	P102		3
Mohamamd Mazaheri	Effects of Melatonin and transcranial photobiomodulation on fear memory consolidation and locomotor activity in chronically stressed rats	P103		4
Zahraa Falah A. Annooz	Exercise Performed Before or After Ischemia Engages Divergent Protective Mechanisms for Brain and Heart: Multimodal Assessment Using TTC, Histology, and Cardiac Biomarkers in a Rat MCAO Model	P104		5
Sara Ahmadi Shokooh	Effect of Ginger derived Exosome-like Nanoparticles on Anxiety and Working Memory Impairments Induced by Ischemia/Reperfusion	P105		6
Hediye Akhlaghi	The effect of brain-derived neurotrophic factor (BDNF) on food consumption of broilers: Role of serotonergic receptor	P106		7
Tahereh Eteraf-Oskouei	The preventive effect of bee pollen methanolic extract on morphine-induced tolerance and dependence in male mice	P107	**10-10:10**	8
Niloofar Aghajani	Atorvastatin Attenuates Stress-Evoked Return to Morphine Seeking After Extinction Training	P108		9
Yasaman Akbarian	Chronobiology in Psychopharmacology: Enhancing Treatment Efficacy for Mood Disorders	P109		1
Baqer Alrazi	Animal Models for Alzheimer's Disease Induced by Intracerebroventricular Injection	P110		2
Muthana Alfatle	Method for Assessing the Effect of Drug Compounds via Intracerebellar/Intra-4th Ventricular Injection	P111		3

Neda Omidian	The Possible Impact of Mitochondrial Dysfunction on Synaptic Pruning in Alzheimer's Disease: A Review Study	P112		4
Fazeleh Entezarian	Neurodegenerative Disorders and Folate Impact	P113		5
Zahra Davtalab Tousi	Evaluating the effect of maternal dysbiosis in fetal neurodevelopment	P114		6
Sohrab Anvari Hajimohammadlou	Changes in the function of intermediate hippocampal CA1 and dentate gyrus synapses following chronic morphine exposure in rats	P115	**10:10-10:20**	7
Enayat Anvari	The Relationship Between Sexual Deprivation and Anxiety-Like Behaviors in Male Rats	P116		8
Enayat Anvari	The Relationship Between Sexual Deprivation and Memory in Male Rats	P117		9
Mina Sadat Izadi	4-Phenylbutyric acid mitigated cognitive impairment induced by a high-fat-fructose diet consumption in male rats	P118		1
Shahla Eyvari-Brooshghalan	Phycocyanin pretreatment ameliorated Scopolamine-induced Alzheimer's disease-like behavior in male rats	P119		2
Shima Abtin	A review on the consequences of molecular and genomic alterations following exposure to electromagnetic fields: Remodeling of neuronal network and cognitive changes	P120		3
Fariba Akhondzadeh	Chronic Constriction Injury and Cognitive Behaviors: Investigating the Neuroprotective Role of Progesterone	P121		4
Parisa Arvin	Sleep deprivation and mental disorders: A systematic review	P122		5
Arman Bab	Effect of Oral Probiotic Administration on Pain Perception in Rats: L. rhamnosus, L. helveticus, B. indicus, B. longum	P123		6
Farzaneh Bagheri	Sex-Specific Neuroadaptations in Reward Circuitry Following Perinatal Stress and Cocaine Sensitization in Rats	P124	**10:20-10:30**	7
Romina Baghinejad	The effect of social hierarchy on depressive-like behaviors in male rats	P125		8
Mohammad Bakhshi	The ameliorating effects of vitamin C on hypothyroidism-associated learning and memory deficit in juvenile rats	P126		9
Saeideh Baradaran	A review of 5 Choice Serial Reaction Time Task for Assessing Cognitive Functions in Animal Models	P127		1

Helia Behrouzfar	Exploring the effects of empagliflozin administration and physical training on cognitive functions, amyloid beta-induced Alzheimer's rat model	P129		2
Mehrnaz Boveiri	The Effect of Nabumetone on Pentylenetetrazol-Induced Seizure Threshold in Male Wistar Rats	P130		3
Mahsa Pakzadfard	Injection of cinnamic acid before testing sulpiride-induced conditioned fear reduces its expression in immature mice	P132		4
Soroush Pejhan	Evaluation of Neuroprotective Effects of Liraglutide on Spatial Memory in Rat Model of Vascular Dementia	P133		5
Fereshteh Pourabdolhossein	Targeting GABAergic Signaling for Neuroprotection and Improvement of Hippocampal Demyelination-Associated Cognitive Deficits	P134	**10:30-10:40**	6
Zeynab Pirmoradi	Sirt1-Modulated Lingo-1 by Resveratrol & Vitamin D3 Improves Essential Tremor Model	P135		7
Masoume Pirouzi	Protective role of naloxone on dorsal hippocampal neuroplasticity during the acquisition and expression of morphine-induced dependence in adult male rats	P136		8
Sajjad Taghizadeh	Synergistic therapeutic effects of combined Nicotinamide Mononucleotide and Melatonin on memory impairment and apoptosis in aged rats	P137		9
Ali Tamimi	Neural Regeneration Strategies in Therapeutic Advances for Huntington's Disease: A Review	P138		1
Zohreh Tavanbakhsh	Protective Effects of Vitamin B12 on Scopolamine-Induced Memory Impairment in Desert Rats: Behavioral Evidence	P139		2
Elham Keramati	Investigation of cognitive functions and expression of mitophagy genes (Drp1, Mfn2, Nrf1, Pgc1α) in the hippocampus of ovalbumin-sensitized aged mice	P140	**10:40-10:50**	3
Tahere Jamali	Mitochondrial Transcriptional Dysregulation: The Central Role of TFAM in Aging	P141		4
Shadmaneh Javdan	Oral Coenzyme Q10 Supplementation Improves Cognitive Deficits Following Nicotine-Ethanol Withdrawal by Reversing Biochemical Alterations in the Hippocampus of Male Rats	P142		5
Zahra Javid	Saffron and estrogen can affect cognitive behavior, hippocampal histopathology, and the GFAP- and Olig2-positive cells number in menopausal demyelinated rats	P143		6

Fatemeh Jodaei	Evaluation of the effect of honey on valproic acid induced damage in mitochondria isolated from male rat liver	P144		7
Melika Jafari Targh	effects of voluntary and forced exercise on serum, prefrontal cortex and hippocampal corticosterone levels in ovariectomized rats exposed to single prolonged stress	P145		8
Zahra Jalayeri darbandi	Studying of methamphetamine exposure impact during pregnancy and lactation on hippocampal doublecortin expression of rat offspring	P146		9
Gonja Javani	Mitotherapy Mitigates Behavioral and Sleep Disturbances in Aged Insomnia Rat by Modulating Circadian Rhythm–Related Genes Expression in the Prefrontal Cortex and Hippocampus	P147		1
Asma Hatami	Effects of Nigella sativa Extract on Anxiety-like Behaviors and BDNF Expression in the Prefrontal Cortex and Hippocampus of Rats Exposed to Chronic Unpredictable Mild Stress	P148		2
Hatami Nemati Homeira	Investigating oxidative stress markers in the brain of rat models of Alzheimer's, Parkinson's and Multiple Sclerosis	P149		3
Mohammad Saleh Hajghani	The neurobehavioral impact of stress and the therapeutic role of valproic acid in a PTSD animal model	P150		4
Negar Haji Reza Boroujerdi	Impaired Anterior Cingulate Cortex–Amygdala Synchrony During Empathy-Related Behavior in a Rat Model of Autism	P151		5
Vahid Hamedianasl	The role of central serotonergic system on food intake caused by intracerebroventricular injection of leptin in broilers	P152		6
Narjes sadat Haeri	Effects of the modified Atkins diet on learning, memory, and anxiety in intact rats	P153		7
Parinaz Haddadi	Evaluated of the effect of astrocytes-derived exosome on neurogenesis by experimentally induced mouse AD model.	P154	**10:50-11**	8
Soqra Hesam	Investigation of the Effects of Lipopolysaccharide Preconditioning on Neuropathic Pain Induced by Chronic Sciatic Nerve Compression Injury in Rats	P155		9
Somaye Hesami	The Role of Zinc and Magnesium in Brain Health and Neurodegenerative Diseases	P156		1
Somaye Hesami	Immunometabolic Pathways Linking Gut Microbiota to Alzheimer's Disease	P157		2

Leila Hasanzadeh	Cannabidiol Enhances Stress-Induced Cellular Damage: Potential Contribution of Kv2.1 Inhibition	P158		3
Nima Hassan Zadeh Maleki	Evaluation of the effect of dimethyl fumarate and honey (Azerbaijan Siah Roud) on morphine induced tolerance in mice	P159		4
Seyed mohammadreza Hosseini	Comparative Hepatotoxicity of Chronic Antidepressant Use: Biochemical and Oxidative Stress Markers in Rats	P160		5
Gohar Sharieh Hosseini	Neurobiological Consequences of High Salt Diet: Impaired Learning, Memory, and Hippocampal Remodeling in Adult Male Rats	P161		6
Elaheh sadat Hosseinimanesh	Effect of Corylus avellana Consumption on Social Interaction Deficits in a Valproic Acid-Induced Rat Model of Autism	P162		7
Hossein Hakimzade naghavi	investigation of the role of central dopaminergic receptors in somatostatin-induced food intake in broiler chickens.	P163	**11-11:10**	8
Mohammadali Heydari	Effect of sucrose consumption on anxiety-like behaviors and blood factors in adult male mice under two intermittent fasting models	P164		9
Mahdi Khakhian	Omega-3 Fatty Acid Supplementation Prevents Ethanol-Induced Cognitive Deficits in Adolescent Rats by Modulating Oxidative and Inflammatory imbalance	P165		1
Leila Khaledi	Saffron improves the electrical and enzymatic activity of the dentate gyrus in cuprizone-induced multiple sclerosis in rats	P166		2
Somayeh Khalesi	Influence of Gut Microbiome on Levodopa Response in Parkinson's Disease: A Systematic Review	P168	**11:10-11:20**	3
Fatemeh Khani	Adolescent Vulnerability to Self-Harm: The Role of Sleep Deprivation	P169		4
Ali Khodabakhshi Korelaei	Protective Role of Coenzyme Q10 Against Manganese-Induced Behavioral Impairments and Oxidative Damage in the Hippocampus	P170		5
Vahid Khodashenas	Kolaviron Attenuates Behavioral Alterations in Prenatal Valproate-Induced Autism Spectrum Disorder	P171		6
Zahra Khosravi	The role of vitamin B12 in Lipopolysaccharide-induced depression like behavior	P172		7
Saeedeh Kheiripour	Gut Microbiota Metabolites and Brain Health: Urolithin A as a Neuroprotective Agent	P173		8

Salmani Hosein	Prior sepsis increases brain susceptibility to future inflammatory insults	P174	**11:20-11:30**	1
Yeganeh Darvish oladi	Effect of sodium butyrate on cognitive-behavioral functions, cholinergic activity and neuroinflammation of the entorhinal cortex in trimethyltin induced Alzheimer's disease	P175		2
Mohsen Rajaee	Hippocampal amyloid beta and GNFP and neuroinflammation-linked cognitive disorders reduced by Rosiglitazone	P176		3
Aydis Rajabi	Evaluation of the Effects of Probiotic Supplementation on Neuromuscular Coordination and Muscle Strength in Rats	P177		4
Fatemeh Rajabian	Evaluation of the effects of alpha-lipoic acid on cyclosporine-induced memory dysfunction and cellular immunosuppression in rat model	P178		5
Fatemeh Rahmati-Dehkordi	Yeast β-Glucan prevents anxiety-like behaviors in a rat model of aging	P179		6
Farkhondeh Razzaghi Firozjaei	Olanzapine attenuates the morphine-induced conditioned place preference: The involvement of the D2-like Dopamine Receptors	P180		7
Mohana Peiro	The Effect of Simvastatin in Prevention of Cognitive Deficits Induced by Bisphenol A in Male Wistar Rats	P181		8
Auob Rustamzadeh	Quantitative measurement of brain lipids by magnetic resonance spectroscopy: a new perspective in investigating neurological diseases.	P182		9
Fatemeh Rostami	Modulatory role of astrocytic aquaporin-4 in synaptic plasticity alterations in a pentylenetetrazol-induced model of epilepsy	P183	**11:30-11:40**	1
Nastaran Roshd-Rashidi	Chronic injections of isovaline result in analgesic tolerance and cross-tolerance to salicylate, without affecting tolerance to morphine, in male mice.	P184		2
Nastaran Roshd-Rashidi	Progressive Development of Pharmaco-resistance in a Chronic PTZ-Kindled Epilepsy Model in Rats	P185		3
Yekta Rezapour	Effects of Probiotic Supplementation on Gut-Brain Axis Function and Depression: A Systematic Review	P186		4
Zahra Rezaeiasl	Effects of acute and chronic zolpidem administration on synaptic plasticity and spatial memory in rats	P187		5

Zahra Rezaei	Involvement of Basolateral Amygdala Dopamine D1 Receptors in the Acquisition and Expression of Morphine-Induced Place preference in Rats	P188		6
Mohammad Mojtaba Rafiee	Cannabidiol Effects on BNST–DRN network and behavioral changes in a PTSD-like model	P189		7
Pourya Roknabadi	Tamoxifen Ameliorates Ovariectomy-Induced Memory Impairment and Brain Oxidative Stress in Female Rats	P190		8
Roya Ranjbar Saber	Effects of maternal stress on maternal care and hippocampal MDA levels in male rat offspring: Protective role of alpha-tocopherol	P191		9
Hooman Ravaei	Effect of Nano-Oleocanthal on Histopathological Alterations and Regulation of APP and PRNP Gene Expression in Alzheimer's Rat Model	P192	**11:40-11:50**	1
Hanieh Riazi	Enhancing Cognitive Function in Acute Sleep-Deprived Individuals: Comparative Effect of Intra-Nasal Air-Puff and Nasal Respiration	P193		2
Zahra Arsalani	Purmorphamine improve D-galactose induced neural stem cells senescence by regulating increased NO production and decreasing levels of oxidants and some SASP factors	P194		3
Mahsa Rivandi	The effect of vitamin A and C on doxorubicin induced memory impairment in male rat	P195		4
Reza Zaredar	Evaluation of malondialdehyde and Tumor Necrosis Factor-alpha level in the brain of carbamazepine and vitamin B-6 combined treatment groups in the infant rat model of maximum electroshock seizure	P196		5
Marziyeh Zarin	The protective role of β-hydroxybutyrate against behavioral and inflammatory alterations induced by high-fat diet and CFA in male rats	P197		6
Azim Zaeimbashi	Herbal Immunomodulators Targeting ER Stress and Neuroinflammation in Alzheimer's Disease: A Systematic Review	P198		7
Azim Zaeimbashi	Gynostemma pentaphyllum: Neuroprotective and Immunomodulatory Mechanisms via Antioxidant and Anti-inflammatory Effects	P199		8
Reyhaneh Zeinali	The role of nitric oxide in improving cognitive impairment in an animal model of Alzheimer's disease induced by aluminum chloride	P200		9

Vajihe Saedi Marghmaleki	"The Impact of Escitalopram on Obsessive-Compulsive Disorder Symptoms Induced by Chronic Stress in Male Rats"	P201	**11:50-12**	1
Adel Salari Esker	Simvastatin Modulates Inflammation, Amyloidogenesis, and Mitochondrial Function in Trimethyltin Neurotoxic Model	P202		2
Mesripour Azadeh	Orlistat induced alterations in depressive behavior in mice after BCG inoculation	P203		3
Leila Dargahi	Effects of Exosomal miRNA on Spatial Memory Performance in Alzheimer's Animal Models: A Systematic Review and Meta-analysis	P204		4
Nahid Sarahian	Interplay of MeCP2/REST/Synaptophysin-BDNF and intranasal oxytocin influence on Aβ-induced memory and cognitive impairments	P205		5
Hakimeh Saadati	Effects of developmental period manipulation of the serotonergic system on spatial memory, brain derived neurotrophic factor (BDNF) levels and morphology of the neurons in the hippocampus	P206		6
Hakimeh Saadati	The effects of postnatal serotonin depletion on cognitive functions in sleep-deprived male rats	P207		7
Mohammadreza Soltani	The Role of Estrogen Receptor Beta (ERβ) in Modulating Alzheimer's Disease Progression	P209		8
Mahdiar Salmani	Yoga vs. Aerobic Cycling: Effects on Stress, Fatigue, and Motor Performance in Multiple Sclerosis Patients	P210		9
Afternoon Session (12-13:40), Wednesday, February 4th, **Neurophysiology/Neuropharmacology**				
Elham Soleimani	Investigation of Tfam, a Mitochondrial Biogenesis Factor, Following 40 Hz White Light Exposure in an STZ-Induced Alzheimer's Model	P211		1
Ali Samii Moghaddam	Low-frequency Communication from Olfactory Bulb to Prefrontal Cortex in Anxiety-like behaviors	P212		2
Ali Samii Moghaddam	Anxiety-Induced Enhancement of Beta OB-PFC Functional Connectivity	P213		3

Ashkan Sanaeirad	Olfactory Bulb Stimulation Attenuates Depression-like Behaviors in Rats Subjected to Chronic Unpredictable Mild Stress (CUMS)	P214	**12-12:10**	4
Rezvan Sohrabi	Neuroprotective Efficacy of Quercus infectoria Gall Nanoparticles against Toxoplasma gondii-Induced Neuroinflammation and Cognitive Impairment	P215		5
Seyedeh Saboura Seyedan	Safranal alleviates schizophrenia-like symptoms in mice	P216		6
Manzarbanoo Shojaeifard	Anacyclus pyrethrum Treatment Restores Spatial Learning in Rats with Alzheimer-Like Pathology	P217		7
Yasaman Shakouri	'Cerebral Ischemia-Reperfusion-Induced Cardiac Oxidative Stress, Apoptosis and TLR4/NF-κB Signaling Alterations: The Effect of Losartan	P218		8
Mersedeh Shamsedin	Protective Effects of Acute Psilocybin on Aluminum Chloride-Induced Learning and Memory Deficits in Zebrafish Larvae	P219		9
Masoud Shahraki	Intracerebroventricular administration of NaHS ameliorated cognitive disorder by regulating hippocampus H2S/Thioredoxin-1/NMDA axis in PCOS	P220	**12:10-12:20**	1
Fatemeh Shahsavari	Quercetin Nanoemulsion Reduces Cognitive and Motor Deficits in Essential Tremor Mice	P221		2
Hamid Shokati Basir	Underlying mechanisms of the neuroprotective effect of L-carnitine against Alzheimer's disease-associated spatial cognitive decline: An in vivo study	P222		3
Mohammad Sheibani	Anti-inflammatory and protective effects of Aripiprazole on TNBS-Induced colitis and associated depression in rats: Role of kynurenine pathway	P223		4
Ali Nakhaei	Harnessing the Role of Insulin Growth Factor in Glioblastoma Multiforme: A Comprehensive Review	P224		5
Siavash Saloori	Oral administration of Crocin reverses memory loss induced by ethanol and nicotine abstinence in adolescent male rats	P225		6
Reza Sarraf Far	Chronic effects of vitamin D3 on motor function and key molecular markers of Parkinson's pathology in a 6-OHDA rat model	P226		7
Mahdiyeh Safary	The interaction between the cholinergic system and dextromethorphan on depression-like behaviors	P227		8

Mahdiyeh Safary	The synergistic effect of dextromethorphan and mecamylamine on anxiety-like behaviors in mice	P228		9
Elaheh Taheri	The effect of ferulic acid on anticonvulsant drugs carbamazepine and sodium valproate in kainic acid-induced seizure model in mice	P229	**12:20-12:30**	1
Mahsa Taheri mirghaed	Effect of ZnO nanoparticles coated with Eucalyptus camaldulensis essential oil on inflammatory pain in male mice: intraction with NMDA receptor	P230		2
Amineh Sadat Zahiri Pour	Domperidone Reduces Morphine Reward and Facilitates Extinction Through Hippocampal Dopamine D2 Receptor Regulation in Rats	P231		3
Nadia Abedi omali	Comparative Effects of Voluntary and Forced Exercise on Cognitive Performance and Hippocampal Integrity in a Rat Model of Post-Traumatic Stress Disorder	P232		4
Zahra Aalidaei	Effects of Cannabidiol on Inflammatory Pain: A Formalin Test Evaluation	P233		5
Nasim Abaspour	Pioglitazone Mitigates TMT-Induced Cognitive and Biochemical Deficits in Rats: Focus on Oxidative and Inflammatory Biomarkers	P234		6
Farzaneh Abdollahi	Does Sex Influence Brain Function and Behavior in a Rat Model of Diabetic Nephropathy	P235		7
Amer Abdoulla Nezhad banadery	The effect of hesperidin on neuroinflammation and JNK/C-jun signaling pathway in a reserpine-induced Parkinson's disease model	P236		8
Yegane Abdolahi	Ascorbic Acid Attenuates Stress-Induced Cognitive Dysfunction in Adolescent Male Rats via Behavioral, Biochemical, and Electrophysiological Modulations	P237		9
Nikta Azizi Tafti	Evaluation of Acetyle choline esterase and butyrylcholine esterase inhibitory activity of Capparis spinosa L fruit extract and fractions	P239	**12:30-12:40**	1
Elham Alaee	Effects of Prenatal Opioid Exposure on the Developing Brain: A Comprehensive Review	P241		2
Mohaddeseh Sadat Alavi	The beneficial effect of berberine on behavioral impairments and oxidative stress induced by cuprizone	P242		3
Shayan Aliakbari	Unraveling the HCN1 channel role in the epileptogenesis process using a lentiviral vector carrying shRNA-HCN1	P243		4

Azam Alinaghipour	Nanocurcumin prevents stress induced anxiety like behavior by modulating hippocampal tight junctions and NMDA receptors	P244		5
Fateme Amarloo	Neuroimmune and Inflammatory Interactions in the Onset and Regulation of Infectious and Psychiatric Disorders: A Multidisciplinary Perspective	P246		6
Elahe Amohashemi	Effects of temporary inactivation and microinjection of GABAB receptors agonist into the lateral habenula on morphine-induced conditioned place preference	P247		7
Pouya Gharavi	From Blood to Vision: Platelet-rich plasma as novel strategy in Age-related macular degeneration treatment - A Systematic Review	P248		8
Fatemeh Gholami	Nuroproective Effects Of Hydroxytyrosol On Hippocampus in a PTZ_Induced Seizure Model	P251		9
Elaheh Gheybi	Folic Acid-Conjugated Chitosan Nanoparticles for Neuroprotection in Parkinson's Disease Model	P252	**12:40-12:50**	1
Homa Fazeli Kakhki	Herbal Nanoparticles: Bridging Traditional Medicine and Modern Science in Epilepsy Treatment	P253		2
Nafiseh Faraji	Combined and Individual Effects of Spirulina and Exercise Training on Behavioral, Biochemical, and Histological Outcomes After Traumatic Brain Injury in Male Rats	P254		3
Fatemeh Farrokhzadeh	Metformin supplementation during gestation and lactation rescues learning and memory deficits in a rodent model of febrile seizures: Targeting oxidative stress and pro-inflammatory cytokines	P255		4
Mahdieh Farhanji	Minocycline attenuated long-term effects lipopolysaccharide on liver tissues in mice	P256		5
Fallahi Hosseinpoor Maryam	The effect of social hierarchy on anxiety-like behaviors in different stages of the development of male rats	P257		6
Sepideh Ghazvineh	Investigating Brain Regions Apoptosis in Rat Model of Autism	P260		7
Amir Ghanbari	Fluvoxamine improve cell senescence induction by D-galactose on neural stem cells via balancing oxidant - antioxidant activity and anti-inflammatory properties	P261		8
Mahbobeh Kamrani Mehni	The Toll Like Receptor 1/2 Ligand Pam3cys reduces TBI-induced damage size	P262		9

Asma Karimzadeh	Impact of Resistance excersice on Motor Performance of male rats During Exposure to Electromagnetic Fields	P263	**12:50-13**	1
Amirhossein Karimi	Thymol Promotes Neuroprotection in a Preclinical Model of Acute Traumatic Brain Injury	P264		2
Mohammad Amin Karimi Kuzehgaran	A Systematic Review of the Role of Magnetic Nanoparticles in Mechanotransduction and Neural Repair	P265		3
Mohammad Amin Karimi Kuzehgaran	Neurophysiological alterations in the prefrontal cortex and limbic system during addiction therapy: an indication of neuronal adaptability and brain network restructuring.	P266		4
Somaye Keshavarz	Stereological Evaluation of Teriflunomide Neuroprotection in the Hippocampus Following Traumatic Brain Injury in Rats	P267		5
Ravieh Golchoobian	Hippocampal Klotho and the Neurotrophic Factor BDNF Mediate the Neuroprotective Effects of Metformin Against ICV-STZ-Induced Cognitive Deficits	P269		6
Negin Golestani Eraghi	Consequences of Long-Term Excessive Vitamin B9 Supplementation Before and During Gestation on Spatial and Avoidance Memory in Rat Offspring	P270		7
Akram Mohammadi	3-Acetyl-11-keto-β-boswellic acid (AKBA) attenuated 6-hydroxydopamine (6-OHDA)-induced toxicity in SH-SY5Y cells via modulation of Akt/mTOR pathway	P271		8
AmirMohammad Ganjali	The Role of Gut Microbiota in Depression: A Focus on Probiotic Interventions — A Systematic Review	P272		9
Mohadeseh Giahi	Chronic Ceftriaxone Administration Modulates Synaptic Plasticity in the Rat Hippocampus	P273	**13-13:10**	1
Negin Givechian	Title: Sex-dependent effects of adolescent morphine exposure on anxiety-like behavior in adult rats	P274		2
Vida Mafikandi	Mitotherapy improves depression and anxiety induced by restraint stress via modulating neuroinflammation	P275		3
Majid Motaghinejad	Unveiling the Neuroprotective Role of Oxytocin against Alcohol-Induced Neurotoxicity and Neurobehavioral Changes	P276		4
Narges Mohebbi	Evaluation of Avoidance Memory Using the Elevated Plus Maze and the Effects of Donepezil on Bisphenol A-Induced Cognitive Impairments in a Rat Model	P277		5

Mahya Mohamadi	Hippocampal Edema Progression After Conditioned Fear in Male Rats	P278		6
Fatemeh Mokhtari Naseri	Modulatory effects of fecal microbiota transplantation on D-Galactose-Induced Aging Disorders in Male Mice: A Neuroscientific and Microbiological Investigation	P279		7
Fatemeh Mokhtari Naseri	Exploring Fecal microbiota Transplantation impact on aging-related cognitive disorders in D-galactose-treated male mice	P280		8
Golsa Modiri	Effects of Ceftriaxone on Seizure Development, Locomotor Activity, and Anxiety-Like Behavior in PTZ-induced epileptic rats	P281		9
Sakineh Sadat Mortazavi Sani	Neuroprotective and Spatial Learning improving effects of cilostazol in Amnesic Rats	P282	**13:10-13:20**	1
Sakineh Sadat Mortazavi Sani	Cilostazol Enhances aversive Memory and Modulates Cholinesterase Activity in Rat	P283		2
Daniyal Mosafri Poodine	The effect of migraine headache on nutritional behavior of male rats	P284		3
Iliya Masoudi	Interactive Effects of Estrogen Depletion and Stress on anxiety-like behaviors, recognition & location memory, and hippocampal neurotrophic factor (BDNF) in rats	P285		4
Negin Mesrian Jahromi	The effect of lithium chloride on cognitive-behavioral deficits and hippocampal expression of pro-/anti-inflammatory cytokines in rat model of Alzheimer's disease	P286		5
Iliya Moslehi	The Effect of Flurbiprofen on Oxidative Stress Levels in the Experimental Animal Model of the Seizure	P287		6
Ashkan Moallemi	The alleviating effects of Vitamin D3 on nicotine withdrawal-induced anxiety and depression-like behaviors: Exploring the roles of oxidative stress, inflammation, and serotonin system alterations	P288		7
Samira Moghadasi	Magnesium sulfate increased Discrimination Index in an AlCl3-induced Alzheimer's rat model	P289		8
Exercise, Environmental & Developmental Physiology				
Mansoureh Karimi	A narrative review of guidelines for women in mountain sports and altitude training	P958		1
Maryam Karimian	The Effect of High-Intensity Interval Swimming Training on β-Aminoisobutyric Acid (BAIBA) of Rats' Soleus with Nonalcoholic Fatty Liver Disease	P959		2

Hesam Parsa	The effect of simultaneous swimming training (interval-aerobic) and capsaicin supplementation on the inflammatory factor IL6 and the antioxidant factor NRF2 in the liver of aged male rats.	P960	**13:20-13:30**	3
Sara Soltanipour	Effects of three types of 8-week aerobic trainings and probiotic consumption on serum levels of irisin and total antioxidant	P961		4
Hamid Azizi Malekabadi	Modulatory Effects of Flaxseed Oil and Endurance Exercise on TGF-β, BMP, and mTOR Gene Expression in Adult Mice with Muscle Atrophy	P962		5
Seyede Somayyeh Yousefi	Effect of eight weeks plyometric training with and without blood flow restriction on three-step height jump, agility and anaerobic power in female volleyball players	P963		6
Saideh Dadpisheh	10 Weeks Endurance Training on Functional and Inflammatory Indices in Heart of Renovascular Hypertensive Rats:Role of Fortilin,miR21-5p,circRNA0031672 and Mitochondrial Quality	P964		7
Mohamumad Reza Jafari	Effects of Four weeks of Resistance Training under Hypoxic Conditions on Quadriceps Muscles Hypertrophic In Healthy Men	P965		8
Seyedeh Soolmaz Mahdioun	The Effectiveness of a 2-Month Course of Cyclic Yoga Practice on the Glycemic Indices of Type 2 Diabetic Women with NAFLD	P966		9
Seyedeh Soolmaz Mahdioun	The Effectiveness of a 2-Month Course of Cyclic Yoga Practice on the IGF-1 Hormone of Type 2 Diabetic Women with NAFLD	P967	**13:30-13:40**	1
Mahsa Shamsaldin saeid	Endurance Training on Functional Indices and Oxidative Stress in Heart of Rats with Renovascular Hypertension:Role of Ninjurin1,miR125a-5p,miR22-3p and Mitochondrial Dynamics	P968		2
Hafez Safari	Effectiveness of Muscle Relaxation Exercises on Psychological and Physiological Indicators of Long-Distance Runners	P969		3
Zohreh Shabani poor	Determining the relative share of aerobic and anaerobic power in the performance of adolescent girls basketball	P970		4
Hamidreza Choobdari	Combined Capsaicin and Interval Exercise Synergistically Reduce Inflammatory Markers and Boost Humoral Response in Aged Rats	P971		5

AhmadAli Barzgar	The Effect of Eight Weeks of Combined Resistance and Aerobic Training on Heart Rate and Quality of Life in Middle-Aged Men with Kidney Failure	P972		6
Evening Session (14:10-16), Wednesday, February 4th, **Neurophysiology/Neuropharmacology**				
Mobina Mahdizadeh	Protective effects of Cocos nucifera L. oil against neural damage in a rat model of pentylenetetrazole - induced seizure	P291	**14:10-14:20**	1
Seyyedeh Diman Mahdi	Survey of modulatory effects of prazosin and yohimbine on induced spike-timing-dependent plasticity of ventral tegmental area neurons in rats.	P292		2
Delnia Mehrafarin	Yohimbine has the same potency as prazosin in the induction of spike-timing- dependent plasticity of the locus coeruleus neurons in rats.	P294		3
Seyedeh Sana Nasehi	Spatial Memory Deficit in Letrozole-Induced Polycystic Ovary Syndrome Rat Models	P296		4
Nasim Naseri	Improving the Sodium Butyrate Neuroprotective Properties using Niosome Nanoparticles in the Cortex of Ischemic Rats	P297		5
Reihaneh Nazarzadeh Oghaz	AT1 Receptor Blockade Selectively Attenuates Inflammation-Induced Anxiety-Like Behaviors in Mice	P298		6
Maryam Nazari	Neuroprotective Effects of 40-Hz White LED Photobiomodulation in a D-Galactose-Induced Aging Rat Model	P299		7
Marjan Nikbakhtzadeh	Deep brain stimulation: a key to blocking the effects of morphine	P300		8
Ali Nikzad	Effects of Simvastatin on Memory Parameters Assessed by the Elevated Plus Maze in a Bisphenol A-Induced Rat Model	P301		9
Seyedeh Yasamin Hashemi.baraz	Vitamin C reduced anxiety and depression from chronic mild stress in adolescent rats by modulating oxidative balance	P302	**14:20-14:30**	1
Shaghayegh Vahedi	Dose-Dependent Effects of Donepezil on Working Memory in the Y- Maze Test in a Bisphenol A-Induced Rat Model	P303		2
Ali Vesalimahmoud	The Effect of Piroxicam on Serum Oxidative Stress Markers in Male Wistar Rats with PTZ-Induced Seizures	P304		3
Omid Yadegar Khosraviyeh	Pseudomonas aeruginosa Exotoxins Orchestrate Chronic Pain: Direct Neuronal Sensitization and Immunological Priming	P305		4

Salaheddin Zarei	Nitric Oxide in the Neural Regulation of Appetite: A Review of Mammalian and Human Studies	P306		5
Aliyeh Bashghareh	Evaluation of Atorvastatin and Forskolin on Neuronal Survival and Memory	P307		6
Shahein Momenabadi	Oxytocin and Brain Ischemia: Pathophysiological Mechanisms and Therapeutic Perspectives	P308		7
Leila Mohammadi	MicroRNA-103a (miR-103a) reverses memory and learning impairments caused by polystyrene microplastics	P309		8
Zahra Abutorabi	Therapeutic effects of zinc oxide nanoparticles synthesized with Rosa damascene extract on spatial learning and memory in a streptozocin-induced Alzheimer's rat model	P311		9
Roksana Imagh	Mitochondrial Transplantation Mitigates 6-OHDA-Induced Motor Deficits in Wistar Rats	P312	**14:30-14:40**	1
Jaleh Bagheri Hamzyan Olia	Role of Gut Microbiota Dysbiosis and Metabolites in Alzheimer's Pathogenesis: Personalized Therapeutic Approaches	P313		2
Jaleh Bagheri Hamzyan Olia	Neuroimmune Mechanisms and TRPV1–CB2 Signaling in Response to Chronic Stress	P314		3
Mobin Pourhamadi	Effects of Two Intermittent Fasting Models on Cognitive memory in the Presence and Absence of Sucrose in Adult Male Mice	P315		4
Salma Sadat Tavakoli Esfahani	Effect of Concurrent Exercise Preconditioning on CD86 Gene Expression and Learning Performance Following Ischemic Stroke in Aged Rats	P316		5
Bagher Jafarvand Geiklou	The Gut-Brain Axis in Alzheimer's Disease: From Pathogenesis to Microbiome-Targeted Therapies	P317		6
Pegah Javadpour Nari	Mitochondrial transplantation as a therapeutic strategy in brain disorders	P318		7
Alireza Jowhari	The effect of interval training on the lactate receptor protein index (HCAR1) of the hippocampal tissue of male rats with fatty liver	P319		8
Fatemeh Chaji	Increased Anxiety-Like Behaviors Following Exposure to Electromagnetic Fields: Analysis of Acute and Long-Term Models	P320		9

Parinaz Hajeforoosh	Investigating the effect of nanoencapsulated cuminaldehyde on catalase enzyme activity in the cerebral cortex of PTZ-induced epileptic mice	P321	**14:40-14:50**	1
Zahra Dolati	Impact of CYP2D15 Polymorphisms on Opioid and Antidepressant Metabolism in Dogs	P322		2
Nassim Rastgar	Preclinical Evaluation of the Therapeutic Effects of Oral Astaxanthin on Spinal Cord Injury Recovery	P323		3
Reza Ramzani Lehmali	Investigating the Effect of Nanocumin Aldehyde on Avoidance Memory in a PTZ-Induced Epilepsy Animal Model	P324		4
Zahra Sepehri	New bone-derived nerve conduction channels for peripheral nerve regeneration: an in vivo study	P325		5
Farzaneh Shakeri	Neuroprotective actions of wogonin against PTZ-triggered convulsions and oxidative stress in mice	P326		6
Saleh Sadeghi	The effects of progesterone administration and pre-training on learning & memory, anxiety-like behaviors, and balance impairments following traumatic brain injury in male ratss	P327		7
Hamid Ahmadpourmir	Carbenoxolone as a modulator of pain and inflammation: evidence from experimental and clinical studies	P328		8
Fatemeh Abbaszadeh	Exploring the Off-Label Potential of Antidepressants in Alzheimer's Disease via Neuroinflammatory Pathway Regulation	P329		9
Fatemeh Aghighi Bidgoli	Probiotic Intervention Reverses Hippocampal BDNF and MicroRNA Expression Alterations Induced by Prenatal Unpredictable Stress in Offspring	P330	**14:50-15**	1
Ghazal Karimi Jashni	Liraglutide Improves Fear Memory in Rats Subjected to Chronic Cerebral Hypoperfusion	P331		2
Seyed Morteza Karimian	β-Glucan improves memory impairment in an animal model of aging	P332		3
Farzaneh Latifnia	The role of mitochondrial dysfunctions in neurodegenerative diseases	P333		4
Shahein Momenabadi	Daphnetin Preconditioning Confers Neuroprotection by Suppressing TXNIP/NLRP3-Mediated Inflammatory Pathways Following Global Cerebral Ischemia/Reperfusion in Mice	P334		5

Reihaneh Mirabzadeh	Effect of fetal life noise stress on neuropathic pain induced by chronic constriction injury (CCI) of the sciatic nerve in male rats	P335		6
Mohammad Hosein Hemmati	Promotion of Neurological and Histological Recovery by Mefenamic Acid After Severe TBI in Rats	P336		7
Mohammad Hosein Hemmati	Therapeutic Effects of Riboflavin on Functional Recovery and Cortical Histology Following Traumatic Brain Injury in Rats	P337		8
Zeynab Golara	Title: Efficacy and Mechanisms of High-Dose Biotin in Progressive Multiple Sclerosis: A Critical Review	P338		9
Sayyed Alireza Talaei Zavareh	Prenatal Unpredictable Stress Alters Hippocampal Tight Junction Expression: Ameliorative Effects of Probiotic Treatment in Adult Offspring	P339	**15-15:10**	1
Atefeh Arab Firozjae	Thiamine hydrochloride-loaded niosomes: Formulation, characterization, and therapeutic efficacy in Cuprizone-induced demyelination in C57BL/6 mice	P340		2
Pegah Javadpour Nari	Mitochondrial transplantation as a therapeutic strategy in brain disorders	P341		3
Leila Dargahi	The Effect of SGLT2 Inhibitors on Depressive Disorders in Non-Diabetic Context: A Systematic Review	P342		4
Mahdieh Sadat Hosseini	Comparative effects of high-intensity interval training and mesenchymal stem cells on long-term memory and spatial learning in amyloid-β-induced Alzheimer's disease in male rat model: the role of oxidative stress, inflammation, and BDNF	P343		5
Akram Mohammadi	Electrochemical Nanosensor Based on Au/PAMAM-Decorated Multi-Walled Carbon Nanotubes for Evaluating Dopamine Release from SH-SY5Y Cells: Effect of AKBA in a Cellular Model of Parkinson's Disease	P346		6
Maedeh Amiri-Shahri	Preclinical Behavioral Outcomes of Combined Stem Cell and Nanodrug-Loaded Scaffold Treatment in Spinal Cord Injury: A Preliminary Report	P347		7
Sarah Ravankhah	Investigation of Pregnenolone Effects on Proliferation and Differentiation of Adult Male Mouse Hypothalamic Neural Stem Cells	P348		8

Soheil Aminizadeh	High-intensity interval training (HIIT) and lactate protect against sleep deprivation-induced memory impairment: role of the PKA-CREB-BDNF-Cofilin signaling pathway	P349		1
Medical Education, Artificial Intelligence And Innovations				
Sobhan Mehrafshan	Discovering Multitarget Propolis drug Compounds for Asthma disease via in bioinformatic and chemoinformatic approach	P350		2
Nilufar Totonchi	Physiological and Behavioral Changes in Uncertainty and Constraint Conditions: Decision-Making at the Last Chance of Iowa Gambling Task	P351		3
Mohammad Mahdi Ajalli	AI-Powered Immersive Learning: Transforming How We Teach Musculoskeletal Physiology and Pharmacology After COVID	P352		4
Maryam Behmadi	A scientometric evaluation of Iran's research output in the subject area of medical physiology	P353		5
Moslem Najafi	Using computer simulation to teach the pharmacology of cardiovascular drugs	P354		6
Tahereh Eteraf-Oskouei	The quality of Iranian and foreign Patient Package Inserts: what do Tabriz pharmacists say	P355	**15:10-15:20**	7
Elham Esmaeil-Jamaat	Comprehensive Pathway Analysis of Citicoline in Neuropathic Pain Treatment: An Integrative Bioinformatics Study	P356		8
Sanaz Tayyebinejad	The Impact of Cybersickness on Learning and Academic Performance in Virtual Reality-Based Education: A Review Study	P357		9
Mohammad Pouya Baghishani	Molecular Insights into the Paradoxical Effects of Berberine During Pregnancy: In silico investigation	P358	**15:20-15:30**	1
Ali Sepehrinezhad	Bioinformatics insights into the molecular basis of neurological involvement in monkeypox infection	P359		2

Amin Esmaeily	Molecular Docking Insights into Heterocyclic Sulfonamide Derivatives Binding with Human Serum Albumin	P360		3
Azade Banezhad	The Role of Psychological Resilience in the Primary Prevention of Addiction with an Emphasis on Nursing Interventions: A Systematic Review	P361		4
Parvane Reyhaneh	Machine Learning Prediction of Input Resistance Alterations in Cerebellar Purkinje Cells under Whole-Cell Current-Clamp Recording	P362		5
Fatemeh Pourhakim	The latest achievements of CRISPR in disease treatment	P363		6
Maryam Hosseini Mohammad Abad	Self-Medication Practices and Their Consequences	P364		7
Ali Hakimi	Designing Novel TARR Binding Site agonists: Insights from Molecular Docking, Structure-based Design, Virtual Screening, and Molecular Dynamics Simulation	P365		8
Amirehsan Heydari	A Systematic Review on the Role of Virtual and Augmented Reality in Physiology and Pharmacology Education	P366		9
Reza Dehghani	The Role of Artificial Intelligence in the Advancement of Pharmacology Toward 2030: A Review Article	P367		1
Behnam Rafei	Reprogramming Laccase Catalysis: Advances in Enzyme Engineering for Pharmaceutical and Biomedical Applications	P368		2
Tanin Sadat Rezaei	In Silico Investigation of Saffron's Non-Volatile constituents on Male and Female Fertility: Molecular Insights	P369		3
Fateme Sadat Seifhashemi	The Role of Artificial Intelligence in Simulating Epidemiological Models for Training on Rational Antibiotic Use and Preventing Resistance on Farms	P371		4
Mahdi Saghiri Ganjeh	Application of Rapid Sequence Induction in Emergency Abdominal Surgery: A Case report from a Trauma Center in Iran	P372		5
Mahsa Farid-Habibi	Investigating Shared Molecular Mechanisms in Human Glioblastoma and the Rat Model Using a Systems Biology Approach	P373	**15:30-15:40**	6

Saber Ghaderpour	Computational Analysis of N-acetylcysteine's Effects on Alzheimer's Disease: Identification of Potential Targets and Molecular Pathways	P375		7
Arshida Mahmoodi	Ethics in the Use of Artificial Intelligence in Medicine	P377		8
Roham Mazloom	Challenges of Using Artificial Intelligence in Physiology Education	P378	**15:40-15:50**	1
Elahe Yaghoubian	Physiological Manifestations in Strategic Decision-Making under Conditions of Uncertainty: Insights from the Iowa Gam-bling Task	P380		2
Zahra Haghshenas	MiR-27a as a Potential Glioma Diagnostic Marker: A Deep Learning Approach	P381		3
Hamidreza Raoufinezhad	Elucidating the Molecular Basis of Dapoxetine's Rapid-Onset "On-Demand" Efficacy in Erectile Dysfunction: An In Silico Study	P382		4
Zahra Kiani	Comparing escape room and conventional methods in medical students' learning, satisfaction, and perceptions in rational drug prescribing	P383		5
Alireza Salmani	Bacoside A Targets in Alzheimer's Disease: A Network Pharmacology Investigation	P384		6
Mohammad Mahdi Ajalli	Augmented Reality Tools for Teaching Rheumatology: Making Autoimmune Joint and Tissue Damage Finally Click for Students	P385		7
Qazal Esmaylpur	Computational Neuroscience for Neuropharmacologists: Models, Processes and Advantages	P386		8
Mostafa Amiri	The Impact of English Content of Digital Platforms on Adolescents' Brain Structure: the Perspective of Neurophysiology of Emerging Media	P387		9
Mostafa Amiri	Evaluating Quality of Machine Translation Using Artificial Intelligence in Pharmacology Education: A Systematic Review	P388	**15:50-16**	1
Aida Toobchi	Identification of Differentially Expressed Genes and Hub Pathways in Ileal Crohn's Disease via Integrated Bioinformatics Analysis	P389		2
Sara Ghasemi	Pharmacokinetics of Novel Anti-inflammatory Drugs in Canines: A Comparative Study	P391		3
Qazal Esmaylpur	Precision Dosing in Neurology: Focusing on Novel Achievements Today	P392		4

Morning Session (9:50-12), Thursday, February 5th,

Endocrine, Gastrointestinal, Nutrition & Metabolic Physiology/Pharmacology

Name	Title	Code	Time	Monitor
Mahdieh Farhanji	Minocycline attenuated long-term effects lipopolysaccharide on liver tissues in mice	P400	9:50-10	1
Fateme Jalalvand	Investigating the Relationship Between Precocious Puberty and Vitamin D	P401		2
Mojdeh Abdollahi	Protective effects of the camphor against thioacetamide-induced liver injury in rats	P402		3
Maryam Lotfi Gharaie	Investigating the role of glutamatergic system on food intake caused by gastric inhibitory polypeptide in broilers	P403		4
Samad Nazemi	Dose-Dependent Effects of Ziziphora tenuior Hydroalcoholic Extract on Hyperglycemia and Dyslipidemia in Streptozotocin-Induced Diabetic Mice	P404		5
Sepideh Ahmadi	The Effect of Simultaneous Treatment of Sitagliptin and Alphalipoic acid on Sperm Quality in Diabetic Mice	P405		6
Fariba Azarkish	High-Calorie Diet Impairs Maternal Metabolic Adaptation and Pancreatic Function during Pregnancy-Lactation in Rats	P406		7
Aidin Amini Sefidab	How does HRT affect endometriosis lesions	P407		8
Akram Aminian	The effect of HRW on the condition of induced models of clinical hypothyroidism & subclinical hypothyroidism with a systemic approach on liver tissue	P408		9
Banan Khojasteh Seyed Mahdi	Study of the effects of vanadium-zinc complex on histology and oxidative stress indices of liver in type II male diabetic rats	P409	10-10:10	1
Zahra Bayat	Response of New Markers of Fatty Liver to Two Months of HIIT Training in Type 2 Diabetic Women with NAFLD	P410		2
Reyhaneh Moghaddam Habibzadeh	The Influence of Stress Hormones on Ovarian Function and Sperm Quality	P411		3
Fereshte Torabi	Effect of platelet lysate loaded in chitosan nanoparticles on ovarian function in cyclophosphamide-induced premature ovarian failure in BALB/c mice	P412		4

Hajiasgharzadeh Khalil	Predicting Anti-TNF Therapy Outcomes in Ulcerative Colitis: Insights from Oxidative Stress Markers	P413		5
Babak Hassankhan	Drug repositioning study on the effect of Propranolol fDrug repositioning study on the effect of Propranolol for high fat diet-Induced hyperglycemia and hepatic lipid accumulation in Rats or high fat diet-Induced hyperglycemia and hepatic lipid accumulation in Rats	P414		6
Hosseini Dastgerdi Azadehalsadat	The effect of magnesium on reducing insulin resistance in the cardiovascular system	P415		7
Hosseini Mohammad Abad Maryam	Evaluation of the Most Important Supplements During Pregnancy	P416		8
Atefeh Heidar Ammameh	Optimal Doses and Protocols for Streptozotocin (STZ) and Alloxan in Experimental Diabetes Induction	P417		9
Parinaz Khadank nikfarjam	Acquired, Environmental, and Immunological Factors in Male Infertility: From Lifestyle to Disease	P418	**10:10-10:20**	1
Amirreza Khamineh	Plasmalemma Vesicle-Associated Protein in Energy Homeostasis and Precision Anti-Obesity Therapy: A Systematic Review	P419		2
Samaneh Sadat Alavi	The effect of agmatine on the regulation of the sexual cycle stages of female rat offspring affected by stress during pregnancy	P420		3
Fereshteh Dadfar	Effects of electromagnetic waves emitted from MRI on changes in pituitary-gonadal axis hormones	P421		4
Mehmannavaz Hemn	Effect of Fasting on Feed and Water Intake in Neonatal Broiler Chicks Under Normal Temperature Following Lipopolysaccharide Injection	P422		5
Nader Shahrokhi	Dental Pulp Stem Cells and Their Exosomes: Ameliorating Hepatic Fibrosis in a CCl_4-Induced Rat Model	P423		6
Melika Rafizadeh	Investigating the effects of Losartan on improvement of liver status in non-alcoholic fatty liver disease (NAFLD) model in Zebrafish	P424		7
Hooman Ravaei	Study of the spermatogenic effect of narcissus extract in azoospermic rat model using histopathological criteria	P425		8

Zohreh Zavvari Oskuye	Exercise and insulin glargine administration in mothers with gestational diabetes improve the apelinergic system function and lipid profile in male offspring	P426		9
Mohammad Saroughi	The Effects of Hydrogen-Rich Water on Gut Microbiota and Related Health Outcomes: A Systematic Review	P427	**10:20-10:30**	1
Mohammad Saroughi	Evaluating the Histopathological Effects of Hydrogen-Rich Water on Testicular and Epididymal Structure in Obese Rats	P428		2
Samaneh Sepahi	Pharmacogenomic for diabetic retinopathy	P429		3
Kimia Satari	Emerging Indices in the Assessment of Anemia and Thrombocytopenia Pathophysiology in Humans, Dogs, and Cats: An Analytical and Comparative Review	P430		4
Atena Soleimani	Evaluation of the Therapeutic Efficacy of EW-7197 in Reducing Post-Surgical Adhesion Formation	P431		5
Reza Shamsi	The effect of hydroalcoholic extract of black hawthorn on histopathological structure and myeloperoxidase level of epididymis following testicular ischemia-reperfusion	P432		6
Forouzan Sadeghimahalli	Metformin in combination with naringenin improved insulin resistance in high fructose-fed mice	P433		7
Mehmannavaz Hemn	Effect of Fasting and Free Feeding on White Blood Cell Count and Serum Lipid Profile in Broiler Chicks under Normal Temperature Following Lipopolysaccharide (LPS) Injection	P434		8
Seyyedeh Fahimeh Talebi	PCOS Improvement by Chlorogenic Acid via miR-93-5p and NF-κB/NLRP3/TLR4 Pathway Modulation	P435		9
Anahita Amiri	The Role of SGLT2 Inhibitors in the Multifaceted Management of Diabetes: Beyond Glycemic Control	P436	**10:30-10:40**	1
Sevda Abdolhosseinvand	Effect of High-Fat Diet On Sciatic Nerve Nitric Oxide Levels and Peripheral Neuropathy in Type 2 Diabetic Rats	P437		2
Mahsa Attarian	Anti-Inflammatory Effects of PGP on Post-Surgical Peritoneal Adhesions in a Rat Uterine Horn Adhesion Model	P438		3
Parisa Azimi	Hormonal and Genetic Underpinnings of Male Infertility: A Physiological Insight	P439		4
Farzaneh Farajian Mashhadi	Comparative study of analgesic effect of Vitagnus and Fennel extracts on Primary Dysmenorrhea	P440		5
Mahdieh Gheysipour	Impact GLP-1Ras in Hepatic Insulin Resistance	P441		6

Hanieh Keikhay Moghaddam	Probiotic Supplementation as an Adjunct Therapy in Type 2 Diabetes: Insights from the Gut–Pancreas Axis	P443		7
Morteza Garmei	The relationship between obesity and types of anemia	P444		8
Amir Goli	The effect of probiotic supplements on metabolic factors after Roux-en-Y (RYGB) surgery	P445		9
Hamidreza Golian	From Molecule to Clinical Function: Metabolic Inhibition in Type 2 Diabetes with Recombinant NMP Protein; Glucose Reduction and Lipid Profile Modification in Rats	P446	**10:40-10:50**	1
Negin Motavalizadeh kakhki	The Role of Circulatory Disorders and Anatomical Abnormalities in Male Infertility	P447		2
Hosein Motlagh	The Interplay Between Glucose Metabolism and SARS-CoV-2: Implications for Diabetes, Insulin Resistance, and COVID-19 Severity	P448		3
Atefeh Maghsoudi	Impact of Desloratadine on Kidney Function Disorders Induced by Ischemia/Reperfusion in Male Rats	P449		4
Maryam Maleki	Determining the Relationship Between Sexual Deprivation and Sex Hormone Levels in Male Rats	P450		5
Elham Karimi-Sales	Link between lifestyle and non-alcoholic fatty liver disease: The influence of nutrition and pollutants	P451		6
Keyvan Mehri	Exercise and insulin glargine administration in mothers with gestational diabetes ameliorate hypothalamic-pituitary-gonadal axis function and sperm parameters in offspring	P452		7
Azadeh Naderi	Boosting Pain Tolerance: The Power of Aerobic Exercise and Chamomile Flower Hydroethanolic Extract in Type 2 Diabetic Rats	P453		8
Seyed Farzam Nezam Alhosseini	Investigating the Effects of Induced Ulcerative Colitis on Heart Rate Variability in Isolated Hearts of Male Rats	P454		9
Razieh Hashemian	Thyroid Hormonal and Structural Changes from Non-Ionizing Radiation in Rats	P455		1
Reza Varanloo	Evaluation of antioxidant capacity of melatonin in female Wistar rat kept in light pollution conditions	P456		2
Zahra Baghani	Systematic Review of Clinical Trials (2015–2025) of Nutritional, Supplementary, and Microbiota-Targeted Interventions for Managing Psoriasis and Psoriatic Arthritis	P457		3

Samane Yousefalizadeh	Title: the effect of Spirulina supplementation on lipid profile and glycemic index in type 2 diabetes: A Systematic Review	P458	**10:50-11**	4
Arefeh Rezaei BahrAbad	The Effect of Eight Weeks of Resistance Training and elderberry supplement consumption on Selected Bone Biomarkers in Overweight Middle-Aged Women	P459		5
Samane Yousefalizadeh	The clinical and biomedical effects of absorption inhibitors drugs on liver disease subjects: A systematic review of random controlled trials	P460		6
Shahla Fadaei	Effects of exposure to Sericin on serum GH, IGF and antioxidant levels following parturition in mice	P462		7
Shahla Fadaei	Effects of exposure to Sericin during gestation on brain growth factor and antioxidant levels following parturition in mice	P463		8
Fezzeh Hosseinzadeh	The effect of Kombucha Tea Pre-Treatment on Liver Enzymes and Blood Glucose in the Brain Ischemic Model Rat	P464		9
Pardis Danesh pour	The relationship between vitamin D supplementation and platelet parameters, aggregation, and blood clot formation in healthy adult male dogs: A pilot study	P465	**11-11:10**	1
Maryam Abedi	A systematic review of the impact of caloric restriction on the expression of longevity-associated genes in human fibroblast cells	P467		2
Maedeh Masoumi	The effect of vitamin D supplementation on carotid artery ultrasonographic parameters in healthy adult dogs.	P468		3
Mahdieh Nezamimajd	Protective Role of Royal Jelly in Dibutyl phthalate-induced Oxidative Injury in Mouse Ovary	P469		4
Mohammad Zabihi	Microcystins Beyond the Liver: Emerging Multi-Organ Toxicity and Long-Term Health Implications	P470		5
Mobina Sadeghi	The effect of nanomicellar urolithin on acute liver toxicity caused by acetaminophen in male rats	P472		6
Erfan Eftekhar	Exploring Curcumin's Role in Managing GI and Visceral Pathologies: From Bench to Bedside	P473		7
Afsaneh Salahvarzi	Quercetin-Based Nanostructures for Oral Delivery: A Review of Strategies to Enhance Bioavailability and Restore Intestinal Barrier Function in Inflammatory Bowel Disease	P474		8
Atena Kooti	The effect of safranal on anxiety in a rat model of ulcerative colitis	P475		9

Mahdi Lotfi	Histomorphometric and histopathological study on the intestines in methadone-treated mice	P476	**11:10-11:20**	1
Maryam Karami	The Effect of Simultaneous Use of Opium and Ischemic Preconditioning on Ischemia/Reperfusion Injury in the Rat Liver	P477		2
Maryam Kazemi	Trans-benzalacetophenone protects steatotic liver from progression to non-alcoholic steatohepatitis by targeting proteins involved in lipid metabolism	P479		3
Amir Bagher Eilkhani	ThePreventing effect of Umbellipreninon hyperglycemia in diabetic rats by activating the insulin receptor IR/PDK1 pathway	P480		4
Mahsan Akbarian	Hepatoprotective effect of nano-selenium in hypothyroid rats	P482		5
Ayda Andarzi	Effect of helium cold plasma on VEGF and CD34 in diabetic rat wound healing	P484		6
Pooya Bagheri	Inositol Role in Enhancing Oocyte Quality and Fertility in Women with Polycystic Ovary Syndrome: Systematic Review and Meta-Analysis	P485		7
Zahra Roostaee	In Vitro Effects of Fluoxetine on the Expression of Apoptosis-Related Proteins and the Quality of Normal Human Sperm	P486		8
Marjan Firouzi	Therapeutic effect of metformin on male infertility associated with oxidative stress: A review	P487		9
Behzad Mesbahzadeh	Investigating the singly and combination effects of Tadalafil and Omeprazole use on acetic acid-induced gastric ulcer model in male rats	P488	**11:20-11:30**	1
Elham Abdi	The Role of Exercise in Modulating Gut Microbiota and Intestinal Permeability in NSAID-Induced Gastrointestinal Disorders: A Systematic Review	P489		2
Elahe Kamelnia	Hepatoprotective Effects of cellulose nanocrystals on Thioacetamide-Induced Liver Cirrhosis in Experimental Rats	P490		3
Zahra Dolati	Omega-3s and *Lactobacillus* Probiotics in Canine Atopic Dermatitis: A Systematic Review and Call for Mechanistic Research	P491		4
Zeynab Yazdanpanah	Expression changes of apoptotic genes in cumulus cells in relationship to oocyte and embryo quality of polycystic ovary syndrome women undergoing ICSI: Ameliorative effect of Myo-inositol	P492		5

Mirtajaddini Goki Maryamossadat	Exercise Reverses Diabetes-Induced MicroRNA Dysregulation in White Adipose Tissue	P493		6
Reyhane Kamelnia	A Histopathological Review of Diabetic Tissue Changes and Their Association with Recurrent Pregnancy Loss	P494		7
Sepideh Moradi	Evaluation of the effect of testosterone administration on the sperm functional parameters in hypothyroid rats	P495		8
Mahdieh Sadat Mortazavi Sani	Hepatoprotective Effects of Nigella sativa Oil Against LPS-Induced liver injury in Rats	P496		9
Maryam Mahmoudabady	Effects of Endurance Exercise on Hepato-Nephropathy in Diabetic Rats	P498	**11:30-11:40**	1
Faezeh Abolhasani	The role of selenium in enhancing the survival of Sertoli cells under testicular hypoxic injury in an in vitro model	P497		2
Cellular And Molecular Physiology/Pharmacology Stem Cells And Regenerative Medicine				
Zohreh Aghaei	Wharton's Jelly–Derived Mesenchymal Stem Cell Conditioned Medium Mitigates Diabetic Cognitive Impairment via Oxidative Stress, Neuroinflammation, and Apoptosis Attenuation	P800	**11:30-11:40**	3
Fahimeh Lavi Arab	Modulatory impacts of Silybum marianum phytocompounds on stem cells from autoimmune patients	P801		4
Pari Tamri	Enhancement of wound closure rate and tissue collagen content by topical Stanozolol in a rat model of second-degree burn	P802		5
Parisa Habibi	Effect of administration of mesenchymal stem cells and exercise on brain complications and biomarkers following traumatic brain injury	P803		6
Yalda Hasanzadehghanad	Effects of Dietary Polyphenols on Viability, Differentiation, and Regenerative Function of Mesenchymal Stem Cells	P804		7
Mohammad Javad Khataee	Comparative Evaluation of the Regenerative and Anti-Inflammatory Effects of BM-MSCs, AD-MSCs, and UC-MSCs in an Experimental Model of Osteoarthritis	P805		8
Elham Zare	Therapeutic Potential of Stem Cell-Derived Exosomes in Modulating Astrocyte-Neuron Interactions in Huntington's Disease	P806		9

Zahra Soltani	Therapeutic Effects of Oral Mucosal Mesenchymal Stem Cell Administration on Pulmonary Inflammation and Oxidative Stress in a Traumatic Brain Injury Model	P807	**11:40-11:50**	1
Iman Soleimanpour	Therapeutic Potential of Mesenchymal Stem Cells in the Management of Diabetic Foot Ulcers: A Regenerative Approach	P808		2
Someyra Sistani	Optimizing Physicochemical and Biological Properties of Gelatin-Hydroxyapatite Scaffolds	P809		3
Solmaz Fallahi	Exosomes modulate the neurocognitive effects of methamphetamine: A Novel Treatment Approach	P810		4
Asiyeh Shojaee	Role postbiotic in biological potential of mesenchymal stem cells	P812		5
Narjes Seddighi	Potential Therapeutic Roles of Endothelial Progenitor Cell-derived Exosomes in Regenerative Medicine: A Comprehensive Systematic Review	P813		6
Fatemeh Safari Alamuti	Application of ChitoHeal gel in the prevention of pressure injuries caused by N95 masks	P814		7
Mahdi Abdsheikhi	Mesenchymal stromal/stem cell-derived exosomes and Parkinson's disease: A therapeutic approach to induce immunomodulatory responses	P815		8
Mahdi Abdsheikhi	Immunomodulatory and regenerative effects of melatonin-stimulated mesenchymal stromal/stem cells in diabetes mellitus	P816		9
Mohadeseh Arabhalvaei	Enhanced Bone Regeneration via Indirect 3D Printed Tragacanth-Hydroxyapatite Scaffolds	P817	**11:50-12**	1
Mohammadreza Attarnosrati	Study of the effective duration of cold helium plasma on the healing of diabetic-induced wounds in rats	P818		2
Zahra Ghafouri	Neural Stem Cell-Based Approaches for Glioma Treatment: Challenges and OpportSectionies	P819		3
Sahar Golabi	Role of the mesenchymal stem cells derived from adipose tissue in changing the rate of breast cancer cell proliferation and autophagy, in vitro and in vivo	P821		4
Zohreh Lamoochi	Neuroprotective Mechanisms of Umbilical Cord Stem Cell Medium in Cerebral Ischemia: A systematic review	P822		5
Mahtab Mottaghi	Application of Dental Pulp Stem Cell-Derived miRNA-Exosomes in Regenerative Medicine	P823		6

Afternoon Session (12-14:10), Thursday, February 5th, Cancer Pharmacology/Immunopharmacology				
Alireza Hosseinzadeh Pilehvar	Application of IgY Against Staphylococcus aureus Biofilms in Reducing Inflammation and Pain in Chronic Wound Infections	P501	**12:12-10**	1
Seyyed Amir Hoseyn Haghayeghee Kakhki Mohassel	mRNA Vaccines for Cancer Treatment: Emerging Immunotherapeutic Strategies	P502		2
Zahra Mohammadnia	Effects of Moderate Aerobic Exercise on Antiviral Immune Responses in Adults	P503		3
Saadat Samadi	Viral RNA-driven epigenetic silencing: a novel paradigm in Ebola virus pathogenesis	P505		4
Aliye Ghorbanpour	The effects of vitamin B12 on lipopolysaccharide-induced systemic inflammation in rats	P506		5
AmirMohammad Ganjali	Clinical Relevance of HSP60 in Diagnosis of Rheumatoid Arthritis: A Systematic Review	P507		6
Saeid Abedi	DNA vaccines: a powerful strategy for controlling brucellosis	P508		7
Mobina Kashki	Lymphocyte Immunotherapy in Recurrent Miscarriage: A Novel Strategy to Restore Maternal-Fetal Immune Tolerance	P509		8
Nooshin Koohi Boushehri	Investigating the effect of chloroquine on MTX-induced oral mucositis experimental model in male rats: The role of nitrergic and opioidergic systems	P510		9
Fatemeh sadat Taghavi	The New Face of Monkeypox: Updated Insights on Spread, Hosts, and Global Risks	P511	**12:10-12:20**	1
Reza Jafari	Exosome-Mediated Immune Modulation in Oncovirus Infections: Therapeutic Potential for Vaccines and Drugs	P512		2
Fatemeh Hoseinpour	Efficacy and Resistance of Amprolium in Broiler Chickens in Iran: A Systematic Review (2000–2025)	P513		3
Faezeh Dangkoub	The effect of nanocarriers on inducing antigen-specific immune tolerance in various autoimmune diseases	P514		4
Sanjari pour Mohammad Rasool	Assessment of antifungal susceptibility of Cryptococcus neoformans isolates from bird feces in laboratory conditions, to Amphotericin B and Fluconazole	P516		5

Mitra Alami-Milani	Formulation, ex-vivo and in-vivo evaluation of oxytetracycline hydrochloride hydrogels based on polyvinyl alcohol and chitosan for wound healing applications	P518		6
Akram Aminian	Exploring the improved impact of 5FU encapsulated within magnetic nanoparticles (MOF) for the treatment of colorectal cancer (CRC)	P519		7
Leyla Azmayesh	Anticancer Potential of Kombucha Tea in Breast Cancer: Mechanisms and Therapeutic Implications	P520		8
Mobina Bagherian	Monoclonal Antibody-Based Therapies in Hodgkin and Non-Hodgkin Lymphomas: Review of Current Evidence	P522		9
Mobina Bagherian	Cancer Immunoediting: Phases of Elimination, Equilibrium, and Escape	P523	**12:20-12:30**	1
Seyedeh Fatemeh Taghavi	Enhancing the Efficacy of 5-Fluorouracil in Human Colorectal Cancer Cells via Allopurinol Co-treatment	P524		2
Freshteh Haerifar	Dual Role of Opioids in Leukemia: Tramadol Suppresses and Morphine Promotes Cancer Progression in AML and ALL Cells	P525		3
Sepideh Hassani	Protective Effects of Silymarin Supplementation Against Capecitabine–Irinotecan-Induced Hepatotoxicity in a Mouse Model of Colorectal Cancer	P526		4
Elahe Khani	Evaluating CAR-NK Cell Therapy as a Novel Immunotherapeutic Approach for Pediatric B-Acute Lymphoblastic Leukemia	P527		5
Samira Khani	Revealing New Potential: How Calcium Channel Blockers Could Transform Colorectal Cancer Therapy	P528		6
Mohammad Javad Khataee	The Key Role of Vitamin D in the Destruction of Cancer Cells in Colorectal Cancer	P529		7
Negin Khazaei	Beyond the Genetic Code: Non-Coding RNAs as Master Regulators in Cancer Pathogenesis	P530		8
Dorna Dehghani	Identification of Significant ALK Overexpression and Neurochemical Pathways in Metastatic Melanoma: An RNA-Seq-Based Differential Expression Analysis Approach	P531		9
Fatemeh Rahmani niya	Enhancing Glioblastoma Therapy: Behavioral and Tumor-Suppressive Effects of Combination therapy with Vericiguat and Temozolomide in Rat	P532		1

Roghayeh Rashidi	Cytotoxic and apoptotic effects of Ferula gummosa Boiss: extract on human breast adenocarcinoma cell line	P533	**12:30-12:40**	2
Hadis Zarafshani	Fabrication of Gemcitabine-Loaded Gelatin and Chitosan Core-Shell Nanofibers for Targeted Cancer Therapy: Anti-cancer Properties and In Vitro Investigation	P534		3
Zeinab Shankayi	the synergism of irreversible electroporation and intermittent fasting on the treatment of breast tumor in an animal model	P535		4
Forouzan Amerizadeh	Identification of Hub Genes and Transcriptional Regulators in Liver Cancer Cells Treated with Galangin	P536		5
Samin Abbaszadeh	Multifunctional photoactive hydrogel loaded with cancer cell membrane and Sorafenib for synergistic photo-immuno-chemotherapy of cancer	P537		6
Nasrin Aghilinezhad	Effects of metformin on ARID1A gene expression and LncRNAs regulating ARID1A gene expression in SW480 and HCT116 colorectal cancer cell lines	P538		7
Zahra Ghafouri	The dual role of miR-17-5p in Colorectal Cancer: intracellular Tumor Suppressor, Extracellular OncomiR	P539		8
Elaheh Gheybi	CA4 and 5-FU combination shows synergistic anticancer effects in esophageal squamous cell carcinoma	P540		9
Sogand Ghazi	Microencapsulated Bioactive Constituents of Smirnovia iranica: A Novel Therapeutic Approach Targeting Cancer Progression and Angiogenesis	P541	**12:40-12:50**	1
Asra Graiti	Tyhroid Microbiome: Implications for AutoimmSectiony and Cancer	P542		2
Maryam Mohammadzadeh	The relationship between apelin and colon cancer: A review article	P543		3
Farhad Manoochehri	Protective effect of α- bisabolol on the development of fibrosis in liver HepG2 and LX2 cell lines	P544		4
Seyedeh Najibeh Nasiri	PNU-74654 as a Wnt/β-catenin antagonist: Reduced tumor growth in colorectal cancer model	P546		5
Somayeh Nazari	1,4-Naphthoquinone Derivatives as Novel P-Glycoprotein Inhibitors: A Strategy to Combat Multidrug Resistance in Cancer	P547		6
Anahita Naeimi	: Development and Characterization of a KRAS-Mutant Peptide–Loaded Nanoliposome as a Therapeutic Vaccine Candidate for Colorectal Cancer	P548		7

Sanaz Nourmohammadzade	evaluation of expression levels of ATF6 and ATF4 involved in unfolded protein response in endometrial cancer patients	P549		8
Elahe Vahedi	A Comprehensive Overview of Cyclin-Dependent Kinase 7 inhibitors as Potential Anticancer Agents	P550		9
Hanieh Yaghoubi	Pharmacogenomics therapies for gastric cancer	P551	**12:50-13**	1
Atieh Yaghoubi	Anticancer activity of Pseudomonas aeruginosa derived peptide with iRGD in the colon cancer therapy	P552		2
Fatemeh Yaghoubi	Molecular crossroads: Unraveling the biochemical pathways of gastrointestinal cancer progression	P554		3
Sara Ebrahimi-Mousavi	The pharmacological role of leptin in cancer targeting therapy: a systematic review study.	P555		4
Tara Akhtarkhavari	A Novel Hybrid Magnetic Nanocarrier for Targeted Drug Delivery in Cancer Treatment	P556		5
Tara Akhtarkhavari	Genetic Polymorphisms Influencing Targeted Nanocarrier-Based Drug Delivery in Cancer Therapy	P557		6
Nastaran Afsordeh	Eslicarbazepine inhibits the growth of glioblastoma tumor cells in vitro and in vivo	P558		7
Yasaman Akbarian	The Contribution of Gut Microbiome in Progression and Treatment of Pancreatic Cancer	P559		8
Maedeh Eezadi	Synergistic Photothermal and Photodynamic Metal Nanoplatforms for Colorectal Cancer: Mechanistic Insights and Clinical Translation	P560		9
Mohadese Pouryani	The effects of Curcumin on the oxidative stress status in HepG2 liver cell line	P561	**13-13:10**	1
Fatemeh sadat Taghavi	Design and cloning of the Tissue inhibitor of Metalloproteinase 4-Chlorotoxin like peptide from Iranian Mesobuthus eupeus fusion protein (TIMP4- MeICT)	P562		2
Rahele Javaheri	Evaluation of the effect of titanium dioxide nanoparticles on growth inhibition of cancer cell line K562	P563		3
Romina Javaheri	Evaluating the Antitumor Effects of Titanium Dioxide Nanoparticles on P53 Gene Expression in CT26 Colon Carcinoma Cells: A Nanomedicine Approach to Cancer Biology	P564		4

Hamid Cheshomi	Systems Pharmacology Analysis of Apigenin-Regulated Genes in Ovarian Cancer	P565		5
Pejman Hosseinzadeh	Investigating the anticancer effects of thymol: a plant-based compound.	P566		6
Parisa Danaie fard	Temozolomide induct Cellular senescence in neural stem cell by imbalanced oxidant and anti-oxidant activity and inflammatory cytokine	P567		7
Ehsan Rastgoo	Influence of Saffron Components and Mesenchymal Stem Cells on Immune Cells in Cancer Cases	P568		8
Sedigheh Shahvali	The Impact of DPP-4 Inhibitors on the Tumor microenvironment: A Narrative Review	P569		9
Shima Asgarzadeh	Multi-Target Actions of Elaeagnus angustifolia: Integrating Evidence from Oncology and Inflammatory Joint Disorders	P570	**13:10-13:20**	1
Pouya Gharavi	Nanoparticle-based targeted therapy as a Novel Method for Esophageal Cancer Stem Cells Elimination: A Systematic Review	P571		2
Ali Faraghi Dastjerd	Anticancer Effects of Borage and Its Derivatives in Breast Cancer Treatment: A Review Study	P572		3
Farnaz Mohajertehran	CRISPR-validated genetic vulnerabilities in oral squamous cell carcinoma: a systematic review	P574		4
Farnaz Mohajertehran	Salivary microRNAs and Cytokine Biomarkers for Early Detection of Oral Lichen Planus and Oral Squamous Cell Carcinoma: A Systematic Review (2020–2025)	P575		5
Zahra Azadian	Modulatory Effects of Citrus latifolia Plant-Derived Extracellular Vesicles on Tumor Cell Proliferation and Migration	P576		6
Samira Kabudani	Therapeutic Effects of Kombucha on liver cancer	P577		7
Sheida Kolahi Jahromi	A Review of Studies on the Effect of the Sinopharm Vaccine on Platelet Count Elevation	P578		8
Amin Aghajani	Evaluation of antimicrobial and anticancer activities of silver–organic coordination compound	P579		9
Hamid Cheshomi	Network-Based Identification of Apigenin-Regulated Hub Genes in Prostate Cancer	P580		1
Shayan Rezanejad	Chronic L-Carnitine Supplementation and Cancer Risk in Physically Inactive Populations	P581		2

Fatemeh Farid	Lung cancer and resistance training: A bibliometric analysis	P582		3
Behzad Mesbahzadeh	Increased survival rate in acute lymphoblastic leukemia treated with methotrexate by DR5 and Caspase-8 in hyperglycemic conditions	P583	**13:20-13:30**	4
Houman Nazeri	T Cell Exhaustion in Cancer: Mechanisms of Immune Dysfunction and OpportSectionies for Immunotherapy	P584		5
Samaneh Rashtbari	Peroxidase-Like Organometallic MO36 as a Dual Anticancer and Antibacterial Candidate: A Functional and Bioactivity Assessment	P585		6
Melika Mehdizadeh	Evaluation of hsa-miRNA-888 and hsa-miRNA-4530 expression in lung cancer patients and comparison with healthy tissue	P586		7
Pooya Bagheri	Alpha-Lipoic Acid and Liver Cancer: A Systematic Review of Its Emerging Therapeutic Potential	P587		8
Ramin Ataee	Evaluation of growth and angiogenesis inhibition effect of Ritanserin on COX2 and EGFR in model of HT29 (colon cancer) incubation in nude mice	P588		9
Soheil Heidarpoor	Explainable Multimodal Deep Learning for Immunotherapy Response Prediction in NSCLC: A Systematic Review	P591	**13:30-13:40**	1
Elham Sameiyan	Targeted SPION nanoparticles for guided delivery of WT1 CRISPR-Cas9 plasmid into breast cancer cells	P592		2
Elham Naderi	Affective Behavioral Deficits After Intracerebral Hemorrhage: Involvement of Amygdala Glial Dysfunction and Cell Death	P593		3
Maryam Shirzad	Functionalized nanodelivery systems for targeting tumor vasculature	P594		4
Sara Gorgani	Fabrication and characterization of electrospun nanocomposite scaffolds made of chitosan and polyethylene oxide reinforced with hydroxyapatite nanoparticles for Melanoma and skin regeneration	P595		5
Sara Gorgani	Electrospun nanofibrous scaffolds reinforced with therapeutic lithium/ manganese-doped calcium phosphates: Advancing skin cancer therapy through apoptosis induction	P596		6
Fereshteh Asgharzadeh	Therapeutic Potential of Allopurinol in Colorectal Cancer	P597		7
Maryam Mohammadian	Time-Dependent Molecular Changes Following MDMA-Induced Nephrotoxicity	P598		8

Ali Mostafavi nezhad	The role of Angiotensin II Type 1 receptor in the dorsomedial periaqueductal gray (dmPAG) on cardiovascular responses and related peripheral mechanisms in rats	P599		9
Cellular And Molecular Physiology/Pharmacology Stem Cells And Regenerative Medicine				
Mahtab Mottaghi	Clinical Application of Human Dental Pulp Stem Cells for Regeneration of Oral and Maxillofacial Tissues	P824	**13:40-13:50**	1
Danial Mahrooghi	Evaluation of Adipose-Derived Mesenchymal Stem Cells and Their Exosomes for Restoring Ovarian Function in a Doxorubicin-Induced Rat Model	P825		2
Seyedeh Elnaz Nazari	Protective Effect of Hydrogen Rich Water on Obesity and Statin- induced Hepatic Complications in a High-fat Diet-induced Obesity in Rats	P826		3
Samira Nokhasteh	Synthesis and Characterization of Composite Scaffold Containing Bioactive Ceramic for Bone Tissue Engineering Applications	P827		4
Mojtaba Vatandoost	An Overview to Using the Zebra Finch Model to Study Neurogenesis and Recovery after Stroke: Possible Implications for Regenerative Medicine	P828		5
Shayan Vafaei	Effects of human umbilical cord blood derived serum on the culture of adipose derived stem cells	P829		6
Atefe Yaghoubi	The Impact of the Decellularized Implant on the Histopathology and Functions of the Recipient's Liver	P830		7
Faezeh Sabet	A Cost-Effective and Physiologically Reliable Home-Made YNB Medium for Controlled Cultivation of Pichia pastoris GS115	P831		8
Fatemeh Nikmehr	Exosome-Integrated Therapeutic Hydrogels in Chronic Diabetic Wound Repair: Therapeutic Variations Based on Exosome Origin, Loading Approaches, and Translational Constraints	P832		9
Mahboubeh Derakhshani	Exosomes: A Promising Strategy for Overcoming the Blood-Brain Barrier & CNS Drug Delivery	P833	**13:50-14**	1
Shadi Montaha	Cholinergic nicotinic receptors in the mediodorsal thalamus mediate cognitive deficits in an intracerebroventricular streptozotocin-induced mouse model of Alzheimer's disease	P835		2
Emad Changizi	Substrate Drives Antibacterial Activity in Black Soldier Fly Larval Fat	P836		3

Shahrzadsadat Eftekhar Vaghefi	Investigation of the effect of Mu Opioid Receptor activation on 6-OHDA-induced cell toxicity in SH-SY5Y human neuroblastoma cells in Parkinson's disease	P837		4
Hassan Bagheri Yazdi	Investigating the potential of antimicrobial compounds in indigenous bacteria of the Iranian desert	P838		5
Sara Hosseinpoor	Upregulation of ATM and p53 in the Hippocampus of Male Rats of Autism Model: Insights into Autism Spectrum Disorder-Related Molecular Processes	P839		6
Reyhaneh Taheri	Crocin Protects Against Beta-Amyloid Peptide-Induced Apoptosis in PC12 Cells Via the PI3 K Pathway	P840		7
Sahar Askari	Temporal Dynamics of Changes in MAPK Signaling in Response to Endoplasmic Reticulum Stress Induced by Thapsigargin	P841		8
Karimzadeh Asma	Impact of Resistance Exercise on Cerebellar BDNF and CREB Gene Expression in Male Rats Exposed to Electromagnetic Fields	P842		9
Mojtaba Sargazi	Conditioned Medium from Wharton's Jelly MSCs Improves Diabetic Testicular and Sperm Damage by Reducing Oxidative Stress, Apoptosis, and Inflammation	P844		1
Arefeh Gholamhosseini	Bourgeonal and Its Role in Human Sperm Chemotaxis	P845		2
Solmaz Fallahi	Exosomes as a therapeutic tool to promote neurorestoration and cognitive function in neurological conditions: Achieve two ends with a single effort	P846		3
Nastaran Fahiminia	Comparison of the effects of N-(1H-indol2-yl) phenoxybenzohydrazide-2-(methylene) derivative and mefenamic acid on liver tissue ultrastructure and liver enzymes in three-spotted gourami (Trichogaster trichopetrus)	P847		4
Ghazale Laliani	Production of Antimicrobial Peptides in Pichia pastoris GS115: A Recombinant Approach	P849		5
Amirmahdi Panzaei	Graft-versus-Leukemia Effect and Immune Escape After Hematopoietic Stem Cell Transplantation: Molecular Insights and Interventions	P850		6
Fatemeh Pourhakim	The latest achievements of CRISPR in disease treatment	P851		7
Elham Zare	Exosomal MicroRNAs in Alzheimer's Disease: Emerging Pathology and Diagnostic Potential	P852		8

Fereshteh Vahidi Mehr	Improvement of Sensory Damage and Pathological Changes in the Sciatic Nerve Using *C-Kit* Positive Stem Cells Type2 Diabetic Male Rats	P853		9
Evening Session (14:30-16:50), Thursday, February 5th, **Cardiovascular, Renal & Respiratory Physiology/Pharmacology**				
Sepide Behrouz	Targeting inflammation and oxidative stress in COPD: protective effects of camel milk in an experimental model	P600	**14:30-14:40**	1
Mohammad Abbas Bejeshk	Unilateral Ischemia–Reperfusion Injury of the Lung: Focus on Inflammatory Responses and Histopathological Changes	P601		2
Seyed Mohammad Sajjadi	Folic acid supplementation suppressed lung inflammatory response and oxidative damage in a systemic inflammation model	P602		3
Pardis Sajadinia	Lipid Metabolism Dysregulation in SARS-CoV-2 Infection: Mechanistic Insights and Clinical Correlations	P603		4
Niayesh Shayanfar	Pulmonary Sequelae of Long COVID: Inflammation, Vascular Dysfunction, and Gas Exchange Abnormalities	P604		5
Niyan Salehi	Inhaled 17β-Estradiol Attenuates Lung Inflammation Following Traumatic Brain Injury in Rats	P605		6
Parisa Askarizadeh	The Effect of Nicotine on Lung Compliance and Airway Pressure in Rats Subjected to Pulmonary Fibrosis	P606		7
Parisa Askarizadeh	Effects of Nicotine and Vagotomy on Inflammatory Reactions in Rats with Pulmonary Fibrosis	P607		8
Zahra Gholamnezhad	The modulatory effects of exercise on lipopolysaccharide-induced lung inflammation and injury, a systemic review	P608		9
Hossein Fatemikia	Activation of α7nAChR Attenuates Surfactant-Depletion-Induced Acute Lung Injury by Peroxisome Proliferator Activated Receptor-γ (PPAR-γ) Signaling Pathways	P609	**14:40-14:50**	1
Hossein Fatemikia	Role of spleen in nicotine's anti-inflammatory effects on surfactant depletion-induced acute lung injury in rats	P610		2
Behnaz Mokhtari	Translational Insights into Ischemic Heart Disease in Diabetes	P611		3
Nikta Soltani	Antioxidant, anti-inflammatory, apoptosis-regulatory, and immune system modulation effects of Rosa damascena	P612		4
Somaye Aalami	Cedrol ameliorates lipopolysaccharide-induced lung injury in rats	P613		5

Mohadese Solati	Lipopolysaccharides-induced lung injury, systemic inflammation and oxidative stress improved by losartan in rats	P614		6
MohammadJavad Maftoon-Azad	Transmission of high arterial pressure into renal microvessels during venous-clamping augments ischaemia/reperfusion induced acute kidney injury in anaesthetized rats	P615		7
Melika Nosrati	A Systematic Review of Dietary Patterns and Their Association with Telomere Length	P616		8
Roya Gholizadeh	Microbial Metabolites of the Gut and Their Cardiovascular Implications: From SCFAs to TMAO	P617		9
Batool Zarei	Albumin: a comprehensive review and practical guideline for clinical use	P618	**14:50-15**	1
Mahdi Zamani Boldaji	Redox-Active Bacteria Reduced Rats' Ethylene Glycol-Induced Kidney Calculi	P619		2
Leila Hafazeh	Toll-like receptor 4 activity was improved by adipose-derived mesenchymal stem cells in acute renal failure	P620		3
Alireza Eskandari	The Evaluation of Oxidative Stress Parameters in the Prevention and Treatment of Arrhythmia Caused by Calcium Chloride in Rat Heart Tissue by Citral	P621		4
Tina rahjoo	The effect of combining Sorafenib and Lactobacillus rhamnosus GG on Liver Fibrosis following bile duct ligation in rats	P622		5
Gholamreza Bayat	changes in the expression of cardiac Farnesoid receptor (FXR) and Nrf2 following bile duct ligation in rats	P623		6
Maryam Paseban	The effects of Nigella Sativa extract on cardiovascular oxidative stress criteria of hypothyroid juvenile rats	P624		7
Somaye Javidanpour	Rosmarinic Acid Modulates Calcineurin/NFAT Pathway in Isoproterenol-Induced Hypertrophy in H9c2 Cells	P625		8
Zakieh Sadat Sheikhalishahi	Pre-Reperfusion Donepezil Enhances Vagal-Mediated Electrophysiological Protection in Myocardial Ischemia Induced by LAD Ligation in Rats	P626		9
Dorsa Dehdashti	The Impact of Vitamin D Supplementation on Carotid Arterial Wall Thickness and Mean Arterial Pressure in Healthy Adult Male Dogs	P627		1
Maryam Doustaki Zaboli	Title Heart rate variability and blood pressure responses to low-intensity endurance training with blood flow restriction in individuals with mild hypertension	P628		2

Saleh Rahimi	Study of aerobic exercise on malonyl-CoA-decarboxylase gene expression in heart tissue of adult male Wistar rats	P629	**15-15:10**	3
Saleh Rahimi	Investigating the Effect of Ginger on Fatty Acid Metabolism in Cardiac Tissue During Aerobic Exercise	P630		4
Farzaneh Rostamzadeh	Exercise Mitigates Cardiac Fibrosis and Apoptosis via circS1c8a1/miR-133a in D-Galactose-Induced Aging Rats	P631		5
Houshang Rafatpanah	Frequency of Heparin Induced Thrombocytopenia [HIT]: a developing country experience	P632		6
Behnaz Mokhtari	Cell-Free, Yet Life-Saving: Mitochondrial Transplantation in Ischemic Heart Repair	P633		7
Ali Rafati	High- Band 5G Electromagnetic Radiation (28 GHz) Effects On Oxidative Stress Markers and Gene Expression of Cardiac Tissue in Male Rats: The Mitigating Effect of Vitamin C	P634		8
Haniyeh Ranjkeshzadeh	Carvacrol Mitigates Doxorubicin-Induced Mitochondrial Dysfunction in Rat Cardiomyocytes: Attenuation of Oxidative Stress, Membrane Potential Collapse, and Complex II Impairment	P635		9
Haniyeh Ranjkeshzadeh	Coadministration of Carvacrol Attenuates DoxorubicinInduced Cardiotoxicity in Rats: Evidence from Histopathological and Oxidative Stress Biomarkers	P636	**15:10-15:20**	1
Melika Rahbardar mojaver	Cardiovascular Sequelae of Long COVID: From Myocarditis to Autonomic Dysfunction	P637		2
Mohammadjavad Roohande	The effect of ginger supplementation on GLUT4 gene expression in cardiac tissue during aerobic exercise in male Wistar rats	P638		3
Mohammadreza Sokhanvar	Exercise Intensity Shapes Cardiac Exerkine Signaling and Cardiometabolic Recovery in Obese Rats	P639		4
Hosein Shafahi	Protective Effects of Melatonin on Isoproterenol-Induced Cardiac Fibrosis in Rats via TGF-β/Smad3 Modulation	P640		5
Mohammad Shahbazian	Investigation of the Effects of Taurine on Cardiac Glucose Metabolism in a Model of Pathological Cardiac Hypertrophy	P641		6
Seyed Alisina Sedghitabar	Taurine Attenuates Doxorubicin-Induced Cardiac Injury Through Autophagy and Anti-Fibrotic Effects	P642		7
ZohrehArab	Protective Effects of Salix alba on Lipid-Related pathways in the Aorta of Hypercholesterolemic Rabbits	P643		8

Mohammad Amin Rajizadeh	The effects of inhaled estradiol and myrtenol on traumatic brain injury	P644		9
Seyedeh Elham Faghih Shirazi	An investigation of renal functional disorders following acute focal cerebral injury induced by ischemia/reperfusion in rats	P647		10
Masoud Fallah	Evaluation of Echinops cephalotes aqueous extract on function and cardiac damage in a model of cardiac hypertrophy following ischemic reperfusion injury in male rats	P648	**15:20-15:30**	1
Vajihe Ghorbanzadeh	Effect of inorganic sodium nitrate on expression of VEGF-A, VEGF-R2 and miR-320 in heart of type 2 diabetic male rat	P649		2
Sina Ghesmatpour	Evaluation of the effect of dalteparin sodium on doxorubicin-induced cardiotoxicity in rats: emphasis on the role of ferroptosis	P650		3
Pouran Ghahramani	Linalool's Protective Role Against Amikacin-Induced Nephrotoxicity	P651		4
Haniyeh Kazemi	Comparison of ischemia/reperfusion-induced acute kidney injury by clamping renal arteries or veins in rats	P652		5
Zeinab Karimi	Protective Effects of Allopurinol on Cardiac Injury Induced by Renal Ischemia-Reperfusion	P653		6
Mahmood Kohan mansourkhani	Evaluation of the Effects of Citral in the Prevention and Treatment of Calcium Chloride-Induced Arrhythmia in Rats	P654		7
Tina Kianfar	Dapagliflozin reduces myocardial injuries through modulation of H3K27me3 and SIRT1 in the male rat model of myocardial ischemia reperfusion	P655		8
Mohammad Moein Nezam Abadi Motlagh	Effects of Interval Aerobic Training on Cardiac MFN1 Expression in Female Sprague–Dawley Rats	P657		9
Afshin Nazari	The combined effect of exercise and hydroalcoholic extract of valerian on endothelial dysfunction in coronary vessels and cardiac injury in male diabetic rats induced by streptozotocin	P658		1
Hamounpeyma Esmaeil	Cardiovascular effects of ventrolateral periaqueductal gray (vlPAG) AT1 receptors in normotensive rats	P659		2
Mohammad khaksari haddad	Vericiguat, a 17β-Estradiol Substitute, Reduces Cardiovascular Risk Factors in Experimentally Menopausal High-Fat Diet-Induced Obese Rats	P660		3

Zahra Pezeshki	The non-protective effect of vitamin E on kidney complications induced by Lithium in aged male and female rats	P661	**15:30-15:40**	4
Mohammad Navid Khaksari	Investigating the Efficacy of Thalidomide in β-Thalassemia Patients: A Systematic Review and Meta-Analysis of Therapeutic Response and Hematologic Improvement	P662		5
Roham Mazloom	Evaluation of Tramadol's Impact on Heart Rate Dynamics from Frequency-Domain Perspective	P663		6
Alireza Nokhodchi	Gut Microbiota-Driven Inflammation and Immune Pathways in Cardiovascular Disease	P664		7
Hajar Ebrahimiyan	Sympathectomy: ventricular remodeling after stroke	P665		8
Zeinab Parvin	Cardio-protective effect of hydro-alcoholic extract of Myrtus communis L. against ischemia-reperfusion injury in isolated rat heart: the role of Nitric oxide and mitochondrial ATP-sensitive K channel	P666		9
Arefeh Moballegh	Therapeutic Targeting of the Gut-Heart Axis: Microbiome-Based Strategies in Cardiovascular Disease	P667	**15:40-15:50**	1
Shabnam Mohammadi	Targeting the TGF-β/Smad Signaling Pathway to Inhibit Cardiac Fibrosis in a Myocardial Infarction Mouse Model	P668		2
Alireza Moradi Khankandi	4-methylumbelliferone alleviated myocardial ischemia/ reperfusion injury in rats through modulation of the TLR4/NF-κB/NLRP3 pathway	P669		3
Fatemeh Eshraghi-Jazi	Effect of gender on renal non-hemodynamic responses to Ang II in 9-12- and 26-30-week-old normotensive rats: the role of Mas receptor	P671		4
Shahrzadsadat Eftekhar Vaghefi	The expression of renal clock genes varies by gender and circadian rhythm	P672		5
Shahrzadsadat Eftekhar Vaghefi	Relationship between gender differences and circadian rhythm on renal function in a rat model of chronic kidney disease.	P673		6
Mahdi Hajiaqaei	Co-treatment of yohimbine and sodium hydrosulfide attenuate the pyroptosis pathway in chronic kidney disease	P674		7
Azadeh Khalili	Gentamicin administration changes the renal expression of angiotensin II receptors in mice: a time-course study	P675		8

Sedighe Khodsooz	Effect of alpha-pinene administration on renal functional changes resulting from renal ischemia-reperfusion injury in adult male rats	P676		9
Mohammadtaghi Khoshniat	Protective Effects of Taranjabin Extract Against Cisplatin-Induced Renal Toxicity: Oxidative Stress Attenuation in Rats	P677	**15:50-16**	1
Ghafil Jasim Hamdan Murtadha	Renoprotective effect of remote ischemic post-conditioning against ischemia/reperfusion-induced acute kidney injury	P678		2
Vahideh Ghorani Sirjani	The effect of folic acid on hypothyroidism-associated oxidative damage in rat kidney	P679		3
Zahra Mobara	Pre- and Post-Treatment Effects of Hesperetin on Acute Kidney Injury Induced by Ischemia-Reperfusion in Male Rats	P680		4
Sina Mohammadi	Effectiveness of ACE Inhibitors, ARBs, and Novel Peptides in Managing Glomerulonephritis via RAS Inhibition, A systematic review	P681		5
Bahareh Mahmoudi	Protective Effects of Inositol on Cisplatin-Induced Nephrotoxicity in Wistar Rats	P682		6
Yasamin Morvarid	Cognitive and Neuronal Protective Effects of NaHS in Chronic Kidney Disease	P683		7
Khojasteh Malekmohammad	Protective effects of late remote ischemic pre-conditioning against ischemia/reperfusion-induced acute kidney injury by modulating oxidative stress pathway	P684		8
Mohammad Foad Noorbakhsh	Comparative Investigation of the Protective Effects of Citral, Silymarin, Curcumin and Quercetin on Doxorubicin-Induced Nephrotoxicity in Rats	P685		9
Shadan Saberi	Various endurance training intensities improve GFR and Up-regulate AQP2/GSK3β in lithium-induced nephropathic rats	P687	**16-16:10**	1
Aslani Mohaddadreza	Altered lung inflammation and expression of endoplasmic reticulum stress markers in male mice aged-asthma model	P688		2
Fahimeh Rostamabadi	Investigation of the anti-inflammatory and antioxidant effects of Hypericum perforatum extract on pathophysiological pathways in rats with allergic asthma	P689		3
Fatemeh Kharazmi	Gender-Dependent Renal Hemodynamic Responses to Angiotensin 1-7 Following AT1 Receptor Blockade and Chronic Renal Denervation in Rats	P690		4

Atefeh Rahimi	Spirulina platensis Mitigates Cardiac Electrophysiological Disturbances and Echocardiographic Parameters Following LAD-Ligated ischemia-reperfusion Rat Model	P691		5
Atefeh Rahimi	Electrophysiological and Stereological Effects of High Band 5G Electromagnetic Fields On Rat Heart: insights into the protective role of Vitamin C	P692		6
Mahdieh Farahani	The Effect of a High-Intensity Interval Training Session on The Level of Cardiac Oxidative Stress In Male Rats Induced By Doxorubicin Cardiotoxicity	P693		7
Reza Badalzadeh	Therapeutic effects of alpha-lipoic acid and ubiquinol combination on mitochondrial function in doxorubicin-induced cardiac injury	P694		8
Ahmad Reza Aminian	Nephroprotective impact of royal jelly against rhabdomyolysis-induced kidney damage in rats	P695		9
Toxicology And Safety Pharmacology				
Fatemeh Ghorbani	Effect of long-term nitrate administration on the mRNA expression of sialin (SLC17A5) gene in the main tissues of healthy male rats	P854	**16:10-16:20**	1
Sepideh Ahmadi	Selenium mitigates the adverse effects of cyclophosphamide on Testicular Tissue in NMRI Mice	P856		2
Sahar Adibinia	The role of natural antioxidants in improving cyclophosphamide-induced nephrotoxicity: a review study	P857		3
Sara Asadi eydivand	Case Report Title: Chronic Lead Poisoning and Kidney Failure in a Foundry Worker with a History of Gout	P858		4
Mahla Asadi	Multi-organ oxidative damage in animal with paraquat-induced intoxication are prevented by Zataria multiflora and its constituent, carvacrol: biochemical evidences	P859		5
Gholamreza Bazmandegan	The effects of Calcium dobesilate on cisplatin-induced hepatotoxicity: antioxidative stress property	P860		6
Nazila Pourhassanali	Title: Comparative Effects of Spontaneous Withdrawal, Methadone, and Naloxone on Morphine-Induced Toxicity in Sertoli Cells (TM4): An in Vitro Study	P861		7

Fatemeh Salabi	From Venom Gland to Application: A Unique, Thermostable Hyaluronidase from Mesobuthus crucittii with Dual-Substrate Specificity	P862		8
Marzieh Jafari Fakhrabad	Effect of cyanocobalamin (vitamin B12) on paraquat-induced brain injury in mice	P863		1
Hedieh Jafari	Study of Clinical symptom and Hematological Parameters in Patients with Scorpion Envenomation Hospitalized in Khuzestan, Iran	P864		2
Fateme Jafari vavsari	The effects of Androctonus crassicoda scorpion venom on liver and kidney histopathology and blood sugar levels in diabetic rats.	P865		3
Rana Hassanloo	Borneol ameliorates acrylamide-induced oxidative stress and inflammation in the hippocampus of rats	P866		4
Zahra Hallajian	Extra-label Therapeutic Applications and Safety of Fluralaner in Cats	P867		5
Fereshteh Dadfar	Study of liver enzyme activity and oxidative stress biomarkers in individuals exposed to air pollutants	P868		6
Mohammad Reza Rahmani	Protective effect of coenzyme Q10 against acetaminophen-induced nephrotoxicity	P869	**16:20-16:30**	7
Farkhondeh Razzaghi Firozjaei	Synthesis, characterization, and cytotoxicity evaluation of liposomal nanoparticles containing adenosine triphosphate for the treatment of aluminum phosphide poisoning.	P870		8
Parizad Rezaye	Edaravone exerts protective effects against ethanol-induced gastric ulcer in rats through the suppression of pro-inflammatory cytokines	P871		9
Mohammad Hossein Rigi	Histopathological Evaluation of Taranjabin's Protective Role in Cisplatin-Induced Acute Kidney Injury in Rats	P872		1
Sana shariatmadar	Gestational acid folic treatment attenuates metabolic and cognitive dysfunctions induced by lithium exposure in rat offspringth	P874		2
Amirreza Saberi	Investigating the role of Edaravone in protectingTM4 SertoliCellsAgainst CoCL2_Induced Hypoxic Injury: A Possible Therapeutic Approach	P875	**16:30-16:40**	3
Tabatabaie Hosseini Seyyed AmirSohrab	A review of Wildlife-inspired Biomimetic Drug Delivery Systems: Innovations From Octopus Salivary Glands to Snake Skin	P876		4

Zahiri Pour Amineh Sadat	Therapeutic Potential of ATP-Loaded Liposomal Nanoparticles Against Aluminum Phosphide-Induced Cardiotoxicity	P877		5
Milad Faraji	Protective Role of Selenium Nanoparticles Against Radiation-Induced Protein Oxidation in Rat Testicular Tissue	P878		6
Mahboobeh Ghasemzadeh Rahbardar	Comparative effects of curcumin, nanocurcumin, and a PPAR agonist on paraquat-induced oxidative stress and systemic inflammation in a rat model	P879		7
Seyedeh Zahra Ghasemi	Adverse effects of alcohol consumption, tobacco smoking, and air pollution on Asthma	P880		8
Sajjad Ghorbani Disfani	Essential Management of Stingray Envenomation: A Systematic Review	P881		9
Haydeh Keyhan	The Study of bee venom on histomorphometry, immunohistochemistry and some blood parameters induce arthritis from Enrofloxacin in rat cartilage	P882	**16:40-16:50**	1
Morteza Garmei	The relationship between metformin use and the incidence of various types of anemia	P883		2
Sadegh Mohades	Synergistic Toxicity and Bioaccumulation of PFAS and Microplastics: A Multi-Omics Perspective	P885		3
Seyed Mohammad Mohammadi	Air pollution and bone mineral density in osteoporosis	P886		4
Sajjad Mollaei	Learning and memory improving effects of vitamin C in lead exposed immature rats	P887		5
Leili Houshyari	Investigation of the amount of heavy metals lead and cadmium in dry fruit and vegetable waste and meat from sheep fed with it	P888		6
Leili Houshyari	The effect of different levels of dry fruit and vegetable waste from warm seasons and its silage on blood parameters, meat malondialdehyde concentration, intestinal texture, rumen acidity and production performance of fattening lambs	P889		7
Zahra Padam	Pediatric Drug Poisoning: A Review Study	P890		8
Mohanna Kian	Evaluation of the Antiproliferative Effects of Mesobuthus eupeus Scorpion Venom on Human Prostate Cancer Cell Line (PC-3)	P891		9

Sara Assadi Eydivand	Chronic Lead Poisoning and Kidney Failure in a Foundry Worker with a History of Gout: Case Report	P892		10
Morning Session (9:30-12:10), Friday, February 6th, **Medicinal Plants, Natural Products & Alternative Medicine**				
Mohamad Mutafa Swara	Persa americana seed improve fibrosis and tissue remodeling of soleus muscle in type II diabetic mice by inhibition of TNF-α	P701	**9:30-9:40**	1
Zahra Baghani	The Effects of Curcumin Supplementation on Liver Function, Inflammation, and Oxidative Stress in Patients with NAFLD: A Systematic Review	P702		2
Maryam Ehsannejad	The Effect of Hydroalcoholic Extract of Equisetum ramosissimum (Horsetail) on Certain Parameters of the Circulatory System in Male Rats	P703		3
Sara Ahmadi Shokooh	Optimized Ginger-Derived Exosome-like Nanoparticles for Drug Delivery: A Seasonal and Methodological Evaluation	P704		4
Amirhosein Ekhlasi	Investigating the effects of silver nanoparticles synthesized with Echinophora platyloba on breast cancer cells by MTT assay	P705		5
Erfan Eftekhar	Comprehensive Effects of Ferula assa-foetida Seed Decoction on Metabolism, ImmSectiony, and Milk Production in Holstein Cows.	P706		6
Ghazaleh Elahabadi	Efficacy of Panax Ginseng in Stress: A Systematic Review of Its Effects on Psychological Stress and Blood Markers	P707		7
Mohammad sorush Ansari	The Use of Plant-Derived Exosomes in the Treatment of some neurodegenerative diseases	P708		8
Maryam Azadmanesh	Antibacterial Effects of Green-Synthesized Silver and Gold Nanoparticles Using Echinophora platyloba Extract Against Escherichia coli and Bacillus subtilis	P709		9
Arman Babaee Monir	Lactoferrin: A Review On a Multifunctional Natural Molecule – From Antibiotic Alternative to Comprehensive Protection in Poultry Production	P710		1
Mohammad Salar Boustani	Antioxidant activity of Allium cepa and its main constituents: Experimental and clinical evidences	P711		2

Sima Beigoli	Understanding the molecular basis for the immunomodulatory impact of natural products: a critical review	P712		3
Mohadese Pouryani	Combined Effects of Hesperidin and Quercetin on Inflammation in HepG2 Cell Line	P713		4
Zahra Jafariazar	Development of an effective and safe topical anti-inflammatory hydrophilic ointments containing Nepeta crispa essential oil in rats	P714		5
Arian Javadi	The effect of alpha-pinene in an experimental model of ulcerative colitis in rats	P715		6
Sepideh Hajivand	β-Sitosterol Attenuates Stress-Induced Colonic Hypermotility and Diarrhea in a Rodent IBS Model: Comparative Efficacy with Sertraline	P716	**9:40-9:50**	7
Hassan Zadeh Maleki Nima	Acute Oral Toxicity Assessment of Rhamnus cathartica Fruit Extract in Wistar Rats	P717		8
Elham Derakhshan marian	Comparison of the effect of hydroalcoholic extract of Foeniculum vulgare on volumetric changes in the sexuallydimorphic nucleus of the rat and the striatum of the chick	P718		9
Tayebeh Rabani nia	Investigating the Impact of Curcumin-Loaded Solid Lipid Nanoparticles on Melanoma	P720		1
Fatemeh Rajabian	Evaluation of pathways involved in the protective effect of baicalein on contrast-induced nephropathy in in vitro model	P721		2
Pourya Roknabadi	Neuroprotective Effects of Garlic Against Lead Neurotoxicity: Behavioral and Biochemical Evidence in adolescent rats	P722		3
Negin Zare Mehrjerdi	From Curcumin to Aloe Vera: A Comprehensive Natural Approach to Target Key Immunopathogenic Pathways in Psoriasis	P723		4
Faezeh Zarei	The Effect of Hydroalcoholic Extract of Capsella bursa-pastoris Leaves on The Cardiovascular System of Male Rats	P724	**9:50-10**	5
Maryam Sarshar	Therapeutic Effects of Kombucha in Lung Cancer	P725		6

Razieh Sanjari	Synthesis and Evalution of optical and Morphological Properties of Chitosan-Rosmarinic Acid-Galic Acid Nanoparticles for the Treatment of Diabetic Wounds.	P726		7
Majid Shokoohi	Protective effects of the hydroalcoholic extract of Fumaria parviflora on testicular injury induced by torsion/detorsion in adult rats	P727		8
Negin Shirvani	the effect of alpha-pinene on anxiety in the dextromethorphan-induced anxiety model in rats	P728		9
Negin Shirvani	the therapeutic effect of alpha-pinene on oxidative stress factors in an experimental model of colitis	P729	**10-10:10**	1
Fatemeh Saberi-iraj	Physiological and pharmacological properties of Chenopodium botrys	P730		2
Sahar Salehi	Herbal Supplements and Plant-Derived Phytochemicals in Supporting Cognitive Health During Aging: A Narrative Review	P731		3
Arefeh Salehi	A review of the biological, metabolic and therapeutic effects of berberine (Berberin or BBR) found in barberry fruit (Berberis vulgaris)	P732		4
Hassan Sadraei	Quantification of luteolin and apigenin contents of Dracocephalum kotschyi by HPTLC technique	P733		5
Mahdi Saghiri Ganjeh	Memory-enhancing effects of sake yeast supplement in mice: Adenosine receptors interaction	P734		6
Seyed Hadi Taheri	The effect of avocado seed methanolic extract on myofibers volume density and MDA level of soleus muscle in type II diabetic mice	P735		7
Seyyed mojtaba Tahmasbi	Papaverine- Like Alkaloids derived from Berberis vulgaris and Papaver Somniferum as Natural Therapeutic Candidates for Impotence and Infertility	P736		8
Mahsa Attarian	Therapeutic Potential of Arnica montana L. and Physical Exercise in Attenuating Colonic Inflammation and Oxidative Stress in Ulcerative Colitis	P737		9
Seyedeh Bahareh Alavian	The preventive effect of Sclerorhachis leptoclada hidroalcholic extract on the renal pathological and Fibronectin and Transforming growth factor-Beta gene expression changes in male diabetic rats	P738	**10:10-10:20**	1
Sanaz Alivandi Farkhad	Effects of Phytoestrogen Genistein on Tumor necrosis factor-α (TNF-α) Levels in Model of Polycystic Ovary Syndrome	P739		2
Farzaneh Faraji Shahrivar	The Impact of Berberine Supplementation versus Atorvastatin Combined with Aerobic Training on Liver Enzymes in High Fat diet male Wistar Rats	P740		3

Milad Faraji	Comparative Study of Lemongrass Extract, Citral, and Green-Synthesized AgNPs in Diabetic Testicular Protection	P741		4
Mohamad javad Farhangi	Biological and Pharmacological Evaluation of Rosemary Extract Combined with Lactobacillus plantarum–Derived Postbiotic for Topical and Dermatological Applications	P742		5
Fatemeh Forouzanfar	Saffron (Crocus sativus) and its constituents; Basic and clinical evidence for a potential role in analgesia	P743		6
Nahid Ghayedi	Effect of hydroalcoholic extract of Levisticum officinale on pancreas tissue level of Malondialdehyde in diabetic rats	P745		7
Ahmad Ghorbani	Effects of fenoferin and tschimgine on ethanol-induced hepatocyte damage	P746		8
Zahra Kazemi Korani	A Systematic Review of Nanocurcumin in Multiple Sclerosis: From Molecular Targets to Clinical Outcomes	P747		9
Omid Fakharzadeh Moghadam	Antioxidant and Organ-Protective Efficacy of Rheum turkestanicum Extract: A Systematic Review and Meta-Analysis of Preclinical Studies	P748	**10:20-10:30**	1
Farnoosh Kaviani	Comprehensive Review of the Effects of Stachys lavandulifolia on Hepatic and Renal Function	P749		2
Zeinab Karimi	Protective effect of quercetin on the amikacin-induced nephrotoxicity	P750		3
Shabnam Mohammadi	Modulatory Role of cyperus rotundus L. Extract on Blood Glucose and Lipid Profiles in Aged Rats	P751		4
Mehraneh Mohamadi	Paraquat-induced lung injury in rat is ameliorated by Curcuma longa	P752		5
Amirabbas Motaharnezhad	A Review of the antinematodal effects of Mentha longifolia against gastrointestinal nematodes in domestic animals	P753		6
Zahra Mousavi	Anti-inflammatory and Anti-nociception Effects of Helichrysum leucocephalum extract in Experimental Animals	P755		7
Sara Salari	Green Tea Polyphenols as Modulators of the NF-κB and NLRP3 Inflammasome Pathways in Inflammation	P756		8
Tahereh Naji	The Comparison of effects of Some phytoestrogens with 17β estradiol on ovarian tissue in Trichogaster trichopterus	P757		9

Kobra Naseri	Evaluation the analgesic and anti-inflammatory effects of flavonoids in Ziziphus jujuba fruit on acute pain and inflammation in male rats	P758	**10:30-10:40**	1
Mohsen Naseri	A randomized placebo-controlled trial on Sinamaz® Drop for Preventing Upper Respiratory Infections in Mass Gatherings	P759		2
Mohammad Foad Noorbakhsh	Investigating the Effects of Synthetic Silver Nanoparticles with Echinophora platyloba on Breast Cancer Cells by Scratch Assay	P760		3
Nafiseh Hedayati	Effects of Concomitant Administration of Lavandula dentata Extract and Fluoxetine on Reserpine-Induced Depression-Like Behaviors in Mice	P761		4
Soroush Yazdani	Cedrol improves lipopolysaccharide-induced systemic inflammation in rats	P762		5
Haniyeh Eghbali	Alpha-Pinene Modulates Feeding Behavior and Hypothalamic Orexin A Expression in a Rat Model of Painful Temporomandibular Disorder	P763		6
Arian Amirkhosravi	Ferulic acid mitigates H2O2-induced oxidative stress by hindering the activity of reactive oxygen species and programmed cell death in rat PC12 cells	P764		7
Zahra Changizi	Immunohistochemical Evidence for Apoptotic Effects of Chlorogenic Acid in a 4T1 Breast Cancer Mouse Model	P765		8
Hamidreza Choobdari	Combined Capsaicin and Interval Exercise Synergistically Reduce Inflammatory Markers and Boost Humoral Response in Aged Rats.	P766		9
Boshra Khajehian	The effect of alpha-pinene on IL-6 levels in colon tissue in a rat model of acetic acid-induced colitis	P767	**10:40-10:50**	1
Razieh Sanjari	Therapeutic Potential of Natural Compounds in Enhancing Wound Healing in Diabetic Rats	P768		2
Fatemeh Taheri	The Effect of Rutin on DNA Fragmentation and Sperm Nuclear Maturation in NMRI mice Following Treatment with Methotrexate	P769		3
Maedeh Ghasemi	β-Sitosterol mitigated stress-induced intestinal barrier dysfunction and endotoxemia in IBS Rats by modulating Claudin-2 and ClC-2 channels: Comparative Efficacy with Sertraline	P770		4
Asma Mahmoudi	High-dose nano-curcumin disrupts sperm motility through post-transcriptional repression of CatSper	P771		5

Asma Mahmoudi	Nano-Micelle Curcumin modifies Sperm Mitochondrial Function through dose-dependent regulation of Mitophagy and Fusion Genes	P772		6
Rasoul Kavyannejad	Pretreatment effects of fucoidan and ruthenium red in reducing neurological injury following ischemic strokes in male rats	P773		7
Rasul Saberi	The effects of Urtica dioica extract on memory, acetylcholinesterase activity, and oxidative stress indicators in a rat model of cholinergic dysfunction	P774		8
Iman Gholami	An examination of the impact of frankincense resin (Boswellia sacra) extract on liver and kidney impairment caused by doxorubicin in male Wistar rats	P775		9
Fatemeh Motefaker	Evaluation of the Effects of Fennel (Foeniculum vulgare) Supplementation on Semen Quality in Adult Male Rabbits	P777		1
Moslem Najafi	Effects of Natural Honey Against Ischemia-Reperfusion Injuries: A Review of Preclinical and Clinical Evidence	P779		2
Shiva Ahrari	The Effect of Curcumin on Cardiovascular Function in Children and Adolescents: A Narrative Review	P780		3
Paria Yousefi Khiabani	Hesperidin attenuated apoptotic-related genes in testicle of a male rat model of varicocoele	P781		4
Bahareh Hassanzadehdelouei	The analgesic and anti-inflammatory effects of gummosin in laboratory animals	P782		5
Nazireh Hassanvand	Effect of hesperidin on sperm quality in asthenoteratospermic men during freezing and thawing	P783	**10:50-11**	6
Maryam Paseban	The healing effect of Achillea wilhelmsii on indomethacin-induced gastric ulcer in rat	P785		7
Mohammad Mahdi Ghazimoradi	Deaddicta®, A Natural formulation with the efficacy of relapse and cravings reduction in opioid addiction	P786		8
Mohammad Mahdi Ghazimoradi	The effects of DeAddicta®, A novel preparation for reduction of Cravings in Cannabis Users	P787		1
Reyhaneh Hanaei	The effects of curcuma longa and its constituent, curcumin on oral health, experimental and clinical studies: A narrative review	P788		2
Ayda Akrami	Dual-function Electrospun Nanofiber Scaffolds for Preventing Post-surgical Tumor Recurrence and Promoting Tissue Regeneration	P789	**11-11:10**	3

Milad Ansari	p-Cymene improves memory and reduces hippocampal neuroinflammation in the reserpine model of Parkinson's disease by modulating the CREB/BDNF signaling pathway	P790		4
Kiarash Sabet	The administration of Cyperus rotundus L. extract mitigates memory deficits induced by stress in male rats: the role of inflammation and oxidative damage	P791		5
Arefeh Dadkhah Tehrani	The role of crocin in improving the destructive effects of various types of stress (short-term and long-term) on memory and learning	P792		6
Zakieh Keshavarzi	The role of *auraptene* and estradiol on intestine injury following traumatic brain injury in rats	P793		7
Nikoo Saeedi	Curcumin plus amniotic membrane reduces post-surgical peri-tendinous tissue adhesion by decreasing inflammation and fibrosis in rats	P795		8
Saeideh Saadat	Mechanistic Insight into Rosemary-Induced Bronchodilation: A Dual β-Adrenergic and Calcium Channel Action	P796		9
Mahnaz Lajevardi	Effect of the effects of propolis and bone marrow - derived mesenchymal stem cells on diabetes induced - heart damage in male rat	P798	**11:10-11:20**	1
Reyhane Akbari	Augmentation of immune cell viability in cancer patients by employing crocetin in co-culture with mesenchymal stem cells	P799		2
Ethics And Regulatory Science (Clinical Trials)				
Maryam Saberi-Karimian	Association of Restless Legs Syndrome and Obesity in Adults	P900		3
Hoda Mojiri-Forushani	Evaluating the Factors Affecting on Adverse Drug Reactions During 5 years in South West of Iran	P901		4
Hoda Mojiri-Forushani	Investigation on the State of Opioid Prescription in Teaching Hospital in Abadan in 2023	P902		5
Rouhollah Nazari	Morphometric Assessment of the Putamen in Adults Using Brain MRI Images during 2013 to 2023 in Shiraz	P903	**11:10-11:20**	6
Hadiseh Vahabi	Cancer Neoantigens: Personalized Targets for Tumor Specific Immunotherapy	P904		7
Shadieh Sani	The Role of Cultural Gender Traits and Premenstrual Symptoms in Predicting Ambiguity in Describing Menstrual Pain	P905		8

Roya Hosseini	The Role of Sleep Quality and Stress in the Development of Coronary Artery Disease	P906		9
Samira Shahraki	Comparison of Three Decellularization Methods for Preparing Natural Human Ureter Scaffold	P907	**11:20-11:30**	1
Esmat Radmanesh	Laboratory diagnostic markers (blood, renal, and coagulation) in patients with liver cirrhosis and hepatitis	P908		2
Sofia Salari	Comparison of the efficacy of oral and IV levetiracetam in the acute phase of mania in bipolar patients	P909		3
Sofia Salari	Comparison of the effectiveness of phenytoin and sodium valproate in acute phase of mania in patients with bipolar disorder	P910		4
Hassan Sadraei	Safety of oral capsule dosage form preparation of Dracocephalum kotschyi extract: a clinical trial in healthy volunteers.	P911		5
Elham Abdi	Vitamin K and Warfarin Therapy: Revisiting Dietary Guidance for Better INR Stability (Narrative Review)	P912		6
Abbas Mohtashamian	Association of serum vitamin D level and hematological inflammatory indices in participants of the MASHAD study	P913		7
Abbas Mohtashamian	Association between vitamin D status and biochemical parameters in breastfed normal and overweight infants	P914		8
Reihaneh Alsadat Mahmoudian	Assessing the significance of BPIFB2 in CRC patients	P915		9
Houshang Nemati	effectiveness of cyclic yoga practice on sleep quality in type 2 diabetic women	P917		1
Houshang Nemati	Impact of Cyclic Yoga on Quality of Life in Type 2 Diabetes Women with NAFLD	P918		2
Mohammad Kazem Imani Khoshkhoo	A Systematic Review of the Effects of Probiotic Supplements on Mental Health and Sleep in Children	P919		3
Omid Barez	Impact of Time-Restricted Feeding on Circadian Rhythm Hormones (Melatonin, Cortisol, Ghrelin, and Leptin) and Metabolic Flexibility in Young Adults	P920		4
Sara Jahangiri	Knowledge, Attitudes, and Practices (KAP) Assessment Regarding the Home Storage and Use of Oral Chemotherapy Drugs Among Parents of Children with Cancer	P921		5

Tayebeh Hamzehloei	Unmasking the Silent Carrier: A Prospective Mutation Analysis of ABCB4 and ABCB11 via Sanger Sequencing in IVF-Induced Intrahepatic Cholestasis of Pregnancy in Northeast Iran	P922	**11:30-11:40**	6
Aysa Rezabakhsh	Serum levels of Endocan and Serum Apolipoproteins A1 and B as Pharmacologic Targets of Endothelial Dysfunction in ACS patients	P923		7
Tayyebeh Zamani-Badi	Altered Expression of long non-coding RNAs and Cytokines in Granulosa Cells of Women with Polycystic Ovary Syndrome	P924		8
Susan Sarhadi	Furazolidone-based quadruple therapy versus levofloxacin-based triple therapy as a treatment for Helicobacter pylori eradication	P925		9
Elnaz Shokri	The effect of combined training on puberty regulators in overweight and obese girls with central precocious puberty	P926	**11:40-11:50**	1
Mahmood Sadeghi	An examination of association of polypharmacy and frailty in the elderly	P927		2
Sogand Abbasi Azizi	The Effect of Chronic Use of Selective Serotonin Reuptake Inhibitors (SSRIs) on Cognitive and Mood Symptoms in Patients with Ischemic Stroke: A Cross-Sectional Study	P928		3
Reza Erfani Far	Comparison of the Cognitive and Fatigue-Reducing Effects of Fingolimod and Dimethyl Fumarate in Patients with Relapsing-Remitting Multiple Sclerosis: A Cross-Sectional Study	P929		4
Mahdiye Askarizade	The Effect of Mediterranean Diet on Cognitive Functions in the Elderly Population	P930		5
Zahra Farzin pour	The Effect of Ten Weeks of Tabata Resistance Training on TRF-1, TRF-2, and BDNF Gene Expression in Obese Older Women	P932		6
Arezoo Faridzadeh	Probiotic Administration in Systemic Sclerosis Patients: A Systematic Review	P933		7
Hadi Karimzadeh	The Impact of Vitamin D Deficiency on Inflammatory Markers in Children	P934		8
Mansoureh Karimi	Impact Salivary IL-1 Beta Level Is Associated with Poor Sleep Quality in University Students Golestan province	P935		9

Fatemeh Kourepaz	The Effect of Antioxidant Supplementation on Reducing Pelvic Pain and Complications Associated with Endometriosis	P936		1
Danial Mahrooghi	Association between Vitamin B12 Deficiency and Severity of Depression and Anxiety in Adolescents: A Retrospective Chart Review Study	P937		2
Masomeh Mohammadi	The Effect of Lycopene on the Expression of Bax, Bcl2 and Caspase-3 Genes During Sperm Cryopreservation in Infertile Asthenozoospermic Patients	P938		3
Faezeh Mashhadi	Potential Glycemic Benefits of Ziziphus Jujuba hydroalcoholic extract in PCOS-Related Infertility: Findings from a Randomized Controlled Trial	P939		4
Hedieh Matloubi	Binaural Beats Effects on Interval Discrimination: Association with some Polymorphisms of Genes from Dopaminergic and Serotonergic Systems	P940		5
Mitra Moodi	Comparison of blood sugar levels and lipid profiles among addicted and non-addicted elderly people	P941	**11:50-12**	6
Zamzam Paknahad	The effects of MIND diet and propolis supplementation on metabolic syndrome indices: A randomized controlled clinical trial	P945		7
Elham Asadi	Title: The Effect of Blood Flow Restriction Resistance Training on Sirtuin-1, PGC-1α Gene Expression and Cardiovascular Endurance in Middle-Aged Women	P946		8
Zeynab Yazdanpanah	The influence of Myoinositol to improve biochemical manifestations of serum and follicular fluid and ICSI outcomes in patients with PCOS: A prospective randomized study	P947		9
Alireza Mohebbi	Evaluation of the treatment results of colchicine/L-carnitine compared to colchicine/pentoxifylline in patients with Peyronie's plaque in Ardabil at 2019–2023	P948		1
Shima Sonieshargh	The effect of metformin on the expression levels of GDF-9, BMP-15 and miR-320 genes in women with polycystic ovary syndrome undergoing intracytoplasmic sperm injection (ICSI)	P949		2
Shayan Rezanejad	Effect of Vitamin C on Levothyroxine Absorption: A Systematic Review	P950		3

Zahra Bayat	The Effect of HIIT Training on the Levels of Liver Enzymes in Type 2 Diabetic Women with NAFLD	P951	**12-12:10**	4
Alireza Afshoun	Formulation and Physicochemical Evaluation of PEGylated Liposomal Spironolactone: Active loading method	P952		5
Mahtab Zhian Mehrizi	PEGylated Liposomes as a Carrier for Spironolactone: Physicochemical Properties and Release Profile	P953		6
Zeinab Alavizadeh	Neonatal Outcomes Following Maternal Pethidine Administration in Labor: A Systematic Review	P954		7
Zahra Bahadoran	Dietary Supplement Use and Regression from Prediabetes to Normoglycemia: A Population-Based Cohort Study	P955		8
Hanieh Gholamalizadeh	Clinical Significance of Fragmented QRS Patterns in Long-Term Cardiovascular Mortality: Findings from the MASHAD Cohort	P956		9

Note: Some abstracts are not included in this abstract book due to withdrawal by the authors, withdrawal of registration, or failure to complete the abstract submission and publication requirements.


مرکز همایش های بین المللی شهدای سلامت

Key.S1, Genes, cells, and discovery in basic science and disease

Randy Schekman
Department of Molecular and Cell Biology, Howard Hughes Medical Institute University of California, Berkeley

My earliest interest in science came with a squint into the plastic lens of a toy microscope where I observed the amazing microbial world of single-cell organisms crawling and swimming across my field of vision. This passion grew through high school, college and graduate school, where I learned to understand life processes at a molecular level. In 1976, my first year as a Berkeley faculty member, I had the great good fortune to attract a stellar PhD student, Peter Novick, with whom I embarked on a search for the genes that control the process of protein secretion. Our chromosomes encode ~ 23,000 genes which encode the protein molecules that make cells and catalyze the chemistry of life. All of these proteins are made inside the cell but some fraction of them, roughly 30% including molecules such as insulin, must be exported out of the cell to work elsewhere in the body. Just as commercial goods are exported by some kind of traffic conveyance, secreted proteins are packaged into membrane carriers called vesicles for traffic within and ultimately, out of the cell. My lab devised genetic and biochemical techniques to discover the secretory machinery in a simple single-cell organism, Yeast. Biological evolution has conserved this machinery such that the very genes and proteins we discovered in yeast have been found to operate throughout our body to organize the secretion of hormones, growth factors, antibodies, chemical neurotransmitters, and all the things our body uses for normal physiology. As is often the case, fundamental discoveries such as this one have unexpected practical applications. Yeast cells are used to manufacture and secrete large quantities of clinically important proteins, such as recombinant human insulin. Some of the genes we discovered were also found to be the basis of human genetic diseases.

Key.S3, Promoting Basic Science

Saeed Semnanian
Department of Physiology, Faculty of Medical Sciences, Tarbiat Modares University, Iran

Basic science is not only studied to satisfy human curiosity, but it also plays a fundamental role in the context of our lives, helping us to address global economic, social and environmental challenges such as the water crisis, infectious diseases, ocean oxygen depletion and climate change. Greater awareness of the vital role of basic science should be created among relevant stakeholders, including policymakers, business and industry, international organizations, philanthropic foundations, professors and students, the media and the general public. It is expected that increased awareness of basic science will lead to increased opportunities for sustainable development and provide a roadmap for improving global well-being for current and future generations. Basic science can help identify mechanisms for the proper use of knowledge and technology transfer, and enable international research cooperation, including among developing countries.

Promoting the importance and effectiveness of different areas of basic science seems to be one of the permanent and permanent groups of enthusiasts and scholars in this field. With this perspective, this presentation has attempted to point out a few examples of valuable findings of these sciences that have led to rich and valuable applications in human life years later. May the young people seeking these fields consider the promotion of these sciences as part of their career dimensions and be influential in opening this path in the country.

Key.S4, Beyond Medication: The Potential of Diet and Probiotics in Epilepsy

Marjan Nassiri-Asl
Department of Pharmacology and Institute of Neuroscience and Cognition, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Given that approximately one-third of epilepsy patients are resistant to conventional pharmacological treatments, identifying novel pathophysiological pathways is imperative to reducing the global burden of this disease. In this context, probiotics play a pivotal role in host health by regulating the gut microbiome. This presentation aims to investigate the interaction between probiotics and the ketogenic diet regarding gut microbiota and to evaluate their therapeutic potential in epilepsy. By modulating microbiome composition and influencing the gut-brain axis, probiotics may help reduce neuroinflammation and oxidative stress. In parallel, the ketogenic diet (KD) impacts this axis by altering gut bacterial profiles and modulating neurotransmitter and short-chain fatty acid (SCFAs) levels.

Evidence from animal models demonstrates attenuated seizure activity, as well as reduced anxiety and neuroinflammation following probiotic administration. Similarly, human studies indicate that these interventions lead to a reduction in seizure frequency and an enhanced quality of life for drug-resistant patients. Consequently, the application of probiotics and nutritional interventions, such as the ketogenic diet, represents a novel and promising strategy for managing epilepsy and improving patient outcomes.

Key.S5, Multitarget Neuroprotection in Spinal Cord Injury: Astaxanthin and Combination Therapy in Rodent Models

Masoumeh Jorjani
Department of Pharmacology & Neurobiology Research Center, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, IRAN

Background: Spinal cord injury (SCI) triggers an irreversible cascade of secondary damage, including neuroinflammation, oxidative stress, excitotoxicity, apoptosis, and edema, hindering recovery. No single therapy currently halts this cascade or yields meaningful functional restoration. Astaxanthin (AST), a fat-soluble keto-carotenoid, exhibits potent antioxidant, anti-inflammatory, and anti-apoptotic properties, making it a compelling multitarget neuroprotectant. We examined the mechanisms of AST in rat models of SCI, with an emphasis on inflammation, astrocyte activation, edema, and potential synergy with cell-based therapy.
Methods: We conducted preclinical studies across multiple rodent SCI models, assessing functional recovery with somatosensory and locomotor tests (e.g., BBB scoring), and tissue preservation via histology. Molecular endpoints included inflammatory signaling (TNF-α, IL-1β, IL-6, COX-2, NF-κB, p38 MAPK), oxidative stress (MDA, ROS, Nrf2/HO-1, SOD), apoptosis (Bcl-2, Bax, caspase-3), excitotoxicity (NMDA NR2B), and edema-related pathways (HMGB1/TLR4/NF-κB, AQP4). A subset of experiments evaluated the combined effect of AST with epidermal neural crest stem cells (EPI NCSCs).
Results: AST consistently improved functional outcomes, with higher locomotor scores and reduced neuropathic pain. Histology showed preserved myelin and motor neurons. Mechanistically, AST suppressed proinflammatory mediators and NF-κB/p38 MAPK signaling, reduced glutamatergic excitotoxicity (via NR2B downregulation), enhanced antioxidant defenses (Nrf2/HO-1 upregulation, lower lipid peroxidation), and shifted apoptotic balance (↑Bcl-2, ↓Bax, caspase-3 inhibition). Edema and astrocyte activation were mitigated by dampening HMGB1/TLR4/NF-κB signaling and downregulating AQP4. Notably, AST plus EPI NCSCs yielded synergistic gains in function, with further reductions in motor neuron loss and demyelination, potentially via boosted mitochondrial biogenesis.
Conclusion: AST exerts pleiotropic neuroprotection in SCI by concurrently modulating inflammation, oxidative stress, apoptosis, excitotoxicity, and edema through NF-κB, MAPK, and Nrf2 pathways, and by preserving the blood–spinal cord barrier. These preclinical findings position AST as a promising multitarget adjunct for SCI, justifying further translational and clinical studies.
Keywords: Astaxanthin, Spinal cord injury, Neuroprotection, Combination therapy

Key.S6, Panax notoginseng Flower Extract Attenuates Pentylenetetrazole-Induced Epilepsy by Restoring Glutamate Homeostasis

Minke Tang
School of Chinese Materia Medica, Beijing University of Chinese Medicine, Beijing 102488, China

Objectives: One-third of patients experience inadequate seizure control with antiseizure medications. Therefore, safer and more effective therapeutic strategies remain urgently needed. Research evidence indicates that Panax notoginseng flower may exhibit potential antiepileptic properties. The study aimed to investigate the neuroprotective and antiepileptic effects of Panax notoginseng flower (PNF) extract in a chronic pentylenetetrazole (PTZ)-kindled mouse model and explore its potential mechanisms, focusing on glutamate homeostasis.
Methods: Chronic epilepsy was induced in ICR mice via repeated subconvulsive PTZ intraperitoneal injections. Following successful kindling, mice were orally treated with PNF (1.5 g/kg or 3 g/kg) for 30 days. Seizure behaviors were scored using Racines scale. Neuronal survival, systemic and cerebral cytokines, hippocampal glutamate levels (in vivo microdialysis with LC-MS/MS analysis), glutamate homeostasis related proteins glutamate transporter-2 (GLT-1), glutamate-aspartate transporter-1 (GLAST), and glutamine synthetase (GS) were investigated.
Results: PNF treatment significantly reduced seizure severity and restored neuronal nuclei (NeuN+) cell neurons in the cortex and hippocampal CA1 region of PTZ kindled mice. PNF attenuated systemic and neuroinflammation by lowering interleukin-1ß (IL-1β), interleukin-6 (IL-6), and tumor necrosis factor-a (TNF-α) levels and increasing interleukin-10 (IL-10) in serum and brain of PTZ mice. PNF reduced hippocampal glutamate accumulation and upregulated GLT-1, GLAST, and GS expression, which were altered by PTZ stimulation. Conclusions: The PNF extract exhibits significant neuroprotective and antiepileptic effects in PTZ-kindled mice, likely through restoring glutamate homeostasis, and suppressing inflammation. These findings, with further clinical development, support the therapeutic potential of PNF as a complementary approach for epilepsy management.
Keywords: epilepsy, Panax notoginseng flower (PNF), neuroprotection; glutamate; neuroinflammation

Key.S7, The vascular effects of red wine polyphenol resveratrol

Lj. Gojkovic-Bukarica[1], M. Gostimirovic[1], J. Rajkovic[1], A. Bukarica[2] and J. Simanovic[1]
1. Institute of Clinical Pharmacology, Pharmacology and Toxicology, Faculty of Medicine, University of Belgrade, Serbia
2. Institute for Cardiovascular Diseases "Dedinje", University of Belgrade, Serbia

Resveratrol, *trans*-3,5,4'-trihydroxy stilbene is a naturally occurring phytoalexin present in many different types of nutrients which we consume on daily basis. Resveratrol was first isolated from dried roots of *Polygonum cuspidatum,* as the principal active ingredient. *Polygonum cuspidatum* and its extract have been used in Japanese and Chinese traditional medicine for treatment of various skin inflammations, cardiovascular and liver diseases, and fungal infections. There are two isoforms of resveratrol: cis- and trans–resveratrol. Trans–resveratrol is biologically active isoform. The main source of resveratrol is grape skin. Also, resveratrol is present in fruits such as cranberry, lingberry, bilberry, mulberry, deer berry, blueberry, sparkleberry, partridgeberry, jackfruit, and in a peanut orchid tree, scots pine, corn lily, white hellebore, eucalyptus, etc. It plays the most important role in the epidemiological phenomenon called "French paradox" (existence of cardiovascular risk factors with low incidence/mortality rates which may attribute to moderate consumption of red wine). Resveratrol induced endothelium-dependent and endothelium-independent vasorelaxation. Endothelium-dependent mechanisms of relaxation by resveratrol include stimulation of endothelial nitric oxide (NO) production by SIRT1-dependent endothelial NO synthase (eNOS) up regulation and SIRT1-dependent eNOS deacetylation. Estrogen receptor ERα-dependent, ERK1/2-mediated eNOS phosphorylation is stimulated by resveratrol. Resveratrol lowers superoxide-mediated NO inactivation by different mechanisms. It decreases expression and activity of vascular NADPH oxidases (NOX) and stimulates expression of superoxide dismutases (SOD), catalase and glutathione peroxidases. Thus, oral treatment with resveratrol results in endothelium-dependent relaxation. In the clinical study which included obese men and post-menopausal women with untreated borderline hypertension, acute consumption of resveratrol (30, 90 or 270 mg) increases resveratrol concentration in plasma and flow-mediated dilatation of the brachial artery. According to this, it seems that resveratrol improves endothelial (dys)function. The endothelium-independent relaxation is mediated by different ion channels in the membrane of vascular smooth muscle cells, including big Ca^{2+}-activated K^+ (BK_{Ca})-channels or voltage-gated calcium channels. Also, there are evidences that margatoxin-sensitive smooth muscle voltage-sensitive K^+ (Kv1.3) channels play important role in vasorelaxation induced by resveratrol in a diabetic blood vessels. According to the presented results, it seems that vascular protective effect of resveratrol is obvious. It is necessary to emphasize that all positive effects of resveratrol were demonstrated mainly in *in vitro* studies and in studies with experimental animals. Further clinical studies are necessary in order to define pharmacokinetics, efficacy, adequate therapeutic doses, tolerability and possible interactions of resveratrol with other drugs.

Key.S8, Bioengineering the Brain: Therapeutic and Technological Applications

Mohammad Javan[1,2,3]
1.Dept. Physiology, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran
2.Institute for Brain and Cognition, Tarbiat Modares University, Tehran, Iran
3.National Primate Center, Royan Institute, ACECR, Tehran, Iran

Advancements in stem cell biology and technology along with essential strategies in converting a cell type to another type both *in vitro* and *in vivo* has provided novel opportunities to reconstruct the brain structures as favored. It may help to recreate an insulted brain structure due to degeneration or trauma to restore the normal lost function or to reshape that brain structure for more feasible communication to read or writing on the brain. The engineered cells inside the brain will report the state of the brain structures for real time mapping or will respond to specific features of contactless stimulation for brain modulation and control.

In this presentation we will review some national achievements in stem cell technologies for the therapeutic applications in neurodegenerative diseases including Parkinson's disease and Multiple sclerosis. The promising outcomes of stem cell therapy using dopaminergic progenitors in non-human primate model of Parkinson's disease as well as the effectiveness of *in vivo* reprogramming of human astrocytes to oligodendrocyte progenitor cells in mice followed by enhanced myelin repair, will be discussed. Engineered neural cells integrated in the brain circuits provide a fortuitous to control, read and modulate the animal brain. Additionally, we will see how combining *in vivo* reprogramming with newly developed technologies as like as CRISPR/dCas9 and brain organoids has provided a new area for advanced technology development required for brain bioengineering.

Keywords: Neural stem cells, *In vivo* reprogramming, Brain Bioengineering, Neural restoration, Parkinson's disease.

Key.S9, The Biology of Inequalities and Social Insecurities from the Perspective of Social Dysregulation, Health, and Behavior

Mohammad-Reza Vaez-Mahdavi
Health Equity Research Center, Shahed University, Tehran, Iran

Introduction: Accumulating evidence indicates that social inequalities and insecurities influence physical health and human behavior through neural and immune mechanisms. The ultimate objective of the brain and the immune system is to preserve the biological, psychological, spiritual and existential security of the organism. Our ancestors inhabited environments fraught with physical and microbial threats. Individuals who established secure and affiliative social relationships to benefit from group support, and who exhibited a proactive inflammatory response to cues of social threat to prepare for potential injuries, were more likely to survive. Accordingly, our biological architecture is intrinsically programmed to seek "social safety" and react to "social threat." These mechanisms are embedded within our behavioral DNA.

The physiological mechanisms' endeavor to maintain and sustain "social safety" necessitates that the formation and maintenance of affiliative social relationships constitute a fundamental principle of human behavior. Neural signaling arising from social threats, such as rejection, isolation, and discrimination, is processed through social brain networks, which encompass the amygdala, the empathy network, the mentalizing network, and mirror neurons. This triggers the activation of the sympathetic nervous system, the hypothalamic-pituitary-adrenal (HPA) axis, the vagus nerve, and the meningeal lymphatic pathways. These processes are associated with increased production of inflammatory cytokines and altered expression of immune-related genes. When sustained, they predispose individuals to depression, cardiovascular diseases, diabetes, cancer, and other chronic disorders. Specifically, these mechanisms lead to the upregulation of pro-inflammatory genes and the downregulation of antiviral genes, establishing the foundation for a chronic inflammatory response. Furthermore, evidence suggests that supportive social relationships, a sense of social belonging, hope for the future, faith, and optimism toward the world are correlated with reduced inflammation and improved health outcomes.

Conclusion: Social threat is not merely a psychological phenomenon but a fully-fledged biological event with established genetic underpinnings. Positive social safety schemas instill a favorable perception of the self, the world, and the future, promoting a sustained feeling of social connectedness, relatedness, purposefulness, and belonging. Conversely, negative social safety schemas generate thoughts and emotions regarding the self, the social world, and the future that can induce profoundly heightened sensitivities to social adversities, culminating in intolerance and individual fragility.

Keywords: Inequality, Social Insecurity, Chronic Inflammation, Social Support, Purposefulness, Optimism.

Key.S10, Brain stimulation to explore mechanisms of breathlessness

S. Shakeeb Hassan Moosavi[1]
1. School of Biological and Medical Sciences, Faculty of Health, Science, and Technology, Oxford Brookes University, Oxford, UK

Breathlessness is a common, scary, unpleasant symptom of cardiopulmonary disease. Fear of breathlessness stops patients exercising, making them unfit and more breathless, creating a cycle of declining health and quality of life. Over 60% of elderly with lung disease have depression, anxiety and fatigue associated with their breathlessness. Better management is imperative when the cause is incurable, and the anxiety provoked makes breathlessness unbearable. Pulmonary rehabilitation involving supervised exercise and education is highly effective, but benefits don't last because after rehab many lose motivation to stay active. Better management options may emerge if the role of the brain can be better defined. Functional brain-imaging studies have reported activation of several brain regions with breathlessness, notably the 'insular cortex'. More recently, we reported that patients with low-grade insular glioma have blunted breathlessness, and that patients having deep brain stimulation (DBS) to treat movement disorders will sense less breathlessness when the 'motor thalamus' is targeted, and more breathlessness when the sub-thalamic nucleus is targeted. This presentation will report preliminary findings with non-invasive transcranial magnetic stimulation of the dorsolateral prefrontal cortex on experimentally induced breathlessness in healthy volunteers and will outline our plans to adopt a neuro-modulatory approach to further interrogate brain regions of interest. Bringing pieces of the puzzle together from the different approaches is likely to reveal how the brain produces feelings of breathlessness so that in future we can develop safe, effective, ways to stimulate the brain to dial down breathlessness when life becomes unbearable because of it.

Keywords: Dyspnea; Deep Brain Stimulation; Transcranial Magnetic Stimulation

Key.S11, Citation boosting: doping or product promotion?

Hossein Hosseinzadeh[1,2]
1.Department of Pharmacodynamics and Toxicology, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran
2.Pharmaceutical Research Center, Pharmaceutical Technology Institute, Mashhad University of Medical Sciences, Mashhad, Iran

Scientific citations and the h-index are among the most widely used indicators for evaluating the impact of researchers, academic groups, and universities. Increasing citation counts not only improves academic reputation but also enhances opportunities for research funding, international collaboration, and translation of findings into policy and clinical practice. This study aimed to review and summarize practical, scientific, and ethical strategies for increasing the visibility and citation of scholarly articles and consequently improving researchers' h-index.
Consistent use of author name and institutional affiliation, together with careful selection of keywords and their inclusion in the title and abstract, were identified as major determinants of article discoverability. Publishing in open-access journals and legally sharing articles through platforms such as ResearchGate can improve accessibility. Graphical abstracts, short video abstracts, and dissemination through academic social networks may increase article visibility and engagement. Multicenter collaboration, review articles, particularly systematic reviews, and publication on emerging or high-interest topics were associated with higher citation potential. In contrast, excessive self-citation may artificially inflate bibliometric indicators and potentially undermine scientific credibility.
The rise in citations suggests the connection between research merit, accessibility, discoverability, and responsible communication practices. Ethical and sustainable improvement of the h-index can be achieved through strategies based on scholarly Search engine optimization (SEO), open access, collaborative research, and complementary dissemination tools such as graphical and video abstracts. These approaches may enhance not only bibliometric performance but also the real scientific and societal impact of research.

SP101, Investigation of the protective effects of aripiprazole on methylphenidate-induced neurotoxicity in rats

Afrooz Mohammadgholi-Beiki[1], Helia Aghamiri[3], Rojin Rashidian[1], Majid Jafari-Sabet[1, 2], Manijeh Motevalian[1, 2], Parvaneh Rahimi-Moghaddam[1], Mohammad Sheibani[1,2]

1. Department of Pharmacology, School of Medicine, Iran University of Medical Sciences, P.O. Box: 14155-6183, Tehran, Iran
2. Razi Drug Research Center, School of Medicine, Iran University of Medical Sciences, Tehran, Iran
3. Department of Pharmacology and Toxicology, School of Pharmacy, Iran University of Medical Sciences, Tehran, Iran

Background: Methylphenidate (MPH) serves as a stimulant in the treatment of attention deficit hyperactivity disorder (ADHD). However, long-term administration has been linked to neurotoxic sequels such as cognitive decline and increased oxidative stress, especially in the hippocampus. In contrast, aripiprazole (ARP), has shown promise in providing neuroprotection and reducing inflammation. This research seeks to investigate the protective role of ARP on MPH-induced neurotoxicity in rats.

Methods: A total of 40 male Wistar rats were organized into five groups. All the groups received daily intraperitoneal injections of MPH at 10 mg/kg, combined with varying doses of ARP at 3, 10, and 30 mg/kg for 21 days. Behavioral assessments undertaken to evaluate motor activity and depressive-like behaviors, as well as the inhibitory avoidance test for cognitive function. Seizure susceptibility was assessed using pentylenetetrazol (PTZ). Hippocampal tissues were collected for biochemical analysis and histopathological studies.

Results: ARP at specific doses significantly mitigated locomotor activity impairment, depressive-like behaviors, and memory deficits induced by chronic MPH administration. Additionally, ARP reduced seizure susceptibility compared to the MPH-treated group. Biochemical analysis indicated that ARP decreased oxidative stress markers, including malondialdehyde (MDA) and myeloperoxidase (MPO), while enhancing levels of glutathione and the expression of brain-derived neurotrophic factor (BDNF), nuclear factor erythroid 2-related factor 2 (NRF2), and protein kinase B (Akt) in hippocampus.

Conclusion: Aripiprazole reduces behavioral and biochemical deficits from chronic MPH use in rats, suggesting it may help mitigate adverse effects of long-term MPH treatment.

Keywords: Methylphenidate, Aripiprazole, Neurotoxicity, Oxidative stress, Rat

SP102, Piperine prevents scopolamine-induced cognitive impairment via its antioxidant and anti-inflammatory roles; suggesting potential modulation of necroptosis-related genes including MLKL and TNF-α

Amin Ataie[1], Hossein Khaleghzadeh‑Ahangar [2], Tayebeh Azramezani Kopi [2], Farzane Shanehbandpour‑Tabari[3]

1. Department od toxicology and pharmacology, Babol University of Medical Science, Babol, Iran
2. Department of Physiology, Babol University of Medical Sciences, Babol, Iran
3. Department of Tissue Engineering and Applied Cell Sciences, School of Advanced technologies in Medicine Shied Beheshti University of Medical Sciences, Tehran, Iran

Background: Alzheimer's disease (AD) is the leading cause of dementia, characterized by cognitive decline and neurodegeneration. Given the limitations of current treatments, research has turned to natural substances such as piperine, which is known for its neuroprotective properties. This study investigates the effects of piperine on cognitive function and genes associated with oxidative stress, inflammation, and necroptosis-related genes in a rat model of cognitive impairment.

Methods: Fifty adult male Wistar rats were used, divided into five groups: an intact group, a control group (vehicle solution followed by scopolamine), and three experimental groups receiving piperine (5, 10, and 20 mg/kg) followed by scopolamine during the training period. Behavioral assessment was conducted using the Morris Water Maze (MWM) test. Hippocampal tissue was collected after euthanasia for gene expression analysis of Nrf2, HO-1 and TNF-α, Fas, TRAIL, MLKL, and Caspase-8. Spatial learning and memory improved significantly in piperine-treated groups, with no impact on swimming velocity, indicating cognitive enhancement without affecting motor functions in the scopolamine-induced cognitive impairment model.

Results: Piperine pretreatment prevented oxidative stress and inflammation, as evidenced by the restoration of Nrf2, HO-1, and Caspase-8 and the reduction of TNF-α, Fas, TRAIL, and MLKL expression levels

Conclusion: These findings suggest that piperine has anti-oxidative, anti-inflammatory, and Cognitive-enhancing effects, with particular effects possibly on necroptosis, and could be a valuable addition to the current AD treatment paradigm, warranting further investigation in clinical trials.

Keywords: Piperine, Scopolamine, Alzheimer's disease, Cognitive Impairment, Necroptosis, Oxidative Stress, Neuro inflammation, TNF-α, MLKL

SP103, Effect of compound extract of *Portulaca olerace, Urtica dioica* and *Boswellia serrata* on multiple sclerosis in rats

Golnaz Mirhosseini[1], Maryam Tehranipour[2], Naser Mahdavi Shahri[3]
1. Department of Biology, Mashhad Branch, Islamic Azad University, Mashhad, Iran
2. Department of Biology, Mashhad Branch, Islamic Azad University, Mashhad, Iran
3. Department of Biology, Basic Sciences Faculty, Ferdowsi University, Mashhad, Iran

Background: Multiple Sclerosis (MS) is a neurodegenerative disease with memory's defect. Nowadays tendency of herbal therapy is increased because of drug's side effects. This study's purpose is evaluation of compound extract effect of *Portulaca olerace*, *Urtica dioica* and *Boswellia serrata* on memory and neurons density in CA1 area of hippocampus in induced multiple sclerosis rats.
Methods: 30 male adult rats were allocated into control group, sham group (salin injection), (MS + salin) group, (MS + extract (200 mg/kg)), (MS + extract (400 mg/kg)). MS model was induced by stereotaxic method, intra hippocampal injection a single dose of ethidium bromide (0.01% ethidium bromide solution in 0.9% salin). Extract were injected as the treatment for 21 days. The shuttle box test was used for memory evaluation. Dissector method was used for neural density in CA1 area. Histopathology method was used for evaluation of the cells alteration.
Results: Neural density in MS group was significantly reduced in comparison with control and sham groups ($P<0.05$) but increased significantly in treatment groups ($P<0.05$). Histological results showed that MS caused the disruption of neuron cells in compare to controls but extract injection cause neurogenesis in treatment groups. Memory in MS group was significantly reduced in comparison with control and sham groups ($P<0.05$) but increased significantly in treatment groups ($P<0.05$).
Conclusion: The extract can effective on memory recovery and neurogenesis in MS disease.
Keywords: Multiple Sclerosis, Hippocampus, Neurogenesis, Memory

SP104, Pioglitazone enhances cognitive performance in a rat model of cholinergic impairment induced by scopolamine: oxidative stress and neuroinflammation

Rasul Saberi[1,7], Arezoo Rajabian[2], Zahra Kioumarsi Darbandi[3], Mahdieh Aliyari[4], Sabiheh Amirahmadi[1], Hamideh Amini[5], Hossein Salmani[6], Pouya Youseflee[1], Mahmoud Hosseini[1,2,7]

1. Applied Biomedical Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
2. Neuroscience Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
3. Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
4. Department of Clinical Biochemistry, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
5. Student Research Committee, Mashhad University of Medical Sciences, Mashhad, Iran
6. Department of Physiology and Pharmacology, Faculty of Medicine, Sabzevar University of Medical Sciences, Sabzevar, Iran
7. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Alzheimer's disease (AD) is a serious neurological ailment marked by increasing cognitive impairment. Pioglitazone (PG), a thiazolidinedione derivative, has recently been shown to possess neuroprotective properties in neurodegenerative conditions. The objective of this investigation was to assess the potential advantages of PG in the prevention of scopolamine-induced cholinergic dysfunction and the subsequent memory and learning deficits in male Wistar rats.

Methods: Five groups of 50 male Wistar rats were randomly assigned: (1) Control, (2) Scopolamine, and (3-5) three treatment groups receiving daily PG injections at 20, 40, or 60 mg/kg for three weeks in addition to scopolamine. The Morris water maze (MWM) and passive avoidance (PA) tests were used to evaluate cognitive function. Malondialdehyde (MDA), superoxide dismutase (SOD), total thiol levels, and acetylcholinesterase (AChE) activity in the cortex and hippocampus were measured. Furthermore, the hippocampal mRNA expression levels of inflammatory markers (TNF-α, IL-1β, and IL-6) were assessed.

Results: Scopolamine caused cognitive impairment, raised MDA levels and AChE activity, decreased SOD activity and thiol levels, and increased mRNA expression of inflammatory cytokines. PG effectively reversed these effects by improving performance in the MWM and PA tests, decreasing MDA levels and AChE activity while raising SOD activity and total thiol concentration. Additionally, PG reduced TNF-α, IL-1β, and IL-6 expression in brain tissue.

Conclusion: According to current behavioral and neurochemical research, PG improves cholinergic function and decreases oxidative stress and neuroinflammation to mitigate scopolamine-induced memory impairment.

Keywords: Cognitive dysfunction, Neuroinflammation, Oxidative stress, Pioglitazone, Scopolamine

SP105, Downregulation of liver-expressed antimicrobial peptide 2 in the rat amygdala during the acquisition of seizures in the electrical kindling

Maedeh Jafari[1], Siamak Beheshti[1]
1. Department of Plant and Animal Biology, Faculty of Biological Science and Technology, University of Isfahan, Isfahan, Iran

Background: Epilepsy, as one of the most common neurological disorders, affects more than 50 million people worldwide [1]. Although the role of ghrelin functional receptor (GHSR1a) in epileptic seizures has been proven [2], our information regarding the effect of liver-expressed antimicrobial peptide 2 (LEAP2), its newly discovered endogenous inverse agonist, in this disease is very limited [3]. This study aimed to investigate changes in LEAP2 gene expression in the rat amygdala during electrical kindling induced epileptogenesis.
Methods: Tripolar electrodes were implanted in the right amygdala of four groups of male Wistar rats by stereotaxic surgery. Two groups received stimulation with threshold intensity until showing focal (stage 2) or generalized seizures (stage 5). The remaining two groups were considered as the corresponding sham groups. After showing focal or generalized seizures, the right amygdala of the rats was removed and its total RNA extracted. Appropriate cDNA was made and the desired data were finally obtained by performing Real-time PCR. Data were analyzed using unpaired t-test.
Results: Data analysis showed that the expression level of LEAP2 mRNA was significantly reduced during the acquisition of focal and generalized seizures induced by electrical kindling in the amygdala of rats compared to the corresponding sham groups.
Conclusion: By demonstrating the reduction of LEAP2 gene expression in the amygdala for the first time in both focal and generalized seizures, our research revealed the probable role of LEAP2 in epileptogenesis.
Keywords: Epilepsy, LEAP2, Electrical kindling, Gene expression

SP106, Identification of prognostic hub genes in glioblastoma using transcriptomic and protein interaction network analysis

Forouzan Amerizadeh[1,2], Payam Sasannejad[1]
1. Department of Neurology, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Internal Medicine, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Glioblastoma multiforme (GBM) remains one of the most aggressive primary brain tumors, largely driven by glioma stem cells (GSCs) that contribute to therapeutic resistance and poor patient survival. Phenotypic plasticity and differentiation dynamics of GSCs play a critical role in tumor progression, yet their prognostic relevance in GBM patients is not fully understood. This study aimed to characterize differentiation-associated transcriptional programs in GSCs and to develop a robust prognostic gene signature for GBM.
Methods: Gene expression microarray data from GSE253400, including stem-like and differentiated states of two patient-derived GSC models (NCH421 and NCH644), were analyzed to identify differentially expressed genes (DEGs). Unsupervised analyses, including principal component analysis and hierarchical clustering, were used to assess global transcriptional patterns. Prognostic modeling was performed using RNA-sequencing and clinical data from The Cancer Genome Atlas (TCGA-GBM). Patients were randomly divided into training and testing cohorts. Candidate genes were screened using univariate Cox regression, followed by LASSO-Cox regression to construct a prognostic gene signature. Survival analyses, time-dependent ROC curves, and multivariate Cox regression were applied to evaluate predictive performance and independence from clinical variables.
Results: Distinct transcriptional profiles clearly separated stem-like and differentiated glioma stem cells, indicating conserved differentiation-associated gene expression programs. Survival analysis of TCGA-GBM data identified a 17-gene prognostic signature consisting of LOXL1-AS1, CARD19, WFDC2, ANKH, P2RY2, GPR39, AC008875.3, MYCBPAP, SCML4, PLK2, AC046143.1, LINC02686, MIR3937, AC074050.1, MTCO3P28, CASC20, and LINC01674. This signature robustly stratified patients into high- and low-risk groups with significantly different overall survival in the training cohort (log-rank $p < 0.0001$) and retained prognostic relevance in an independent test cohort. Time-dependent ROC analysis demonstrated good predictive performance, with a 1-year AUC of 0.773 in the training set and 0.671 in the test set. Multivariate Cox regression confirmed the risk score as an independent prognostic factor.
Conclusion: This study identifies a differentiation-associated transcriptional signature derived from glioma stem cell plasticity that robustly predicts survival in GBM patients. The proposed 17-gene signature may serve as a valuable prognostic biomarker and provides insights into stemness-driven tumor heterogeneity, with potential implications for patient stratification and therapeutic targeting.
Keywords: Glioblastoma, Glioma stem cells, Gene expression profiling, Prognostic biomarkers, survival analysis

SP107, Identifying key genes and approved medications associated with major depressive disorder using network analysis and systems biology

Yasin Parvizi[1], Seyed Mahdi Sadati[2], Pedram Porbaha[3,4], Shima Masumi[1], Saeid Mahdian[5], Seyed Alireza Vafaei[6], Saeid Afshar[7,8]

1. School of Medicine, Student Research Committee, Hamadan University of Medical Sciences, Hamadan, Iran
2. Department of Neuroscience, School of Science and Advanced Technologies in Medicine, Hamadan University of Medical Sciences, Hamadan, Iran
3. Department of Pharmaceutics, School of Pharmacy, Shiraz University of Medical Sciences, Shiraz, Iran
4. Student Research Committee, Shiraz University of Medical Sciences, Shiraz, Iran
5. Behavioral Disorders and Substance Abuse Research Center, Hamedan University of Medical Sciences, Hamedan, Iran
6. Hamadan University of Medical Sciences, Hamadan, Iran
7. Department of Medical Biotechnology, School of Advanced Medical Sciences and Technologies, Hamadan University of Medical Sciences, Hamadan, Iran
8. Research Center for Molecular Medicine, Hamadan University of Medical Sciences, Hamadan, Iran

Objective: Major depressive disorder (MDD) stands as one of the serious psychiatric conditions that detrimentally affect patients' quality of life and leads to a significant part of disability worldwide. Due to the limited understanding of the basic molecular mechanisms of depression and antidepressant medications, a clear understanding of the onset and development of MDD is unavailable. This study aims to figure out the pivotal genes and pathways implicated in the MDD development and identify medications that can potentially improve MDD treatment based on their relation with the key genes.

Method: Symbols of human coding genes were retrieved from the HUGO Gene Nomenclature Committee database. These symbols were then queried for MDD-related associations using a Python script in PubMed. Subsequently, genes with two or more related articles to MDD were selected. A union of our search data and MDD-related genes in the DisGeNET database was found. The gene interaction network was generated and analyzed utilizing the STRING and Cytoscape, respectively. Finally, a drug-gene network was constructed and medications that can affect multiple genes were selected.

Results: The union of our search data and DisGeNET data contained 1734 genes. Based on network analysis, TNF, IL1B, IL6, STAT1, and STAT3 were identified as the key genes in the MDD pathogenesis. Eleven drugs that affect more than one gene were detected through a drug-gene network. These medications include Acitretin, Adalimumab, Alteplase, Cisplatin, Digoxin, Etanercept, Infliximab, Insulin, Omeprazole, Pentoxifylline, and Rabeprazole.

Conclusion: In summary, our findings identified five genes as key genes in MDD development, as well as medications related to key genes. This study provides a new vision of the pathogenesis and treatment of MDD. However, further experimental and clinical studies are necessary.

Keywords: Antidepressive agents, Depressive disorder, Drug therapy, Major, Protein interaction maps, Systems biology

SP108, Salivary transcriptomic biomarkers for glioblastoma: PIK3R1, PLXDC2, PBX3, and miR-320a-3p expression analysis

Faezeh Montazeri-Mogaddam[1], Melika Mehdizadeh[2], Amirhosein Pourabdollah[3], Mohammadreza Bigdeli[4]

1. Faculty of Life Sciences and Biotechnology, Shahid Beheshti University, Tehran, Iran
2. Facualty of Biosocial and Quantum Sciences and Biotechnologies, Islamic Azad University, Qom, Iran
3. Faculty of Psychology and Educational Sciences, Allameh Tabataba'i University, Tehran, Iran
4. Department of Animal Sciences and Marine Biology, Faculty of Life Sciences and Biotechnology, Shahid Beheshti University, Tehran, Iran

Background: Glioma, the most common primary malignant brain tumor, has a poor prognosis with a median survival of approximately 14 months despite standard therapies. This highlights an urgent need for novel, non-invasive diagnostic markers. This study aimed to evaluate the potential of specific salivary biomarkers for glioma detection.

Methods: We investigated the expression of miR-320a-3p and three target genes (PBX3, PI3KR1, PLXDC2) as potential salivary diagnostic markers. The study involved a bioinformatic analysis of tissue expression data from 512 glioma patients from the TCGA-LGG cohort and CancerMIRNome database. Subsequently, these bioinformatic findings were validated using Real-Time PCR on saliva samples from 28 glioma patients and 20 healthy controls.

Results: Salivary expression of PBX3, PI3KR1, and PLXDC2 was significantly increased in glioma patients compared to the healthy control group. In contrast, miR-320a-3p expression showed no significant difference between the groups. The diagnostic performance, evaluated by the area under the receiver operating characteristic (ROC) curve, was 0.901 for PBX3, 0.572 for PI3KR1, and 0.792 for PLXDC2.

Conclusion: To our knowledge, this is the first study to report on the expression of these molecules in the saliva of glioma patients. The findings indicate that salivary PBX3 and PLXDC2 hold significant promise as accessible, non-invasive biomarkers for glioma diagnosis.

Keywords: glioma, PBX3, PI3KR1, PLXDC2, miR-320a-3p, cancer diagnosis, expression

SP109, Levetiracetam protects OLN-93 cells against glutamate toxicity: An *In vitro* study

Mohaddeseh Sadat Alavi[1], Abdulridha Mohammed Al-Asady[2], Farzaneh Abbasinezhad-Moud[1], Arezoo Rajabian[2], Zahra Rastegartizabi[1], Hamid R. Sadeghnia [1,2]
1.Pharmacological Research Center of Medicinal Plants, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
2.Department of Pharmacology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: The role of glutamate in the development of some brain pathological conditions, such as multiple sclerosis, has been well described. Levetiracetam (LEV), a new broad-spectrum antiseizure medicine, is widely used to control certain types of seizures. The current study was designed to evaluate the protective potential of LEV against glutamate-induced injury in OLN-93 oligodendrocytes.
Methods: At first, the potential negative impact of LEV on OLN-93 viability was evaluated. After cells were concurrently treated with LEV (0-100 μM) and glutamate (8 mM) for 24 h. The viability, redox status, and the rate of apoptosis of OLN-93 cells, as well as caspase-3 expression, were then assessed.
Results: LEV at 1-800 μM did not have any negative effect on cell survival. Treatment with LEV (50 and 100 μM) substantially enhanced the cell viability following glutamate insult. The cytoprotective activity of LEV (50 and 100 μM) against glutamate toxicity was accompanied by reduced reactive oxygen species (ROS) accumulation and malondialdehyde (MDA) level. Moreover, 100 μM of LEV inhibited apoptosis and decreased the expression level of cleaved caspase-3 following glutamate exposure.
Conclusion: Taken together, the results suggested that LEV has protective effects against glutamate-mediated cytotoxicity in OLN-93 cells. The oligoprotective action of LEV was shown to be exerted via inhibition of oxidative stress and cellular apoptosis.
Keywords: Glutamate, Apoptosis, OLN-93 cells, Levetiracetam, Multiple sclerosis

SP110, Potential impacts of grape seed extract on hippocampal learning and memory impairment in aged mice

Seyed HamidReza Rastegar-Moghaddam [1], Mahmoud Hosseini[2], Abbas Mohammadipour[3]
1. Department of Anatomy and Cell Biology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2.Division of Neurocognitive Sciences, Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
3. Applied Biomedical Research Center, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Aging is associated with cognitive decline, as it reduces hippocampal neurogenesis and synaptogenesis. Growing evidence suggests that natural products can protect neural cells from damage and potentially offer therapeutic avenues for improving learning and memory in aged populations. In light of this, this study scrutinizes the potential impacts of grape seed extract (GSE) on hippocampal neurogenesis, synaptogenesis, and cognitive function in aged mice.
Methods: Fourteen aged male mice were divided into control and GSE-treated groups, with the latter receiving 300 mg/kg of GSE for eight weeks via gavage. Cognitive performance was assessed using the Morris water maze and passive avoidance tests, while hippocampal neurogenesis, synaptogenesis, and dark neuron production were evaluated through immunohistochemistry and histological analysis.
Results: Results indicated a significant increase in DCX^+ cells and synaptophysin expression in the GSE group compared to controls, alongside a reduction in dark neurons. Behavioral assessments revealed improvements in memory and learning, suggesting that GSE may mitigate the decline in hippocampal function associated with aging.
Conclusion: These findings support the potential of GSE as a natural product for enhancing cognitive health in the elderly by promoting neural regeneration and reducing detrimental neuronal changes.
Keywords: Grape seed extract, hippocampus, neurogenesis, synaptogenesis, memory and learning

SP111, The impact of propolis and bone marrow mesenchymal stem cells on renal function in diabetic nephropathy in male Wistar rats

Abolfazl khajavi Rad[1,2], Fatemeh Salami[1], Hossein Hosseinzadeh[3,4], Sara Hosseinian[1,2], Elahe Mahdipour[5], Vahideh Ghorani[2,6], Mohammadtaghi Khoshniat[1]

1. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Applied biomedical Research Center, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Pharmacodynamics and Toxicology, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran
4. Pharmaceutical Research Center, Pharmaceutical Technology Institute, Mashhad University of Medical Sciences, Mashhad, Iran
5. Department of Medical Biotechnology and Nanotechnology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
6. Clinical Research Development Unit, Imam Reza Hospital, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Diabetes mellitus is a common metabolic disorder. The most important reason of end-stage renal disease (ESRD) is diabetic nephropathy. This study aimed to investigate the combined effects of two therapies effects on diabetic kidney injury caused by streptozotocin (STZ).
Methods: 36 male Wistar rats were separated into 6 groups: 1- Control, 2- STZ, 3- STZ+Met (300 mg/kg), 4- propolis (200 mg/kg)+STZ, 5- mesenchymal stem cells (MSCs) (2×10^6)+STZ, 6- MSCs (2×10^6) pre-incubated with propolis + STZ. Diabetes was induced by administration of STZ (65mg/kg) and animals with fasting blood sugar (FBS) levels above 250 mg/dl were included in the study.
24- hour urine and blood samples were collected on days -3rd, 21st and 42nd of the experiment. At the end of the study, FBS, serum urea and creatinine concentrations, were specified.
Results: STZ significantly raised FBS, serum urea and creatinine concentration on 42nd day compared to the control group ($p<0.001$). Propolis (200 mg/kg), MSCs, and their combination improved these factors significantly on 42nd day in diabetic animals ($p<0.001$).
Conclusion: In the current study, different treatments decresed fasting blood sugar and enhanced renal function. The protective effects of MSCs and propolis likely stem from reduced FBS.Further research is necessary to understand the exact mechanisms of action of MSCs and propolis.The synergism effects of MSCs and propolis could be a potential cure for diabetic nephropathy.
Keywords: Diabetic nephropathy, Mesenchymal stem cell, Propolis, Renal function

SP112, Protective effect of berberine nanoemulsion on bisphenol a-induced nephrotoxicity in rats during the prepubertal stage

Tahereh Farkhondeh, Shima Mehrabadi, Saeed Samarghandian
Department of Physiology, Faculty of Medicine, Neyshabur University of Medical Sciences, Mashhad, Iran

Background: This study aimed to evaluate the protective effects of berberine nanoemulsion (BBH-NE) against bisphenol A (BPA)-induced nephrotoxicity in prepubertal male rats.
Methods: Thirty-six male Wistar rats (n=6 per group) were treated for 30 days and randomly divided into six groups: Group 1 (Control): Received corn oil orally and normal saline intraperitoneally (0.3 mL). Group 2 (BPA**):** Received BPA orally at a dose of 200 mg/kg. Groups 3 and 4 (BBH-NE 5 and 10**):** Received intraperitoneal BBH-NE at 5 mg/kg and 10 mg/kg, respectively. Groups 5 and 6 (BPA + BBH-NE 5 and 10): Co-treated with BPA (200 mg/kg, orally) and BBH-NE (5 or 10 mg/kg, intraperitoneally). At the end of the treatment period, rats were anesthetized with ketamine (50 mg/kg) and xylazine (10 mg/kg). Blood and kidney samples were collected for biochemical and histopathological analyses.
Results: BPA significantly increased serum levels of urea, uric acid, creatinine (Cr), and blood urea nitrogen (BUN), along with kidney tissue levels of malondialdehyde (MDA), nitric oxide (NO), interleukin-6 (IL-6), interleukin-1β (IL-1β), and tumor necrosis factor-alpha (TNF-α) compared to the control group ($p < 0.001$). Estimated glomerular filtration rate (eGFR), reduced glutathione (GSH) levels, and superoxide dismutase (SOD) activity were significantly decreased in the BPA group ($p < 0.001$). Treatment with BBH-NE at 10 mg/kg significantly restored these altered parameters toward normal levels ($p < 0.05$). Histopathological examination of the BPA group revealed obliteration of tubular lumens, dilated blood vessels, glomerular atrophy, and widened Bowman's space. Co-treatment with BBH-NE (10 mg/kg) markedly reduced inflammation and improved glomerular architecture in BPA-exposed rats.
Conclusion: The results indicate that BPA exposure at 200 mg/kg for four weeks induces renal dysfunction in prepubertal rats by promoting oxidative stress and inflammation, as evidenced by elevated pro-inflammatory cytokines and oxidative markers, along with reduced antioxidant defenses. BBH-NE, particularly at 10 mg/kg, effectively ameliorated these pathological changes, suggesting its potent anti-inflammatory and antioxidant properties.
BBH-NE demonstrated significant protective effects against BPA-induced nephrotoxicity in prepubertal rats, highlighting its potential as a therapeutic agent.
Keywords: Berberine nanoemulsion, Bisphenol A, Nephrotoxicity, Rat, Prepubertal stage

SP113, Effect of MSC-derived conditioned medium on function, oxidative stress, and inflammation in Movento-induced kidney injury in male rats

Majid Askaripour[1], Soodeh Rajabi[2], Iman Zangiabadi[3]
1. Department of Physiology, School of Medicine, Bam University of Medical Sciences, Bam, Iran
2. Physiology Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Jehad Blvd, Ebn Sina Avenue, Kerman, 76198-13159, Iran
3. Department of Basic Sciences, School of Medicine, Bam University of Medical Sciences, Bam, Iran

Background: Movento, an insecticide that contains spirotetramat, has demonstrated significant toxic effects in both humans and rats. Despite its widespread agricultural use, its potential impact on kidney function remains unexplored. Therefore, this study aimed to examine the effects of Movento on kidney structure and function in rats.
Methods: A total of 24 adult male Wistar rats were randomly divided into four groups: (1) Control (CTL), (2) Movento-treated (M), (3) Movento combined with basal medium (M + BM), and (4) Movento combined with conditioned medium (M + CM). Tissue damage was evaluated using H&E staining. Additionally, functional parameters, oxidative stress and inflammatory markers were measured using specialized biochemical assay kits.
Results: In rats exposed to the Movento insecticide, there was a significant reduction in total antioxidant capacity (TAC), Superoxide dismutase (SOD), Glutathione peroxidase (GPx) compared to the control group. Treatment with conditioned medium (CM) led to a notable increase in these parameters relative to both the Movento-only (M) and Movento plus basal medium (M + BM) groups. Additionally, Movento administration resulted in elevated blood urea nitrogen (BUN), creatinine, albumin, histological damage scores, malondialdehyde (MDA) levels, and pro-inflammatory cytokines TNF-α and IL-6 when compared to controls. However, CM treatment significantly reduced these markers compared to the M and M + BM groups.
Conclusion: Conditioned medium derived from adipose-derived mesenchymal stem cells shows potential as a therapeutic approach for treating kidney damage induced by Movento toxin in rats. This strategy may also offer a promising avenue for managing kidney complications in agricultural workers who are chronically exposed to this pesticide.
Keywords: Conditioned medium, adipose-derived mesenchymal stem cells, kidney injury, Movento, male rats.

SP114, The synergistic reno protective effects valproate sodium and metformin in diabetic nephropathy mice model through attenuating the expression of pro-inflammatory and enhancing the expression of Sirt1 and Bcl-2

Parisa Saberi-Hasanabadi[1,2], Ramin Ataee[3]
1. Department of Toxicology and Pharmacology, Faculty of Pharmacy, Mazandaran University of Medical Sciences, Sari, Iran
2. Student Research Committee, Mazandaran University of Medical Sciences, Sari, Iran
3.Medicinal Plants Research Center, Mazandaran University of Medical Sciences, Sari, Iran

Background: This study aimed to assess the synergistic Reno preventive effects of valproate sodium (VPS) and metformin (MET) on alloxan-induced diabetic nephropathy and to elucidate their mechanisms of action.
Methods: In this study, type 1 diabetics mice (25-30 g) were established using a single dose of alloxan (120 mgkg-1), and the diabetic mice were treated with three doses of VPS (10, 20, and 40 mg/kg) and MET (200 mg/kg) for a period of 28 days. Specific tests were performed to evaluate inflammatory gene expression and histopathological changes
Results: VPS and MET led to significant decreases in blood glucose levels, thereby reflecting the improvement of impaired kidney function and decreasing elevated renal mRNA levels of inflammatory genes (TNF-α, IL-6, and NF-κB) in diabetic mice. A significant increase in the expression of Sirt1and Bcl2 was observed in the kidneys of diabetic mice receiving MET/VPS Moreover, MET/VPS successfully prevented diabetes induced histo pathological deleterious changes in the kidney
Conclusion: It can be concluded that MET and VPS alone or in combination can prevent alloxan-induced diabetic nephropathy through attenuating inflammatory pathways and decreasing inflammatory genes expressions together probably with the sup-pression of oxidative stress, inflammation and apoptosis
Keywords: Diabetes, valproate sodium, metformin, alloxan, diabetic nephropathy, reno protective supports.

SP115, Saffron nephroprotective effects against medications and toxins: A review of preclinical data

Batool Zarei[1], Sepideh Elyasi[1]
1. Department of Clinical Pharmacy, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Toxin- and drug-induced nephrotoxicity (DIN) accounts for approximately 25% of acute kidney injury cases and is associated with substantial morbidity and increased healthcare utilization. Currently, no approved pharmacological agent exists to prevent DIN. Saffron (*Crocus sativus)* and its main constituents exhibit potent antioxidant and anti-inflammatory properties, and experimental studies have demonstrated their protective effects in multiple organs, including the kidney, brain, heart, liver, and lung, against various toxins and drugs. This review summarizes saffron's potential preventive and therapeutic roles in DIN, proposed mechanisms of action, dosing strategies, and renal outcomes.
Methods: PubMed, Embase, Scopus, and Web of Science databases were searched by these search terms: "saffron" OR "*Crocus sativus*" OR "crocin "OR "safranal" AND "Drug induced nephrotoxicity" OR "Renal Injury" OR "Nephrotoxicity". All 25 relevant in vitro and in vivo studies up to the date of publication were included.
Results: Promising protective effects were reported particularly on aminoglycosides, cisplatin, and ethanol. Saffron and its constituents significantly prevented biochemical and histopathological changes, mediating via antioxidant, anti-apoptosis, and anti-inflammatory effects. Despite success in animal models, no human study is available in this field and further well-designed clinical trials are necessary for better judgment.
Conclusion: In this review, all in vivo and in vitro studies are summarized to conclude the efficacy of saffron and its active constituents in protection against DIN.
Keywords: *Crocus sativus*, Saffron, Crocin, Nephroprotective

SP116, Obesity and renal sympathetic function

Hajaralsadat Hosseini-Dastgerdi[1], Mehdi Nematbakhsh[2,3]
1. Department of Medical Basic Sciences, Isf.C., Islamic Azad University, Isfahan, Iran
2. Water and Electrolytes Research Center, Isfahan University of Medical Sciences, Isfahan, Iran
3. Department of Physiology, Isfahan University of Medical Sciences, Isfahan, Iran

Background: Obesity, which is mainly the result of poor diet and physical inactivity, is a global health challenge. From a physiological perspective, obesity is associated with complex consequences on the function of the renal sympathetic nervous system. Such an association may lead to pathological changes including renal disorders, hypertension, and cardiovascular diseases.
Methods: In this review, a comprehensive search was conducted in PubMed, Scopus, and Web of Science to identify and analyze studies investigating the association between obesity and renal sympathetic nerve activity.
Results: In obesity, hormonal imbalances—including increased levels of leptin, insulin, and angiotensin II, along with decreased concentrations of ghrelin and adiponectin—contribute to increased renal sympathetic nerve activity (RSNA) through various neurohumoral pathways. In addition, factors such as activation of inflammatory signaling cascades, baroreflex dysfunction, increased oxidative stress, and stimulation of peripheral chemoreceptors in response to hypoxia further exacerbate sympathetic hyperactivity. Emerging therapeutic approaches—including lifestyle modification, pharmacological treatments, and novel neuromodulatory strategies—have been proposed to reduce these pathological interactions and restore autonomic balance.
Conclusion: Prevention and management of obesity are essential to reduce renal sympathetic nerve hyperactivity and maintain renal health. Targeted interventions may help reduce associated cardiovascular and renal complications.
Keywords: Obesity, Renal sympathetic nerve activity, Cardiovascular risk

SP117, Investigating the effect of adalimumab on the renal toxicity disorders caused by gentamicin in rats

Mahdiyeh Ahmadi[1], Saeed Hajihashemi[2]
1. Department of physiology, Medical Faculty, Arak university of Medical Sience, Arak, Iran
2. Department of physiology, Medical Faculty, Arak university of Medical Sience, Arak, Iran

Background: Cisplatin is a potent chemotherapeutic agent widely used to treat various cancers, but its nephrotoxicity limits clinical applications. Inflammatory mediators, particularly tumor necrosis factor-alpha (TNF-α), play a central role in cisplatin-induced renal damage. This study aimed to evaluate the protective effects of adalimumab, an anti-TNF-α agent, against cisplatin-induced nephrotoxicity in rats.
Methods: Thirty-two male Wistar rats were randomly assigned to four groups: control, cisplatin (5 mg/kg/day), adalimumab (7 mg/kg/day), and cisplatin + adalimumab, all administered intraperitoneally for five days. On day six, kidney function was assessed by measuring renal blood flow, plasma and urinary levels of urea, creatinine, sodium, potassium, and glucose. Histological evaluations were also performed.
Results: Co-administration of adalimumab with cisplatin significantly improved renal blood flow, reduced plasma urea and creatinine levels, and increased their urinary excretion compared to the cisplatin group alone. Moreover, adalimumab mitigated cisplatin-induced increases in urinary sodium and potassium excretion and reduced renal tissue injury. Histological analysis revealed that adalimumab treatment led to improvements in tubular necrosis, reduction of proteinaceous casts, and decreased cell scattering—all of which were prominently elevated in the cisplatin group.
Conclusion: Adalimumab partially ameliorates cisplatin-induced nephrotoxicity in rats by improving renal hemodynamics, suppressing inflammatory responses, and attenuating histopathological damage. These findings suggest potential therapeutic benefits of anti-TNF-α strategies in managing drug-induced kidney injury.
Keywords: Cisplatin, Adalimumab, Nephrotoxicity, TNF-α, Rats, Inflammation

SP118, Comparison of the effect of losartan and telmisartan on renal blood flow response to ang ii in male and female rats

Samira Choopani [1,2], Hajaralsadat Hosseini-Dastgerdi[3], Zahra Pezeshki[1,2], Mehdi Nematbakhsh[1,2]
1. Department of Physiology, Isfahan University of Medical Sciences, Isfahan, Iran
2. Water and Electrolytes Research Center, Isfahan University of Medical Sciences, Isfahan, Iran
3. Department of Medical Basic Sciences, Isf.C., Islamic Azad University, Isfahan, Iran

Background. The renin–angiotensin system (RAS) is crucial in regulating blood pressure, and fluid volume in the body. Overactivation of this system can lead to the development of several medical conditions, such as kidney, and cardiovascular disorders. Losartan and telmisartan are two common angiotensin II (Ang II) receptor blockers which used for hypertension therapy. Both of these blockers affect renal blood flow (RBF), and this study aimed to compare the effects of losartan and telmisartan on the RBF and renal vascular resistance (RVR) responses to Ang II infusion in male and female rats.
Methods. Six groups of males and females Wistar rats were assigned, and they randomized in vehicle, losartan (10mg/kg), and telmisartan (10mg/kg) treated groups. Subsequently, under anesthesia, mean arterial pressure (MAP), RBF and RVR responses to graded doses of Ang II administration under controlled renal perfusion pressure were determined.
Results. Infusion of Ang II resulted in dose-dependent increases in MAP that were similar in both male ($P_{dose}<0.0001$) and female ($P_{dose}<0.002$) rats. Ang II infusion led to a dose-dependent percentage change of RBF decreasing and RVR increasing in the vehicle group for both genders, and these changes were different statistically from others groups. Additionally, urine flow was increased significantly in telmisartan group when compared with others groups ($P<0.05$).
Conclusion. Losartan in female rats is more effective in reducing MAP than telmisartan, while similar RBF and RVR responses to Ang II infusion were conducted in losartan and telmisartan groups.
Keywords: Losartan, Telmisartan, Gender Differences, Renal Blood Flow, Renal Vascular Resistance.

SP119, Effect of cordycepin on methotrexate-induced nephrotoxicity in male rats

Mohadese Pouramini[1], Kazem Javanmardi [2], Ali Abedi[3], Ava Soltani Hekmat[4]
1. Department of Physiology, School of Medicine, Fasa and Ardabil Universities of Medical Sciences, Fasa and Ardabil, Iran
2. Department of Physiology, School of Medicine, Fasa University of Medical Sciences, Fasa, Iran
3. Department of Physiology, School of Medicine, Ardabil University of Medical Sciences, Ardabil, Iran
4. Department of Physiology, School of Medicine, Fasa University of Medical Sciences, Fasa, Iran

Background: Oxidative stress induced by methotrexate is considered an important factor involved in the pathophysiological changes of the kidney during methotrexate-Induced nephrotoxicity.
Methods: Thirty-five adult male Wistar rats were randomly assigned to five groups (n = 7 each): Control (no treatment), Sham, Cordycepin, Methotrexate, and Cordycepin + Methotrexate. Cordycepin was administered orally by gavage at a dose of 20 mg/kg for 15 days. The Sham group received normal saline by gavage for 15 days in the same volume as cordycepin on day 8, methotrexate was administered intraperitoneally as a single dose (20 mg/kg) to the relevant groups, and on the same day they were injected intraperitoneally with normal saline in the same volume as methotrexate. At the end of the treatment, both kidneys were weighed to calculate the Renal Index. Left kidney tissue samples were prepared for histological examination, including changes in glomerular size and shape and hemorrhage, using hematoxylin and eosin staining. Blood samples were analyzed for sodium, potassium, creatinine, blood urea nitrogen, and glutathione peroxidase (GPx) activity, and theglomerular filtration rate (GFR) was calculated based on serum creatinine, urinary creatinine, and urinevolume. The right kidney was used to assess oxidative stress markers, including superoxide dismutase (SOD) and malondialdehyde (MDA).
Results: Methotrexate significantly increased the levels of sodium, potassium, creatinine, blood urea nitrogen, and malondialdehyde (MDA). Meanwhile, the activity of antioxidant enzymes, including superoxide dismutase (SOD) and glutathione peroxidase (GPx), as well as the glomerular filtration rate (GFR) and Renal Index, were significantly decreased. Histological analysis showed that methotrexate caused shrinkage or deformation of glomeruli and hemorrhage. In contrast, cordycepin administration mitigated these changes, improved antioxidant enzyme activity, restored glomerular size, and reduced hemorrhage, indicating its protective role against methotrexate-induced nephrotoxicity.
Conclusion: Cordycepin was protected the kidney against methotrexate-induced nephrotoxic and oxidative damage.
Keywords: Cordycepin, Methotrexate, Nephrotoxicity, Kidney, Oxidative Stress.

SP120, Modulation of renal ischemia-reperfusion-induced oxidative stress and pulmonary injury by propargylglycine and sodium hydrosulfide

Pooran Ghahramani [1], Firouzeh Gholampour[2], Zeinab Karimi[3]
1. Department of Biology, College of Science, Shiraz University, Shiraz, Iran
2. Department of Biology, College of Science, Shiraz University, Shiraz, Iran
3. Shiraz Nephro-Urology Research Center, Shiraz University of Medical Sciences, Shiraz, Iran

Background: Dysfunction of distant organs is a major complication of acute kidney injury. Nrf2 is a transcription factor regulating proteins involved in oxidative stress and cellular redox balance. This study evaluates the effects of Propargylglycine (PAG) and Sodium Hydrosulfide (NaHS) on limb remote ischemic perconditioning's protection by modulating Nrf2 expression in renal ischemia-reperfusion-induced lung injury.
Methods: Renal ischemia/reperfusion (I/R) was induced by 60-min occluding both renal pedicles followed by 24 h reperfusion. RIPerC was performed by applying four cycles (5 min femoral artery ischemia followed by 5 min of reperfusion). Rats were divided into sham, I/R, I/R+RIPerC, I/R+NaHS (100 µmol /kg, i.p.), I/R+RIPerC+NaHS, I/R+ PAG (50 mg/kg, i.p), I/R+ RIPerC+PAG groups. After 24 h, blood samples were collected, and kidneys and lungs were removed for mRNA extraction and histopathology.
Results: The data indicated a significant increase in plasma creatinine, urea nitrogen, and tissue damage compared to the sham group. Treatment with RIPerC and NaHS mitigated all observed alterations. mRNA expression of Nrf2 was downregulated in the renal I/R group, while RIPerC and NaHS treatments upregulated it; PAG treatment had the opposite effect**.**
Unlike kidney tissue, the expression of Nrf2 in lung tissue within the I/R group did not differ significantly from the sham group. No significant differences were noted between the treated and other groups.
Conclusion: Our findings indicate that one hour of renal ischemia followed by 24 hours of reperfusion does not result in pulmonary injury. Additionally, lung Nrf2 expression is preserved, reflecting maintained antioxidant balance in pulmonary tissue.
Keywords: Hydrogen sulfide, DL-propargylglycine, Remote ischemic perconditioning, Nrf2 expression, pulmonary injury caused by Renal IR

SP121, The effect of folic acid on hypothyroidism-associated kidney damage in rat

Sara Hosseinian[1], Abolfazl Khajavi Rad[1], Mohammad Taghi Khoshniat[1]
1. Department of Physiology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: The present study was conducted on the effect of folic acid on kidney damage caused by hypothyroidism in rats.
Methods: In this study, 40 male rats were randomly divided into 5 groups: control, hypothyroid (received water containing 0.3% PTU for 6 weeks, and hypothyroid+folic acid groups that received folic acid (5, 10, 15 mg/kg). On the last day of the study, blood and kidney samples were collected. Serum samples were kept at – 20 Celsius for measuring urea and creatinine. The right kidney was used for histological tests and the left kidney was for oxidative damage.
Results: Serum urea and creatinine concentrations in the hypothyroid group showed a significant increase compared to the control group ($p<0.001$). In the hypothyroid groups treated with different doses of folic acid, serum urea and creatinine concentrations significantly decreased compared to the hypothyroid group ($p<0.01$ to $p<0.001$). Catalase activity and total thiol groups in the hypothyroid group was significantly lower than the control group ($p<0.05$). However, these parameters in the groups receiving different doses of folic acid was significantly higher than the hypothyroid group ($p<0.05$ to $p<0.01$). MDA concentration in the hypothyroid group was significantly higher than the control group ($p<0.05$). However, the concentration of MDA in the group receiving folic acid 15 mg/kg was significantly lower than the hypothyroid group ($p<0.05$).
Conclusion: Based on the findings of the present study, folic acid can improve kidney damage caused by hypothyroidism, which is probably secondary to improving the antioxidant status of the body.
Keywords: folic acid, hypothyroidism, oxidative stress

SP122, Minocycline, an old antibiotic with new applications

Khojasteh Joharchi[1], Tahereh Shirin Haghighi[2], Mahsa Mikaniki[3]
1. Department of Pharmacology, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran
2. Department of Oncology, Taleghani Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran
3. Medical Student, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: Considering the importance and high risks of malignant ascites and the fact that this injury is one of the most important causes of mortality in advanced cancer patients, it is necessary to evaluate the methods and drugs that affect it. There is still no approved treatment for malignant ascites, and resistant cases are on the rise. Therefore, we tried to evaluate the effectiveness of minocycline in the treatment of refractory malignant ascites.
Methods: In this single-blind randomized clinical trial study, 6 patients with refractory malignant ascites referred to our oncology clinic were selected by available methods. Patients were treated with escalating doses of minocycline (100-400 mg daily) for 6 weeks. Before and 6 weeks after treatment, ascites fluid volume and tumor markers levels (vascular endothelial growth factor, VEGF, and interleukin 6, IL-6) were assessed using an ELISA kit.
Results: The most common type of cancer was ovarian cancer (50.0%), and the mean survival rate was increased to 11.00 ± 11.77 weeks. After the intervention, compared to before, the volume of ascites fluid up to 57.1%, the plasma IL-6 level up to 45%, and the plasma level of VEGF up to 43.3% were significantly reduced.
Conclusion: Minocycline has been effective in treating the volume of refractory malignant ascites by reducing tumor markers such as VEGF and interleukin-6.
Keywords: Interleukin-6, Malignant ascites, Minocycline, VEGF

SP123, Efficacy and safety of okra in type 2 diabetes: a randomized double-blind placebo-controlled trial

Mojtaba Ziaee[1,2], Mahdi Tavakolizadeh[3], Saeid Peyrovi[4], Hussein Ghasemi-Moghaddam[5]
1. Medicinal Plants Research Center, Maragheh University of Medical Sciences, Maragheh, Iran
2. Research Center for Integrative Medicine in Aging, Tabriz University of Medical Sciences, Tabriz, Iran
3. Department of Pharmacognosy, School of Pharmacy, Zanjan University of Medical Sciences, Zanjan, Iran
4. Department of Internal Medicine, Maragheh University of Medical Sciences, Maragheh, Iran
5. Department of Hematology & Oncology, Tabriz University of Medical Sciences, Tabriz, Iran

Background: Type 2 diabetes mellitus (T2DM) is a chronic metabolic disorder frequently accompanied by dyslipidemia and low-grade inflammation, increasing the risk of long-term complications. Growing interest in natural functional foods has highlighted okra (Abelmoschus esculentus (L.) Moench) as a traditional medicinal plant with potential hypoglycemic, lipid-lowering, and anti-inflammatory properties. However, clinical evidence supporting its efficacy and safety in patients with T2DM remains limited.
Methods: In this randomized, double-blind, placebo-controlled clinical trial, 100 patients with T2DM aged 40–60 years were randomly allocated to receive either okra pod capsules (1000 mg, three times daily) or matching placebo for 3 months, alongside standard antidiabetic therapy (metformin and gliclazide) and dietary management. Fasting blood glucose (FBG), insulin, HbA1c, lipid profile, high-sensitivity C-reactive protein (hs-CRP), liver and renal function tests, blood pressure, and body mass index (BMI) were assessed at baseline and at the end of the intervention.
Results: Compared with baseline and the placebo group, okra supplementation resulted in significant reductions in FBG, HbA1c, total cholesterol, and triglyceride levels after 3 months. hs-CRP levels were significantly lower in the okra group compared with placebo. No significant adverse effects or clinically relevant changes in liver and renal function, blood pressure, or other safety parameters were observed.
Conclusion: This study showed that three months of okra supplementation (1000 mg, three times daily) as an adjunct to standard therapy in patients with type 2 diabetes significantly improved glycemic control, lipid parameters, and chronic inflammatory markers, without producing any clinically significant adverse effects.
Keywords: Type 2 Diabetes Mellitus, Abelmoschus esculentus, Glycemic Control, Inflammation, Randomized Controlled Trial

SP124, The effect of verapamil on TXNIP gene expression, GLP1R mRNA, FBS, HbA1c, and lipid profile in T2DM patients receiving metformin and sitagliptin

Farrokh Ramesh[1], A. Malayeri[1], M. Zakerkish[2], H. Galehdari[3], A. A. Hemmati[4], K. A. Angali[5]
1. Department of Pharmacology, School of Pharmacy, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
2. Department of Internal Medicine, Diabetes Research Centre, Health Research Institute, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
3. Department of Genetics, Faculty of Sciences, Shahid Chamran University of Ahvaz, Ahvaz, Iran
4. Medicinal Plant Research Center, School of Pharmacy, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
5. Department of Biostatistics and Epidemiology, School of Health, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

Background: Type 2 diabetes mellitus (T2DM) is the most common type of diabetes. A decrease in the number of pancreatic beta cells is a pathological sign of diabetes, and to date there is no drug treatment that targets damage to these cells. Pancreatic beta cells have a weak antioxidant system and are highly sensitive to oxidative stress reactions that occur within cells. Thioredoxin interacting protein (TXNIP) inhibits thioredoxin, which is part of the intracellular antioxidant system, thereby accelerating oxidative stress and apoptosis of pancreatic beta cells. Verapamil is a nondihydropyridine calcium channel blocker. The efficacy of this drug to improve beta cell survival and glucose homeostasis by inhibiting TXNIP expression has been demonstrated in in vitro studies. Although several retrospective studies have shown a lower incidence of T2DM with verapamil treatment, no prospective intervention studies have determined the efficacy of this drug in patients with T2DM.
Methods: The aim of this randomized, doubleblind, placebo-controlled study was to evaluate the efficacy and safety of oral verapamil administration in T2DM patients. In this 90-day study, the effects of verapamil on fasting blood sugar (FBS), hemoglobin A1C (HbA1c), and the lipid profile were evaluated and compared with those of the placebo.
Results: There was a significant decrease in HbA1c (about 0.5%) in the verapamil group at the end of the intervention period. The effects of verapamil on TXNIP gene expression and glucagon-like peptide-1 receptor (GLP1R) mRNA were compared with those of the placebo (at baseline, after 15 and 30 days, and at the end of the study). During the first month of the study, decreased TXNIP gene expression and increased GLP1R mRNA were associated with the administration of verapamil when compared with the placebo, although the differences were not significant.
Conclusion: Verapamil can lead to better control of T2DM by reducing TXNIP gene expression and increasing beta cell survival and, possibly, by other mechanisms.
Keywords: Type 2 diabetes, Randomized controlled trials, Verapamil, TXNIP

SP125, Topical *Nigella sativa* oil versus diclofenac gel for knee osteoarthritis: A randomized open-labeled active-controlled clinical trial

Marzieh Amirian Farsian[1], Javid Dehghan Haghighi[2], Farzaneh Farajian Mashhadi[3], Mahnaz Sandoughi[4]
1. Department of internal medicine, Ali Ebn Abitaleb Hospital, Zahedan University of Medical sciences, Zahedan, Iran
2. Department of community medicine, Zahedan University of Medical Sciences, Zahedan, Iran
3. Department of Pharmacology, Zahedan University of Medical Sciences, Zahedan Pharmacology Research Center, Zahedan, Iran
4. Clinical Immunology Research Center, Zahedan University of Medical Sciences, Zahedan, Iran

Background: Osteoarthritis (OA) is the most common cause of pain and disability among older adults. This study aims to compare the effect of topical use of Nigella Sativa (NS) oil and diclofenac gel on pain and function in knee OA (KOA).
Methods: This randomized clinical trial was performed in a rheumatology clinic. Patients who fulfilled the American College of Rheumatology criteria for OA were selected. The subjects were randomly assigned to apply NS oil or diclofenac gel on the knee joint 4 times a day for 3 weeks. The outcomes, including pain and physical activity, were measured with a visual analog scale and the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC).
Results: Of the initial 200 KOA patients who were assessed for eligibility, data from 60 patients (30 in each group) were analyzed. The two groups had no significant difference regarding age, sex, and body mass index. Both interventions showed statistically significant within-group differences in terms of the WOMAC subscales of pain, stiffness, function and VAS of pain ($P < 0.001$). However, there was no significant difference between the groups
Conclusion: Our findings suggested that topical use of NS oil could be as effective as diclofenac gel in reducing pain and stiffness and improving function in KOA.
Keywords: Nigella Sativa, Black seed, Osteoarthritis, Complementary therapy

SP126, Study of royal jelly effect on serum levels of IL-4, TNF- α, TGF-B, and IFN-γ in multiple sclerosis patients in comparison with omega-3; A double-blind, randomized, clinical trial

Mohammad Mahdi Vahedi[1], Alireza Malayeri[2], Nastaran Majdinasab[3]
1. Department of Pharmacology, School of Medicine, Zahedan University of Medical Sciences, Zahedan, Iran
2. Department of Pharmacology, School of Medicine, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
3. Department of Nourology, Golestan Hospital, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

Background: Multiple sclerosis (MS) is a debilitating disorder related to damage to the central nervous system (CNS). MS incidence in about 2.3 million people worldwide. Royal jelly (RJ) is a white material with many medicinal properties. Omega-3 (ω−3) is a natural substance that its beneficial effects were demonstrated in several studies performed on MS patients
Methods: 60 patients referring to the MS Society of Iran were randomly divided into two groups (1:1 ratio) receiving 1-gram RJ and 1-gram ω-3 capsule 1 gr capsules of RJ and 1 gr ω−3 daily in addition to receiving their daily treatment. Then, their information was recorded. Blood samples of all subjects were collected to evaluate the level of IL-4, INF-Y, TGF-B, and TNF-α with Enzyme-linked immunosorbent assay (ELISA) method twice; first, before the intervention and then, received supplements for one month. The duration of treatment was one month, and the patients returned to the center.
Results: The results indicated that RJ, similar to ω−3, could improve the cytokines levels in MS patients. RJ significantly improved TNF-α ($p<0.05$), and ω−3 significantly decreased TGF-β levels ($p<0.05$). Both decreased IFN-γ and increased IL-4, but it was more in the group receiving RJ
Conclusion: According to the findings, it is hoped that using RJ and ω−3 could be helpful in MS patients.
Keywords: IL-4, TNF- α, TGF-B, IFN-γ, Royal Jelly, Omega-3

SP127, Comparison of pro-oxidant antioxidant balance between physiologic jaundice and healthy neonates

Hassan Boskabadi [1], Majid Ghayour-Mobarhan[2], Sara ghahremani[1], Maryam Zakerihamidi[3]
1. Department of Pediatrics, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Metabolic Syndrome Research Center, Mashad University of Medical Sciences, Mashad, Iran
3. Department of Midwifery, School of Medical Sciences, Tonekabon Branch, Islamic Azad University, Tonekabon, Iran

Introduction: Neonatal physiologic jaundice is a normal transitional phenomenon which occurs in most newborns. Bilirubin levels lower than 95th percentile based on age and time of evaluation does not necessitate therapeutic intervention. Previous reports have pointed to anti-oxidant properties of bilirubin. The present study was conducted to compare pro-oxidant antioxidant balance (PAB) between physiologic jaundice and healthy neonates.

Method: This case control study was conducted on 152 newborns with more than 35 weeks of gestation who were born in Ghaem hospital of Mashhad within 2017-2024. A number of 80 newborns of the non-jaundice (control) group and 72 cases of physiologic jaundice (case) group (based on bilirubin levels lower than 14 in cutaneous evaluation) were compared together. Data were collected by a questionnaire about neonatal characteristics (e.g., gestational age, gender, and Apgar score). Notably, the bilirubin level was cutaneously tested by jaundice meter. For both groups, 0.2 ml of blood sample which was taken for PAB evaluation.

Results: Among all neonates, 54% of cases were male and 46% were female. In addition, 48% of neonates were born vaginally and 52% by cesarean-section. The mean±SD Apgar scores of control and physiologic jaundice groups were 9.56±0.76 and 9.80±0.43, birth weight; 3268.98±348.16 and 3297.39±456.90, respectively (P>0.05). The mean values serum sample's PAB were 69.19±66.15HK for control group and 45.72±34.62 HK for case group (P=0.006).

Conclusion: The obtained results of the current study indicated that physiologic jaundice is associated with prooxidant-antioxidant balance (PAB) in favor of anti-oxidant which can be of great help for neonatal health.

Keywords: Pro-oxidant antioxidant balance, Physiologic jaundice, Healthy neonates

SP128, Prevalence of ADHD among adults in Afghanistan

Raheel Bayat[1], Massoma Ramazani[1], Tela Mohammad Mehrabi[2, 3], Sayed Yousof Mousavi[1], Aziz Rahman Rasib[4]

1. Department of Cognitive Neuroscience, Neuroscience Research Center, Kavosh Nonprofit Educational-Research Institute, Kabul, Afghanistan
2. Department of Neurology, Sajid Arman Neuropsychiatric Hospital, Kabul, Afghanistan
3. Fellowship in the Imam Khomeini Hospital's epilepsy department, Tehran, Iran
4. Department of Neuropsychiatry, Kabul University of Medical Sciences Kabul, Afghanistan

Background: One of the most common neurodevelopmental disorders among children and adults is Attention-Deficit/Hyperactivity Disorder (ADHD). Impulsivity and/or hyperactivity are the most prominent symptoms of this disorder. Studies indicate a high global prevalence of ADHD. The goal of this study is to assess the prevalence rate of ADHD abundance among adolescents in Afghanistan.

Methods: A web-based cross-sectional study was conducted utilizing the Adult ADHD Self-Report Scale (ASRS-v1.1) through various social media platforms over two months. The responses measured on a 4-point Likert scale. A combination of the scores of 6-items ASRS-v1.1 scale were considered, where a score of 18 to 24 indicated a higher ADHD involvement and a score of 0 to 17 indicated a lower ADHD. In case of evaluation of the association between different possible factors associated with ADHD, both descriptive and non-parametric analyses were conducted.

Results: This study included 175 participants. The prevalence of low and high positive ADHD was respectively 12% and 4.6%. Majority of the participants received lower scores (under 18), indicating a lower prevalence of ADHD among Afghan adults. In addition, Kruskal-Wallis analysis showed a significant difference between sleep quality and living location, while Chi-Square test indicated a significant difference between psychiatrist consultation, usage of psychiatric medications, and having history of mental disorders and ADHD.

Conclusion: The findings of this study revealed a low prevalence of ADHD among Afghan adolescents. However, given the limitations of this study, there is a need for further research with larger sample size.

Keywords: ADHD, Afghanistan, Prevalence, Adults, Questionnaire

SP129, Challenges and progress in cell therapy for heart failure: a glance at current clinical trials

Aysa Rezabakhsh[1, 2]
1.Patient Safety Research Center, Clinical Research Institute, Urmia University of Medical Sciences, Urmia, Iran
2. Cardiovascular Research Center, Tabriz University of Medical Sciences, Tabriz, Iran

Background: Heart failure (HF) continues to be a major cause of death globally, accounting for 13% of all fatalities. Currently, the only way to replace permanently damaged heart tissue is through full heart transplantation. Over the last two decades, cell therapy has emerged as a promising strategy for repairing and regenerating cardiac tissue. However, both preclinical research and clinical trials have faced considerable challenges. Despite these obstacles, the field is advancing by applying insights gained from previous studies. This review summarizes current clinical trials involving cell-based and cell-derived treatments for HF.
Results: The results from these studies will help move cardiac regenerative therapies into clinical practice by assessing their safety and effectiveness, as well as exploring new treatment approaches such as repeated intravenous administration, personalized patient selection guided by pharmacogenomics, different methods of cell delivery (systemic versus direct injection into the heart muscle), and the use of engineered tissue grafts applied to the heart's outer surface.
Keywords: Cardiac Regenerative Therapy, Clinical Trial, Heart Failure, Stem Cell Therapy

SP130, The role of exosomes in the recovery of traumatic brain injury

Ali Siahposht Khachaki[1], Nourollah Rezaei[2], Misagh Shafizad[3]
1. Associate Professor; Immunogenetics Research Center, Departments of Physiology, School of Medicine, Mazandaran University of Medical Sciences, Sari, Iran
2. Professor of Anatomical Sciences, Department of Anatomy & Cell Biology, Faculty of Medicine, Mazandaran University of Medical Sciences, Sari, Mazandaran, Iran
3. Associate Professor, Department of Neurosurgery, Mazandaran University of Medical Sciences, Sari, Iran

Background: Traumatic brain injury (TBI) is one of the major causes of death and disability worldwide. No effective treatment has been identified from clinical trials. Exosomes are endosomal origin small-membrane nano-sized vesicles generated by almost all cell types. Exosomes play a pivotal role in intercellular communication. Therapeutic effects of exosomes derive from the exosomes content, especially microRNAs (miRNAs) we investigated the role of exosomes after diffuse traumatic brain injury in rats, as well as its effect on the level of interleukins and histological changes.
Methods: After induction of anesthesia and cannulation in the trachea, 56 Wistar rats underwent diffuse controlled brain injury by Marmarou method, and 30 minutes later, the drug was injected intracerebroventricular with different doses and repeated in the following days.In the pre-traumatic times, immediately after recovery from trauma induction, 24, 48 and 72 hours after trauma, Veterinary Coma Scale and Beam Walk and Beam Balance movement and balance tests were taken and recorded from rats. After 72 hours, CSF was collected from Cisterna Magna and used for ELISA test to evaluate the level of interleukins. Rats were killed under deep anesthesia and their brains were removed and fixed in 10% formalin for 48 hours. Staining with hematoxylin and eosin was used. Blood-brain barrier permeability was tested by Evans dye injection after induction of trauma in rats of the respective group.
Results: Findings of this study show that brain injury caused by traumatic brain injury causes cerebral edema, destruction of the blood-brain barrier, disturbance of neurological and balance-motor scores of the animal ($P < 0.0001$). It also leads to an increase in interleukin 1 beta and a decrease in interleukin- 10 in CSF fluid ($P < 0.0001$). Our findings also showed that exosomes at doses of 100 µg / kg and 200 µg / kg can reduce these differences compared to the control group (Sham and Intact) ($p < 0.001$). It should be noted that exosomes was more effective at 200 µg / kg ($P < 0.0001$).
Conclusion: In this study, it can be found that, dose-dependent exosomes has neuroprotective effects in the brain and was able to affect the consequences of trauma and reduce cerebral edema, accelerate the improvement of blood-brain barrier and neurological scores and be vistibulomotor function. Histological changes have also been shown to improve. These effects of exosomes may be due to a decrease in inflammatory interleukins and an increase in anti-inflammatory interleukins.
Keywords: Exosomes, Neuroprotective, Brain trauma, Brain edema, Blood-brain barrier, Interleukins

SP131, Optimal timing of exercise for enhanced learning and memory: insights from CA1 and CA3 regions in traumatic brain injury model in male rats

Sedigheh Amiresmaeili[1], Forouzan Rafie[2], Mohammad Khaksari[3]
1. Department of Physiology, Bam University of Medical Science, Bam, Iran
2. Neuroscience Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
3. Department of Physiology and Pharmacology, Kerman Medical Science University, Kerman, Iran

Objective: Evidence suggests that exercise timing is crucial in reducing the impact of traumatic brain injury (TBI). The present study explores the effects of delayed and early exercise on brain damage, cognitive dysfunction, and anxiety behavior using an experimental TBI model.
Methods: We randomly assigned 36 male rats to six groups: control (sham, TBI), treadmill exercise (24hA, 1-month exercise 24 h after TBI), 1WA (1-month exercise 1 week after TBI), 1MB (1-month exercise before TBI), and 1MBA (1-month exercise before and after TBI).
Results: TBI caused significant impairments in cognitive and anxiety behaviors, as well as increased brain edema ($p < 0.05$). The exercise groups showed significant improvement in the following order for cognitive impairments: 1MBA > 24hA > 1WA > 1MB. Compared to the 1WA group, exercise starting 24 h after TBI (24hA) significantly improved all variables except anxiety behavior. Exercise 1MBA was significantly more effective than other groups ($p < 0.05$) in reducing cognitive problems, anxious behavior, and brain damage.
Conclusion: Regular exercise or a consistent exercise routine before TBI, such as in athletes, may provide the most benefits from exercise intervention after the TBI. Starting exercise soon after the TBI (within 24 h) may help protect against brain edema and improve learning and memory by reducing cell death in specific brain regions (CA1 and CA3) and also decreasing TNF-α and MDA compared to starting exercise later (1 week after).

SP132, Estrogen and progesterone in lung injury induced by traumatic brain injury: The role of oxidative stress and inflammation

Ladan Amirkhosravi[1], Mohammad Khaksari[2], Maryam Iranpour[3]
1. Endocrinology and Metabolism Research Center, Kerman University of Medical Sciences, Kerman, Iran
2. Physiology Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
3. Pathology and Stem Cell Research Center, Kerman University of Medical Sciences, Kerman, Iran

Background: Traumatic Brain Injury (TBI) can lead to lung damage that is just as severe as brain damage because it reduces antioxidant capacity, triggers apoptosis, and increases inflammation in the lungs. Given the positive effects of estrogen (E2) and progesterone (P4) on TBI-related brain damage, we looked into the possibility that these hormones could also help with TBI-related lung damage.
Methods: Male rats were divided into 6 groups: sham, TBI, vehicle, P4, E2, and P4+E2 (P4 1.7 mg/kg and E2 33.3 µg/kg intraperitoneally for 30 min and again 24 h following TBI). Brain water content was measured 24 hours after TBI. Oxidative stress, inflammatory biomarkers, and histopathological studies were assessed 10 days after TBI in lung tissue. The Marmora technique caused diffuse concussions in all but the sham group's animals.
Results: E2 and P4, both separately and concurrently, reduced level of oxidant factors and inflammatory cytokines in lung tissue. Moreover, these hormones increased lung level of antioxidant factors and anti-inflammatory cytokines. The histopathological parameters including pneumocyte proliferation, inflammation, alveolar collapse, emphysema, and congestion in lung tissue after trauma was enhanced. The use of P4, E2, and their combinations led to a reduction of these parameters.
Conclusion: Hormonal treatment decreased inflammatory markers and increased antioxidant capacity in the lung after TBI. Also, these hormones modulate histopathologic changes in lung tissues after injury.
Keywords: Traumatic brain injury (TBI), 17β-Estradiol, Progesterone, Inflammatory markers, Oxidative Stress, Lung injury

SP133, Sympathectomy: A suggestive method for dominative of post stroke cardiac arrhythmia

Aminollah Bahaoddini[1], Hajar Ebrahimiyan[1], Mohammad Reza Namavar[2], Ali Reaza Tavassoli[3]
1. Department of Biology, College of Sciences, Shiraz University, Shiraz, Iran
2. Histomorphometry and Stereology Research Center, Department of Anatomical Sciences, Shiraz University of Medical Science, Shiraz, Iran
3. Department of Pathology, Fasa University of Medical Science, Fasa, Iran

Background: Usually stroke causes imbalance of cardiac autonomic system, potentially leading to secondary cardiovascular complications, including cardiac arrhythmias. The aim of this study was to investigate the effect of sympathetic denervation on post stroke cardiac arrhythmia.
Methods: Cerebral ischemia was induced by middle cerebral artery occlusion (MCAO) (1 hour, n=14), and animals were divided into MCAO and MCAO+ Sympathectomy groups. In the treatment group, after 1 hour of ischemia and during reperfusion, the superior cervical ganglion was transected. An electrocardiogram was recorded from all animals before and 48 hours after ischemia using lead II configuration. All animals underwent evaluation for neurological function using the Neurological Deficit Score (NDS) before and two hours after the stroke.
Results: NDS as an indicator of the ischemia induction was significantly elevated two hours post ischemia and sympathectomy reduced this index after 48 hours. 48 hours after cerebral ischemia, QTc interval, was significantly elevated compared to the pre-ischemic state, and this increase returned to the normal level after sympathectomy.
Conclusion: Our findings demonstrated that sympathectomy can be considered as an appropriate candidate for reducing post- stroke cardiac arrhythmias.
Keywords: Superior cervical ganglion, MCAO, cardiac arrhythmias.

SP134, Administration of monophosphoryl lipid a immediately after traumatic brain injury prevents spatial and avoidance memory deficits and neuroinflammation

Maryam Hooshmand[1,2], Mohammad Sayyah[2], Ahmad Asoodeh[1], Hamid ghomipourbadie[2]
1. Department of Chemistry, Faculty of Science, Ferdowsi University, Mashhad, Iran
2. Department of Physiology and Pharmacology, Pasteur Institute of Iran, Tehran, Iran

Background: Traumatic brain injury (TBI) is a leading cause of cognitive impairments, including deficits in spatial and avoidance memory, accompanied by neuroinflammation. Monophosphoryl lipid A (MPL), a non-toxic lipopolysaccharide derivative with immunomodulatory properties, holds potential as a therapeutic agent for mitigating TBI-induced deficits. This study aimed to investigate the effects of early MPL administration on cognitive impairments and neuroinflammation following TBI.
Methods: In a rodent model of TBI, adult male rats received intraperitoneal MPL immediately after injury induction. Cognitive performance was assessed using the Morris Water Maze (spatial memory) and passive avoidance tests (avoidance memory). Neuroinflammatory markers, including pro-inflammatory cytokines (IL-1β, TNF-α) and microglial activation, were evaluated in the cortex and hippocampus via immunohistochemistry and ELISA.
Results: MPL administration significantly improved spatial and avoidance memory deficits ($p<0.05$) compared to controls. Additionally, MPL-treated animals exhibited a marked reduction in pro-inflammatory cytokine levels and microglial activation in the cortex and hippocampus ($p<0.01$), indicating attenuated neuroinflammation.
Conclusion: Early administration of MPL mitigates cognitive impairments and neuroinflammation following TBI, likely through its immunomodulatory effects. These findings highlight MPL's potential as a novel early-intervention therapeutic for TBI and underscore the need for further studies to elucidate its molecular mechanisms and long-term clinical applicability.
Keywords: Monophosphoryl lipid A, Traumatic brain injury, Spatial memory, Avoidance memory, Neuroinflammation

SP135, Lactobacillus pentosus and plantarum intervention reduces neurological symptoms and enhances myelin repair in experimental autoimmune encephalomyelitis (EAE) model in rats

Fereshteh Pourabdolhossein[1], Raha Aghajani[2], Elaheh Ferdousi[3], Mohammadreza Ataherian[4]
1. Department of Physiology, School of Medicine, Babol University of Medical Sciences, Babol, Iran
2. Biotechnology Department, School of Biology, Islamic Azad University, Science and Research Branch, Tehran, Iran
3. Department of Medical Biotechnology, School of Medicine, Babol University of Medical Sciences, Babol, Iran
4. Student Research Committee, School of Medicine, Babol University of Medical Sciences, Babol, Iran

Background: Multiple sclerosis (MS) involves inflammation, demyelination, glial activation, and oxidative damage. This study evaluates the therapeutic potential of *Lactobacillus plantarum* (Lpl) and *Lactobacillus pentosus* (Lpe) in the experimental autoimmune encephalomyelitis (EAE) model.
Methods: Female Lewis rats (180–200 g, n=8/group) received Lp, Lpe, or their combination (2×10^9 CFU/ml) via gavage every other day, starting 10 days pre-EAE induction until day 28 post-induction. Neurological symptoms and myelin repair were assessed. Demyelination, inflammation, and remyelination were analyzed via LFB, H&E, and IHC staining. qPCR evaluated spinal cord gene expression of inflammatory (TNF-α, IL-1β, IL-17), anti-inflammatory (IL-10, Foxp3), oxidative (iNOS, Nrf2, HO-1), and myelin-related (MBP, Olig2, BDNF) markers.
Results: Combined probiotics significantly improved EAE clinical signs. Histology revealed reduced demyelination and inflammation in the combination group. Pro-inflammatory cytokines (TNF-α, IL-17, IL-1β) decreased, while anti-inflammatory markers (IL-10, Foxp3) increased. iNOS levels dropped, and antioxidant factors (Nrf2, HO-1) rose. Total antioxidant capacity improved, with upregulated myelin-associated proteins (MBP, Olig2, BDNF). Astrocytic (GFAP) and microglial (Iba1) activation markers decreased.
Conclusion: Co-administration of Lp and Lpe enhances myelin repair and alleviates EAE symptoms via anti-inflammatory, antioxidant, and neuroprotective mechanisms. This combination shows promise as a complementary therapy for MS management.
Keywords: Multiple sclerosis, Probiotics, inflammation, Neuroprotection.

SP136, Encapsulated MSC-derived exosomes enhance axonal regeneration and functional recovery after optic nerve crush in mice

Samaneh Dehghan[1,2], Alireza Shoae- Hassani[2,1], Kaveh Abri- Aghdam[1], Reza.Mirshahi[1], Nooshin Ahmadi-rad[3]

1. Eye Research Center, The Five Senses Health Institute, Moheb Kowsar Hospital, School of Medicine, Iran University of Medical Sciences, Tehran, Iran
2. Stem Cells and Regenerative Medicine Research Center, Iran University of Medical Sciences, Tehran, Iran
3. Cellular and Molecular Research Center, Iran University of Medical Sciences, Tehran, Iran

Optic nerve injury (ONI) is a major cause of irreversible vision loss with limited treatment options. This study investigated the therapeutic potential of encapsulated mesenchymal stem cell (MSC)-derived exosomes (enEXO) in promoting axonal regeneration and functional recovery in a mouse model of optic nerve crush (ONC). Exosomes derived from umbilical cord MSCs were isolated, characterized, and encapsulated in a biocompatible hydrogel. Mice were assigned to either an untreated ONC group or an enEXO-treated group. Visual evoked potentials (VEP) were recorded 21 days post-injury to evaluate functional outcomes. Histological analysis of the optic nerve was performed to assess axonal regeneration. The enEXO group showed significantly improved VEP responses and enhanced axonal regrowth compared to the control group. These findings suggest that encapsulated MSC-derived exosomes may represent a promising strategy to support axonal repair.

Keyword: Optic nerve injury, Encapsulated exosomes, Axonal regeneration, Visual evoked potentials, MSC therapy

SP137, Alteration in glial cells' response contributes to diminished remyelination in an aged animal model of multiple sclerosis

Elham Parandavar[1], Mohammad Javan[1,2]
1. Department of Physiology, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran
2. Institute for Brain and Cognition, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran

Background: Aging exacerbates white matter injury and impairs remyelination in multiple sclerosis (MS). The central nervous system's (CNS) regenerative capacity relies upon various glial cells' function within the lesion microenvironments and axonal integrity. In cases of prolonged disease course or when MS onsets in older individuals, the accumulation of senescent cells might contribute to the failure of the myelin repair system.
Methods: Herein, we investigated the impact of aging on myelin repair, glial cells response and mitochondrial alteration in a mouse model of MS. Using young (2 months old) and aged (18 months old) mice, we induced focal demyelination via lysolecithin (LPC) injection and analyzed myelin repair at 7and 14 days post-injury (dpi), using histological and ultrastructural analyses.
Results: Our results revealed reduced remyelination capacity in aged mice, coinciding with increased senescence phenotypes in oligodendrocyte precursor cells, astrocytes, and microglia. Histological analyses demonstrated that aged glial cells exhibited impaired recruitment to the injury site, increased SA-β-galactosidase activity, and diminished regenerative potential. Aged axons were also more vulnerable to degeneration, and myelin repair became incomplete. Ultrastructural analyses revealed age-related deficits, axons more susceptible to degeneration, incomplete myelin repair, and more damaged mitochondria in aged mice, which also remained 14 days after injury.
Conclusion: These findings highlight glial senescence as a key contributor to age-related remyelination failure and emphasize the importance of anti-aging strategies in MS treatment and modulating the glial cells' response to myelin repair.
Keywords: Multiple sclerosis, Myelin repair, Aging, Glial cells, Mitochondrial damage

SP138, Indigenization and Production of Smart Brain-spinal cord Interface with the Aim of Motor Rehabilitation in Animal Models with Spinal Cord Injury

Sahar Kiani[1,2], Shahin Rouhi[1,2]
1.Department of Stem Cell and Developmental Biology, Cell Science Research Center, ROYAN Institute for Stem Cell Biology and Technology, ACECR, Tehran 193954644, Iran
2.Department of Brain and Cognitive Sciences, Cell Science Research Center, ROYAN Institute for Stem Cell Biology and Technology, ACECR, Tehran 193954644, Iran

Background: in this study, we design a brain spinal interface (BSI) system with aim of leg rehabilitation for laboratory small animals (Rat). In our BSI, the electrical pulse generation part could be controlled by EEG theta rhythms. In summary when the treadmill speed was zero and the animals was immobile on the treadmills line, the BSI recognized this situation only, based on animal's theta rhythms. In another situation, the treadmill started with 12m/min speeds and the BSI system realized the situation after brain recording analyzing. If animals had experienced 12m/min speed, the BSI triggered an electrical pulse generator and an electrical pulse was applied to spinal cord tissue below the injury site by an electrode array. Due to electrical stimulation, the paralyzed animals could move their legs.
Methods: the EEG signals were recorded from the CA1 area and analyzed by a customized MATLAB script. The theta rhythm's (6-9 HZ) periodogram was calculated for brain recording at zero and 12 speeds. Based on periodogram results a pulse generator circuit was triggered. In the next steps, the intact animal went under SCI surgery and our BSI in offline mode analyzed the brain recordings. if it's recognized the animal had experienced speeds of 12 in the past, the electrical circuit produced a square pulse with 9 HZ frequency and 2-volt amplitude. The pulses were transferred to spinal tissue below the contusion site by a customized electrode array. The leg behavior movement had analyzed by image processing methods and acceleration recording in three situations, before SCI, after SCI without electrical stimulation, and after SCI in presence of electrical stimulation.
Results: the results have shown our BSI systems could recognize the Rat behavioral movement on the treadmill only based on brain recording and the electrical pulse could induce movements in paralyzed legs.
Conclusion: the results study has been shown a BSI system could be designed and used for leg rehabilitation based on theta rhythms for small laboratory animals.
Keywords: brain spin interface, electroencephalography, EEG, spinal cord injury

SP140, Direct differentiation of adipose mesenchymal stem cells to neural progenitors using Sox2 overexpression

Hamed Shiri[1], Mohammad Javan[1]
1. Department of Physiology, Faculty of Medical science, Tarbiat Modares University, Tehran, Iran

Background: Mesenchymal stem cells have been converted to neural cells via growth factors and chemical, while the resulting cells seems to be less effective in replacing the lost ones. Direct differentiation is a promising method for generation of appropriate cells for regenerative medicine. Sox2 is key transcription factor in neural stem Cell fate commitment and used repeatedly for transdifferentiating different cell types to neural progenitors (NPs). Using Sox2 overexpression by viral vector transduction, we tried to transdifferentiate adipose tissue mesenchymal stem cells (AT-MSCs) to NPs.
Methods: Human Sox2 coding sequence was transduced to AT-MSCs using inducible and puromycine selection lentiviral vector. Transfected cells were selected by adding puromycine to culture medium. Twenty-one days after induction of gene expression using doxycycline and keeping the cells in neural differentiation medium, proliferating colonies of transformed cells emerged. Emerged colonies were handpicked and expanded in culture plates for more investigation and characterization using immunostaining against NP markers.
Results: Expression of Sox2 lead to robust morphologic changes in AT-MSCs and formation of highly proliferating colonies. Resulted cells expressed specific markers of NPs such as Nestin and Pax6. These induced-NPs shaped in rosette structures in 2d-culture and formed primary and secondary spheres in suspension culture while expressing NPs markers Nestin, Pax6 and NCAM. iNPs get matured 3w after expansion in neural maturation medium as confirmed by immunostaining against mature neuronal marker, Tuj1.
Conclusion: NPs like cells emerging from Sox2 overexpressing AT-MSCs were able to form rosette structures and primary and secondary neurospheres with NPs markers expression, followed by differentiation to mature neurons. Due to the expression of a cell fate determining factor in this method, iNPs are expected to participate in replacing the lost cell in neurodegenerative diseases.
Keywords: Adipose mesenchymal stem cell, Neural progenitors, Human Sox2, Transdifferentiation

SP141, Combined therapy with cerebrolysin and enriched environment ameliorated the behavioral and cognitive deficits in a mouse model of posttraumatic stress disorder

Leila Hosseini[1], Javad Mahmoudi[2]
1.Research Center of Psychiatry and Behavioral Sciences, Tabriz University of Medical Sciences, Tabriz, Iran
2. Neurosciences Research Center, Tabriz University of Medical Sciences, Tabriz, Iran

Background: Posttraumatic stress disorder (PTSD) is classified as a neuropsychiatric disorder that occurs after exposure to stressful, fearful, or troubling events. Cerebrolysin (CBL) is a neuropeptide preparation derived from porcine brain proteins and exhibits neuroprotective and neurotrophic properties. This study was conducted to examine whether a combination of CBL with housing in an enriched environment (EE) could have beneficial effects in reducing PTSD-like induced memory impairment and anxiety symptoms or not.
Methods: The inescapable electric foot shocks were delivered to Balb/c mice for two consecutive days. Then, mice were treated with CBL (2.5 mL/kg) and/or were kept in EE (2 h per day) or received their combination for 14 consecutive days. The hole-board and Lashley III tests were used to evaluate anxiety and spatial memory, respectively. Changes in the serum corticosterone level and expression of synaptic elements, including growth-associated protein 43, post-synaptic density 95, and synaptophysin, were assessed in the hippocampus**.**
Results: This model caused anxiety and spatial memory impairment related to raised serum corticosterone levels and reduced synaptic elements. However, CBL and/or combination treatment reversed behavioral and molecular alterations.
Conclusion: Our findings indicated that CBL, separately or in combination with EE (more potent), is effective in reducing anxiety and spatial memory deficits in PTSD-like mice.
Keywords: Anxiety, Cognitive deficits, Cerebrolysin, Enriched environment, Posttraumatic stress disorder.

SP142, Deferiprone modifies microglial polarization in optic nerve demyelination

Reyhaneh Doost[1], Yaghoub Fathollahi[1], Mohammad Javan[1,2]
1. Department of Physiology, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran
2. Institute for Brain and Cognition, Tarbiat Modares University, Tehran, Iran

Background: Multiple sclerosis (MS) is a chronic inflammatory disease of the central nervous system marked by loss of oligodendrocytes, axonal damage, and neurodegeneration. Disruption of iron homeostasis may worsen neuroinflammation and disease progression by influencing microglial phenotypes. Iron accumulation in MS lesions can promote pro-inflammatory M1 microglial activation. Iron chelators such as deferiprone offer neuroprotective effects by restoring iron balance and regulating microglial polarization
Methods: Initially, we reanalyzed a microarray human MS dataset from GEO DataSests, under accession number GSE108000, to evaluate differentially expressed genes involved in iron regulatory pathways in MS lesions and peri-lesional normal-appearing white matter (PL-NAWM) compared with healthy white matter. This analysis was performed using GEO2R and RStudio software. Subsequently, we induced an experimental model of optic nerve demyelination in male C57BL/6J mice to investigate the effects of deferiprone on microglia/macrophage polarization. Microglial phenotypes were assessed at 7 days post-injury using RT-qPCR with M1/M2 markers.
Results: Bioinformatic analysis revealed significant alterations in the expression of iron regulatory genes in MS lesions, indicating iron dyshomeostasis compared with control white matter. In the animal model, deferiprone treatment attenuated the microglia/macrophages activation and polarization toward both pro-inflammatory and anti-inflammatory phenotypes, while favoring an anti-inflammatory phenotype in the remaining cells at 7 days post-demyelination.
Conclusion: These findings suggest that iron dyshomeostasis is a relevant feature of MS pathology. Using deferiprone for iron chelation modulates microglial polarization in optic nerve demyelination, may disrupt the cycle of iron-driven inflammation, oxidative stress, and myelin damage. Targeting iron-related pathways may represent a promising therapeutic strategy for demyelinating disorders.
Keywords: MS, Demyelination, Macrophage/microglia, Iron metabolism, Deferiprone

SP143, Exercise pills: promising pharmacology or impossible dream?

Hossein Shirvani [1], Fatemeh Rostamkhani[2]
1. Exercise Physiology Research Center, Life Style Institute, Baqiyatallah University of Medical Sciences, Tehran, Iran
2. Department of Biology, YI.C., Islamic Azad University, Tehran, Iran

Background: The concept of "exercise pills" refers to a class of investigational pharmaceuticals designed to pharmacologically mimic key health benefits of physical exercise, such as improved metabolic function and muscle endurance, without requiring physical exertion. The goal is not to replicate all holistic benefits of exercise but to target specific cellular pathways activated during activity. Core research focuses on molecules like AMPK, PPAR-delta, and PGC-1α, which regulate energy metabolism, fat burning, and mitochondrial growth. Compounds like experimental GW501516 or the diabetes drug metformin show exercise-mimicking effects in models by activating these pathways.
Methods: Potential applications are significant, particularly for individuals unable to exercise due to disability, severe illness, or muscle-wasting conditions. Such therapeutics could help combat metabolic diseases, cachexia, and age-related sarcopenia, and are of interest for astronauts experiencing muscle atrophy in spaceflight.
Results: However, major challenges exist. Exercise produces complex, systemic effects across the cardiovascular, skeletal, and nervous systems that a single pill is unlikely to capture fully. Crucially, psychological and cognitive benefits derived from movement itself are not easily pharmacologically replicated. Safety concerns regarding long-term use of powerful metabolic modulators and ethical questions about misuse for enhancement or doping also arise.
Currently, no comprehensive "exercise pill" is approved. Research remains incremental, aiming to develop targeted adjunct therapies for specific patient populations rather than a wholesale replacement for physical activity in healthy individuals.
Conclusion: While promising for restorative medicine, these pills are not a substitute for the proven, multifaceted benefits of genuine exercise.
Keywords: Metabolic mimetics, Molecular targets, Therapeutic indications, Systemic complexity, Adjunct therapy

SP144, Role of specialized pulmonary rehabilitation programs in improving cardiopulmonary efficiency in chronic obstructive pulmonary disease

Hamid Marefati[1], Rostam Yazdani[2], Jamil Esmailiyan[3]
1. Department of Exercise Physiology, Faculty of Sport Sciences, Hakim Sabzevari University, Sabzevar, Iran
2. Internal Medicine Department, Kerman University of Medical Sciences, Kerman, Iran
3. Cardiopulmonary Rehabilitation Center, Heshmatiyeh Hospital, Sabzevar University of Medical Sciences, Sabzevar, Iran

Background: Chronic obstructive pulmonary disease (COPD) is a progressive respiratory disorder accompanied by systemic physiological impairments that promote a vicious cycle of cardiopulmonary dysfunction and physical inactivity. This study investigated the effects of a comprehensive pulmonary rehabilitation program on cardiopulmonary function and exercise efficiency in patients with COPD.
Methods: In this randomized controlled clinical trial, 35 patients with COPD (21 men and 14 women; aged 55–70 years) were randomly assigned to an exercise group (n = 19) or a control group (n = 16). The intervention consisted of eight weeks of supervised aerobic, resistance, and respiratory training performed three times per week (80 minutes per session). Outcomes assessed at baseline and post-intervention included quality of life (SF-36), functional status (Barthel Index), respiratory health (St. George's Respiratory Questionnaire), depression severity (BDI-II), pulmonary function tests, aerobic capacity (VO_2peak and 6-minute walk test), and cardiopulmonary efficiency indices (HR/load and O_2 pulse). Between-group comparisons were conducted using two-way ANOVA.
Results: Compared with the control group, the exercise group demonstrated significant improvements in quality of life, respiratory symptom burden, and functional independence ($P \leq 0.05$). While forced vital capacity showed no significant change, significant increases were observed in FEV_1/FVC and respiratory flow indices. Aerobic capacity, oxygen pulse, walking distance, and cardiopulmonary efficiency indices significantly improved following rehabilitation ($P \leq 0.05$).
Conclusion: Structured pulmonary rehabilitation is an effective non-pharmacological strategy that improves cardiopulmonary efficiency, functional capacity, and quality of life in patients with COPD and should be considered a core component of comprehensive disease management.
Keywords: Chronic obstructive pulmonary disease, Pulmonary rehabilitation, Pulmonary function, Exercise training

SP145, High-intensity interval training (HIIT) and lactate protect against sleep deprivation-induced memory impairment: role of the PKA-CREB-BDNF-Cofilin signaling pathway

Ataollah Movahed[1], Soheil Aminizadeh[2, 3], Hamid Marefati[1], Beydolah Shahouzehi[4], Hamid Najafipour[5], Saeed Sheikhshoaei[6], Keyvan Hejazi[1]

1. Department of Exercise Physiology, Faculty of Sport Sciences, Hakim Sabzevari University, Sabzevar, Iran
2. Physiology Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
3.Department of Physiology and Pharmacology, Afzalipour School of Medicine, Kerman University of Medical Sciences, Kerman, Iran
4. Gastroenrology and Hepathology Research Center, Institute of Basic and Clinical Physiology Sciences, Kerman University of Medical Sciences, Kerman, Iran
5.Cardiovascular Research Center, Institute of Basic and Clinical Physiology Sciences, Kerman University of Medical Sciences, Kerman, Iran
6. Neuroscience Research center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran

Background: The present study aims to investigate the protective effect of high-intensity interval training (HIIT) or lactate administration on signaling pathway (Protein kinase A (PKA)/ Cyclic AMP response element-binding (CREB)/ Brain-derived neurotrophic factor (BDNF)/ P-cofilin) associated with memory impairment in hippocampal tissue due to sleep deprivation (SD).
Material and methods: 42 male Wistar rats were randomly divided into six groups: 1. Control, 2. SD, 3. SD + HIIT, 4. HIIT, 5. Lactate, 6. SD + Lactate. Training groups participated in 6 weeks of HIIT on a treadmill and lactate groups received a daily dose of lactate intraperitoneally for 6 weeks (Target concentration of lactate was 7 ± 0.7 mmol/L). After 6 weeks of treatment, SD groups were placed in a water-based sleep deprivation device for 48 hours. Spatial memory was assessed by Morris water maze (MWM). Proteins (PKA/BDNF/P-cofilin) and gene (*CREB*) expression were measured by Western blot analysis and Real-Time PCR ($2^{-\Delta\Delta CT}$), respectively.
Results: After 6 weeks, there was a significant increase in number of enter in target zone (P = 0.001), time in target zone (P = 0.002) and path length (P = 0.03) between HIIT and control group. SD significantly decreased BDNF (P < 0.0001), PKA (P < 0.0001) and p-cofilin (P < 0.0001) protein expression in hippocampus tissue, compared with control group.
Conclusion: HIIT and lactate can improve the spatial memory in SD condition. It seems that many adaptations resulting from HIIT are associated with increased lactate levels as a crucial signaling molecule in the hippocampus.
Keywords: HIIT, Lactate, Sleep deprivation, BDNF, PKA, P-cofilin

SP146, Correlations between dopaminergic and adrenergic markers and motor performance following acute rem sleep deprivation: modulatory effects of exercise and caffeine

Esmail Karami[1], Mohammad Taghi Mohammadi[2], Hossein Shirvani[1], Behzad Bazgir[1]
1. Exercise Physiology Research Center, Life Style Institute, Baqiyatallah University of Medical Sciences, Tehran, Iran
2. Department of Physiology and Medical Physics, Faculty of Medicine, Baqiyatallah University of Medical Sciences, Tehran, Iran

Background: REM sleep deprivation impairs motor performance mainly by disrupting D2 receptor–mediated dopaminergic signaling. Although D1R, DAT, and adrenergic receptors also contribute, their effects are weaker. Exercise and caffeine may enhance dopaminergic function and improve motor performance under REM-SD. This study examined the relationships between dopaminergic and adrenergic markers particularly D2R and motor performance, as well as the modulatory effects of exercise and caffeine.
Methods: Forty male Wistar rats were assigned to control, caffeine, exercise, caffeine + exercise, and REM-SD groups. Caffeine (30 mg/kg/day) and moderate-intensity treadmill exercise (22 m/min, 4 weeks) were applied. REM-SD was induced using the multiple-platform method, motor performance was assessed by the Pole test, and striatal tissues were analyzed for dopamine levels and gene expression.
Results: Exercise and caffeine modulated dopaminergic signaling. D2R showed the strongest negative correlations with pole-test performance, indicating faster motor responses with higher D2R levels. D1R, DAT, and dopamine were moderately associated with improved performance, while adrenergic receptors showed weaker direct relationships. Exercise and caffeine improved motor outcomes in REM-SD rats.
Conclusion: Striatal D2R showed the strongest association with motor performance, with higher levels linked to faster Pole-test outcomes. Exercise and caffeine enhanced D2R expression, highlighting D2R as a key mediator of motor function under REM sleep deprivation.
Keywords: Sleep deprivation, Motor activity, Dopamine D2 receptors, Caffeine, Exercise

SP147, Swimming exercise training (SET) and MitoQ supplementation can mitigate the atrophy and inflammation process in skeletal muscles of male Wistar rats with spinal cord injury (SCI): NF-κB/MuRF-1/proteasome pathway

Zahra Behroozi[1,6], Beydolah Shahouzehi[2], Daruosh Moflehi[3], Mahdiyeh Moradi[3], Fatemeh Rastegari Nasab Ravari[3], Mahdiye Lashkari-Zadeh[4], Maryam Hadadi[2], Mohammad Mojtaba Farazi[2], Soheil Aminizadeh[5]

1. Bio Environmental Health Hazards Research Center, Jiroft University of Medical Sciences, Jiroft, Iran
2. Cardiovascular Research Center, Institute of Basic and Clinical Physiology Sciences, Kerman University of Medical Sciences, Kerman, Iran
3. Department of Exercise Physiology, Faculty of Physical Education and Sport Sciences, Shahid Bahonar University of Kerman, Kerman, Iran
4. Department of Pathology, Afzalipour School of Medicine, and Physiology Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences,
Kerman, Iran
5. Department of Physiology and Pharmacology, Afzalipour School of Medicine, and Physiology Research Center, Institute of Neuropharmacology, Kerman University of
Medical Sciences, Kerman, Iran
6. Clinical Research Development Unit, Imam Khomeini Hospital, Jiroft University of Medical Sciences, Jiroft, Iran

Background: In the present study, we investigated the effects of a rehabilitation period with MitoQ supplement and swimming exercise training (SET) on atrophy and the inflammation process in the skeletal muscles of male rats with spinal cord injury (SCI).

Methods: In the present study, rats were assigned to five groups (n = 7): Sham, SCI, SCI + SET, SCI + MitoQ (250 μM), and SCI + SET + MitoQ. In the training groups, the rats underwent swimming training for 4 weeks, 5 days/week. Motor function was assessed via the Basso, Beattie, and Bresnahan (BBB) locomotor scale method. The diameter of the skeletal muscle cells, along with the expression of the genes (NF-κB, MuRF-1, proteasome, and myostatin) and proteins (NF-κB, proteasome, and myostatin) were measured using hematoxylin and eosin (H&E) staining, real-time PCR (2□ ΔΔCT), and Western blot analysis, respectively.

Results: After 4 weeks, the BBB score in the SCI + MitoQ and SCI + SET + MitoQ groups did not return to normal levels compared to the sham group. MitoQ helped improve the motor function score compared to the SCI group ($p < 0.0001$). In skeletal muscles, performing SET significantly decreased proteasome ($p < 0.0001$) and myostatin ($p = 0.0003$) proteins, as well as myostatin and NF-kB gene expression compared to the SCI group ($p = 0.02$).

Conclusion: SET, MitoQ, and the combination of treatments helped improve motor function and reduce muscle atrophy. Although MitoQ's antioxidant effect on reducing atrophy was not as strong as the combined treatment, it still led to better improvements in motor function.

Keywords: Swimming, Skeletal muscle, Spinal cord injuries, Atrophy

SP148, Modulatory effects of moderate exercise on lipopolysaccharide-induced cardiac injury in rats

Zahra Gholamnezhad[1, 2], Fatemeh Khoshkhouy[2], Maryam Mahmoudabady[1, 2]
1. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Applied Biomedical Research Center, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran

Background: The beneficial effects of different exercise modality on cardiovascular system has been shown. Repeated exposure to Lipopolysaccharide (LPS) might trigger apoptotic and inflammatory process in cardiac tissue. The current study, aimed to evaluate the protective effects of moderate exercise against LPS-induced cardiac tissue apoptosis, oxidative stress and inflammation.
Methods: Three groups (N=8) of male Wistar rats were treated as control (saline); LPS (1 mg/kg); and LPS+moderate exercise (LPS+EX: 30 min/day, at velocity of 15 m/min) for 9 weeks. Saline or LPS was intraperitoneally injected for 5 days during the last week of experiment. Finally, the heart of rats was harvested for gene expression and biochemical assessments.
Results: In comparison to the control group, LPS elevated the levels of C-reactive protein (CRP), tumor necrosis factor α (TNF-α), interleukin (IL)- 1β, nitric oxide (NO) metabolites and malondialdehyde (MDA) in heart tissue, however reduced the superoxide dismutase (SOD) and catalase (CAT) activity, and thiol contents in cardiac tissue. In LPS+EX animals, a decrease in thiol contents and an increase in the NO metabolites was recorded in comparison to the control animals. Moderate exercise reduced the levels of NO metabolites, IL-1β, TNF-α, and CRP while elevated the CAT activity in the LPS+EX animals compared to the LPS treated rats. The BAX mRNA level in the LPS rats and the BCL2/BAX ratio in both LPS+EX and LPS animals were increased compared to the control rats.
Conclusion: This study showed the probable anti-inflammatory, anti-apoptotic and anti-oxidative stress effects of moderate exercise in LPS-induced cardiac injury.
Keywords: Lipopolysaccharide, Moderate exercise, Cardiac tissue, Inflammation, Oxidative damage

SP149, The effect of two selected training methods combined with vitamin d supplementation on plasma levels of neurotrophin-3/4, neuregulin-1, and selected functional factors in patients with multiple sclerosis

Mahmoud Soltani[1], Hassan Sanian[1], Zahra Ataei[2], Ghazal Soltani[2]
1. Assistant Professor. Department of physical education and sports science. Mashhad Branch, Islamic Azad University, Mashhad, Iran
2. Department of physical education and sports science. Mashhad Branch, Islamic Azad University, Mashhad, Iran

Background: Multiple sclerosis is one of the prevalent neurological disorders that leads to substantial functional limitations. Evidence indicates that exercise training and certain nutritional supplements may help reduce MS-related complications. The present study aimed to examine the effect of two selected training methods combined with vitamin D supplementation on plasma levels of neurotrophin-3/4, neuregulin-1, and selected functional factors in patients with multiple sclerosis.
Methods: This semi-experimental study included sixty MS patients aged 35.10 ± 2.84 years with a body mass index of 29.32 ± 2.64 kg/m². Participants were selected through purposeful and convenient sampling and randomly assigned to six groups: resistance training with Theraband (n=10), Pilates training (n=10), resistance training with Theraband plus vitamin D (n=10), Pilates training plus vitamin D (n=10), vitamin D only (n=10), and placebo (n=10). The intervention lasted two months. One-way ANOVA and Tukey's post-hoc test were used to analyze between-group differences, and paired t-tests assessed within-group changes. The significance level was set at $p < 0.05$.
Results: Resistance training with Theraband and Pilates, when combined with vitamin D supplementation, significantly increased neurotrophin-3, neuregulin-4, neuregulin-1, static balance, and physical performance (all $p = 0.001$) in MS patients.
Conclusion: Resistance training with Theraband and Pilates, alongside vitamin D supplementation, appears to enhance neurotropic factors and improve functional performance in individuals with multiple sclerosis.
Keywords: Exercise، Vitamin D، Neurotrophin، Neuregulin، Multiple sclerosis

SP150, Pilates-driven neuroimmune rebalancing: enhancing reward circuit function and cognitive recovery during human addiction withdrawal

Mohammad Reza Sokhanvar[1], Vahid Sokhanvar[2], Roya Askari[3], Bahar Ghaedi[4], Yaser Firouzi[1]
1. Physiology Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
2. Department of Psychology, TOJ.C, Islamic Azad University, Torbat Jam, Iran
3. Department of Exercise Physiology, Faculty of Sport Sciences, Hakim Sabzevari University, Sabzevar, Iran
4. Student Research Committee, Kerman University of Medical Sciences, Kerman, Iran

Background: Addiction withdrawal is characterized by persistent neuroinflammation, dysregulation of reward related hormonal pathways, and impairments in cognitive function. The present study examined the effects of a 12-week Pilates intervention on neuroimmune regulation, reward system hormones, and cognitive performance in adults undergoing substance withdrawal.
Methods: Thirty adults in withdrawal were enrolled and assigned to Two groups: withdrawal +Pilates (n = 15), withdrawal-only (n = 15), and healthy controls (n = 15). The Pilates group completed supervised sessions three times per week for 12 weeks, including core stabilization, mindful breathing, and neuromuscular coordination. Blood samples were collected at baseline and post intervention to measure anti-inflammatory (IL-10), pro inflammatory (IL-6, TNF-α), and reward related hormones (dopamine, β-endorphin, serotonin, cortisol). Cognitive function was evaluated using standardized tests for executive function, working memory, and cognitive flexibility. Data were analyzed using ANCOVA with Bonferroni correction ($\alpha = 0.05$).
Results: After 12 weeks, the Pilates group exhibited significant increases in IL-10 ($p < 0.01$) and reductions in IL-6 and TNF-α ($p < 0.04$), indicating improved anti-inflammatory status. Dopamine ($p < 0.03$), β-endorphin ($p < 0.001$), and serotonin ($p < 0.05$) increased, with partial normalization of cortisol ($p < 0.05$). Cognitive performance improved significantly in executive function and working memory (both $p < 0.02$). The withdrawal-only group showed no meaningful changes. By week 12, several neurobiological and cognitive markers in the Pilates group approached levels observed in healthy controls ($p < 0.05$).
Conclusion: Twelve weeks of Pilates improved neuroimmune balance, hormone regulation, and cognitive recovery in addiction withdrawal, highlighting mind–body exercise as a valuable adjunct in rehabilitation.
Keywords: Exercise, Pilates, Addiction withdrawal, Neuroinflammation, Reward hormones

SP151, Effect of exercise, mitoq, and their combination on microRNA and oxidative stress in women with multiple sclerosis

Atena Alifarsangi[1], Mohammad Khaksari[2], Hosseinali Ebrahimi Meimand[3], Hoda Kamali[4], Soheil Aminizadeh[5], Forouzan Rafie[6]

1. Department of Physiology and Pharmacology, Kerman University of Medical Sciences, Kerman, Iran
2. Neuroscience Research Center, Institute of Neuropharmacology , Kerman University of Medical Sciences, Kerman, Iran
3. Department of Neurology, School of Medicine, Neurology Research Center, Kerman University of Medical Sciences, Kerman, Iran
4. Department of Neurology, School of Medicine, Neurology Research Center, Kerman University of Medical Sciences, Kerman, Iran
5. Department of Physiology and Pharmacology, Kerman University of Medical Sciences, Kerman, Iran
6. Division of Geriatrics and Gerontology, Department of Medicine, Emory University, Atlanta, USA

Background: Multiple sclerosis (MS) is a chronic autoimmune disorder characterized by central nervous system demyelination and neurodegeneration. Although current treatments focus on symptom management and slowing disease progression, there remains a need for interventions that address the underlying pathogenic mechanisms. In this study, we evaluated the effects of exercise, MitoQ (a mitochondria-targeted antioxidant), and their combination on key biomarkers in non-menopausal and menopausal women with MS.

Methods: After an 8-week treatment period (aerobic exercise, MitoQ, and their combination), we assessed changes in oxidative stress markers, total antioxidant capacity (TAC), malondialdehyde (MDA), and glutathione peroxidase (GPx), as well as the expression of microRNAs (miR-146a and miR-223) involved in inflammatory regulation.

Results: In non-menopausal women, all treatments significantly increased TAC and enhanced GPx activity while markedly reducing MDA levels. In menopausal women, MitoQ and the combination therapy effectively modulated these markers, whereas exercise alone did not yield significant changes. Moreover, all interventions upregulated miR-146a expression and downregulated miR-223 expression in both groups. Notably, the combined exercise and MitoQ therapy exhibited the most pronounced effects across both cohorts.

Conclusion: This observation suggests that while exercise may enhance the body's intrinsic antioxidant defenses, MitoQ directly decreases mitochondrial oxidative stress, and they mutually support each other. These findings suggest that targeting oxidative stress and inflammation through exercise and MitoQ could positively affect the biological pathways involved in MS development, offering a promising addition to existing treatment options.

Keywords: Multiple sclerosis, Exercise therapy, MitoQ, MicroRNAs, Menopause.

SP152, Magnetic hyperthermia improves survival and quality of vitrified ovarian tissue in a sheep model

Sareh Karimi[1], Seyed Nasrollah Tabatabaei[2] and Fatemeh Karimi[3]
1. Department of Anatomy and Cell Biology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Medical Nanotechnology, School of Advanced Technologies in Medicine, Tehran University of Medical Sciences, Tehran, Iran
3. Student Research Committee, Sabzevar University of Medical Sciences, Sabzevar, Iran

Background: Today, regarding the increasing incidence of cancers, fertility preservation has become an important issue in reproductive sciences. Cryopreservation by vitrification is one of the promising solutions for long-term fertility preservation. One of the challenges in cryopreservation of large-sized tissues and organs is the formation of ice crystals due to the tendency of the material to contract with temperature changes. In the present study, we tried to increase the warming rate by magnetic hyperthermia in cryopreserved ovarian tissue.
Methods: In this study, sheep ovaries were prepared from the slaughterhouse and divided into 4 groups (Fresh, Kagawa, Nanowarming, and Alternating Magnetic Field), then follicular density and development, apoptosis, oxidative stress, and expression of GDF9, BMP15, and FSHr genes were assayed.
Results: Briefly, based on our results, Nanowarming had better follicular viability and more expression of GDF9, BMP15, and FSHr genes in comparison to Kagawa, and generally, oxidative stress induced by Nanowarming was less than Kagawa.
Conclusion: Nanowarming is a new method that can improve ovarian cryopreservation outcomes in comparison to the routine method. The ovaries that are cryopreserved by the Nanowarming method have less oxidative stress, therefore more ovarian follicle density and development.
Keywords: Ovary, Cryopreservation, Vitrification, Warming, Nanoparticle

SP153, The effect of intralipid injection immunotherapy on pregnancy outcome in frozen embryo transfer in repeated implantation failure (a randomized controlled trial)

Malihe Mahmoudinia[1], Nayereh Khadem[1], Ezat Shabani[1], Azadeh khazaee[2], Malihe Afiat[1], Malihe Amirian[1], Tahere sadeghi[3], Nafiseh jahanpak[4], Fatemeh Barani moghadam[4]

1. Supporting of the Family and the Youth of Population Research Core, Department of Obstetrics and Gynecology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Royesh Infertility Center, Birjand University of Medical Sciences, Birjand, Iran
3. Department of pediatrics, School of Nursing and Midwifery, Nursing and Midwifery Care, Research Center, Mashhad University of Medical Sciences, Mashhad, Iran,
4. Department of Midwifery, Mashhad University of Medical Sciences, Mashhah, Iran,

Background: Intralipid is proposed as an effective therapy for patients with repeated implantation failure. This research examines the impact of intralipid injection on pregnancy outcomes in individuals who have had recurrent implantation failure in assisted reproductive technologies.
Methods: It was a double-blind randomized controlled study that conducted on 60 women with recurrent implantation faliure, Milad, IVF Center, Mashhad, Iran, between August 2020 and September 2022. Patients were randomly assigned to two groups. Endometrial preparation was performed with artificial protocol with hormone therapy. Intervention groups were given two turns of 20% intralipid, the first one on the day before progesterone administration, and the second one, on the day after a positive test of pregnancy. Pregnancy outcomes were compared in both groups.
Results: Demographic characteristics and underlying variables of the samples under study were similar in both groups, and there was no significant difference among the groups in this regard ($p > 0.05$). There was not a statistically significant difference in chemical pregnancy, clinical pregnancy, and ongoing pregnancy in the intervention and control groups ($P> .05$). Although no statistically significant differences were detected in overall pregnancy outcomes, the live birth rate was higher in the intervention group (14.9% vs. 6.4%). Furthermore, the miscarriage rate was lower in the intervention group compared to the control group (27% vs. 54.5%), suggesting a potential clinically meaningful reduction, despite the lack of statistical significance.
Conclusion: The intervention group did not have favorable outcomes in terms of definite immunity advantages and the rate of pregnancy, whether it increased or decreased, compared to the control group. The outcomes of the groups being studied showed a poor outlook. It is recommended to conduct large-scale randomized clinical trial studies to determine the final benefit or loss of intralipid administration for infertility therapy's failure or success.
Keywords: Intralipid, Repeated Implantation Failure, Live Birth, IVF, Pregnancy Outcome

SP154, Therapeutic potential of mesenchymal stem cells transplantation in non-alcoholic fatty liver disease of polycystic ovary syndrome

Arash Abdi[1], Mina Ranjbaran[2], Fardin Amidi[3], Behjat Seifi[2]
1. Department of Physiology, School of Medicine, Shahed University, Tehran, Iran
2. Department of Physiology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
3. Department of Anatomy, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran

Background: About 51% of women who have Patients with polycystic ovary syndrome (PCOS) are impacted by non-alcoholic fatty liver disease (NAFLD). Research in the underlying diseased mechanisms of this link could offer valuable insights for preventing and treating this complication.
Methods: Three experimental groups were formed by randomly dividing twenty-four female Wistar rats.: Vehicle, PCOS and PCOS+MSCs. In the PCOS group letrozole (1 mg/kg, daily) administrated in 0.5% CMC for 21 days. Meanwhile, the PCOS+MSCs group was treated with 1×106 MSCs/rat intraperitoneally on the 22nd day. Ovarian mitochondrial dynamic gene expression, liver and ovarian oxidative stress, liver and ovarian inflammation, liver and parameters related to ovarian histology, serum testosterone levels, glucose homeostatic indexes, liver function enzymes, insulin and glucose concentrations, lipid profile were evaluated.
Results: PCOS groups revealed a notable disturbance of ovarian changes in histology and mitochondrial dynamics, lower liver and SOD of ovary, HDL and ovarian MFN2. Furthermore, notable increases were observed in glucose and insulin level, HOMA-IR, and androgen levels, ovarian DRP1 gene expression, liver and ovarian levels of inflammatory factors, MDA, ALT, LDL, TC, TG, AST and CRP levels in comparison with the Vehicle group. In the PCOS+MSCs group, transplantation of MSCs could lead to improvements in the parameters mentioned above.
Conclusion: The prescription of MSCs improved ovarian and liver injury in PCOS through its anti-inflammatory and antioxidant characteristics in addition to modulation of mitochondria function in ovary. This study showed that notice to the liver beside ovarian organs in PCOS is principal.
Keywords: PCOS, NFALD, Mesenchymal stem cells, Oxidative stress, inflammation

SP155, Effect of platelet lysate loaded in chitosan nanoparticles on ovarian function in a mouse premature ovarian failure model

Fereshte Torabi[1], Alireza Ebrahimzadeh-Bideskan[1], Sareh Karimi[1], Fatemeh Alipour[1]
1. Department of Anatomy and Cell Biology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Premature ovarian failure (POF) is a common cause of infertility in women. Cyclophosphamide (CP) is one of the most important gonadotoxic agents that leads to POF. Platelet lysate (PL) can be a promising treatment option to repair and regenerate insufficient ovarian tissue. Chitosan (CH) is considered a promising biopolymer for sustained and controlled release systems. This study aimed to evaluate the therapeutic effect of Platelet lysate-loaded chitosan nanoparticles (PLCH NPs) on ovarian function in a mouse POF model induced by CP.
Methods: A total of 36 adult female BALB/c mice were divided into six groups: Control, Sham, POF, POF-PL, POF-CH, and POF-PLCH. At the end of treatment, the animals were sacrificed, and right ovary was used to evaluate parameters such as MDA, SOD, CAT, and thiol levels. Additionally, the expression of the genes BMP15, GDF9, KITLG, and FSHR was analyzed using Real-time PCR. The left ovary was also utilized for histological studies.
Results: The POF-PLCH group demonstrated higher levels of SOD, CAT, and thiol parameters, along with a significant decrease in MDA levels compared to the POF group. The expression genes increased significantly in the POF-PL and POF-PLCH groups compared to the POF group. Histological examinations revealed significant improvement in ovarian morphology and follicle count in the POF-PLCH group compared to the POF group ($P<0.05$).
Conclusion: This study proposed a novel PLCH NP-mediated combination therapy for the clinical treatment of POF and showed PLCH NPs have superior effectiveness compared with free PL.
Keywords: Infertility, Premature ovarian failure, Cyclophosphamide, Platelet lysate, Chitosan

SP156, Effect of N-acetylcysteine on the sperm biochemical parameters and expression of HSPA70 and caspase-3-genes in asthenoteratospermic infertile males undergoing cryopreservation

Narges Ashoori [1], Sharbanoo Oryan [1,2], Akram Eidi [1], Kambiz Roshanaei [3]
1. Department of Biology, Faculty of Basic Sciences, Science and Research Branch, Islamic Azad University, Tehran, Iran
2. Department of Biology, Faculty of Sciences, Kharazmi University, Tehran, Iran
3. Department of Biology, Faculty of Sciences, Qom Branch, Islamic Azad University, Qom, Iran

Background: Protecting sperm from oxidative stress caused by freezing is one of the important goals for improving sperm quality. This study examines the effects of N-acetylcysteine and resveratrol as potent antioxidants on human sperm parameters, as well as evaluating the levels of apoptosis and the expression of the HSP70 gene after freezing.
Methods: In this study, semen samples were collected from 80 male participants visiting the infertility treatment center of Jihad University of Qom. These individuals were initially divided into two groups: the first group consisted of individuals with asthenoteratospermic, while the second group included men who met the normal criteria according to WHO standards. Ultimately, each group was further divided into two subgroups of 20 individuals each. One subgroup received N-acetylcysteine (NAC) antioxidants at concentrations of 0.01, 0.02, 0.05, 0.1, and 0.25 millimolar. The other subgroup received resveratrol at the same concentrations of 0.01, 0.02, 0.05, 0.1, and 0.25 millimolar. The data were analyzed using SPSS software and ANOVA tests.
Results: The results showed that N-acetylcysteine (NAC) at concentrations of 0.02 and 0.05 millimolar significantly increased sperm motility. However, at a concentration of 0.25 millimolar, NAC led to a significant decrease in motility compared to the control group. With the exception of the 0.25 millimolar concentration, all other concentrations of NAC resulted in increased sperm viability. Additionally, the findings indicated that this antioxidant improved normal sperm morphology and reduced levels of reactive oxygen species (ROS). Moreover, N-acetylcysteine at concentrations of 0.02 and 0.05 millimolar significantly decreased apoptosis levels and the expression of the HSP70 gene. The results also demonstrated that resveratrol, another antioxidant, is effective in scavenging free radicals and preventing damage during the freezing process. This compound significantly improved sperm motility and viability compared to the frozen control group.
Conclusion: In conclusion, the study found that the antioxidants N-acetylcysteine and resveratrol can significantly mitigate the effects of freezing shock and enhance sperm quality. Furthermore, concentrations of 0.02 and 0.05 millimolar for N-acetylcysteine and 0.02 millimolar for resveratrol were identified as optimal for use in assisted reproductive technology (ART) protocols.
Keywords: Cryopreservation, N-acetylcysteine, Human semen, Asthenoteratospermia, Apoptosis.

SP157, Evaluation of bacterial infections leading to IVF failure in infertile individuals

Zahra Davtalab Tousi[1], Hadi Farsiani[2]

1. Department of Microbiology and Virology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Microbiology and Virology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Infertility is a global condition affecting millions of people worldwide. In vitro fertilization (IVF) is the most effective treatment option for couples with multifactorial infertility problems. Some factors cause failure in this technique which one of the most important factors are bacterial infections. Genital Tract Infections (GTIs) are strongly associated with an increased incidence of urethritis, amniotic fluid infection and pelvic inflammatory disease (PID). *Chlamydia trachomatis* infection is one of the main causes of PID resulting in infertility. The most common urogenital tract pathogens associated with infertility are *Ureaplasma urealyticum, Neisseria gonorrhoeae, Mycoplasma hominis and Chlamydia trachomatis.* Meanwhile *Mycoplasma* and *chlamydia* infections are the strongest predictors of IVF failure. Also high abundance of *Lactobacillus iners* potentially indicate an IVF failure. In addition, studies demonstrated that IVF success rate in couples infected with *U. urealyticum* or *M. hominis* was just 7.5%. A history of GTI also can be associated with IVF failure in future.
Method: A systematic search was conducted in scientific databases including PubMed, Scopus, Web of Science and Google Scholar from 2015 to 2025.
Results: GTIs are one of the main causes of IVF failure and subjects who test positive for bacterial infection have approximately 50% lower pregnancy rates than subjects who test negative for bacterial infection.
Conclusion: GTIs strongly affect IVF outcome and presence of >2 bacterial pathogens in genital tract is highly associated with IVF failure. Meanwhile there is a significant association between *Mycoplasma, chlamydia* co-infection and IVF failure, therefore screening for GTIs is recommended before IVF treatment.
Keywords: In Vitro Fertilization, IVF Failure, Genital Tract Infections, Infertility, Bacterial Infections

SP158, Individual and synergistic effects of vericiguat with estrogen on metabolic parameters in ovariectomized rats with dietary obesity

Azadeh Shahrokhi Raeini[1], Mohammad Khaksari[2], Hamideh Bashiri [3], Fatemeh Majidpour[4], Fatemeh Marani[5]

1. Student Research Committee, Afzalipour Faculty of Medicine, Kerman University of Medical Sciences, Kerman, Iran
2. Endocrinology and Metabolism Research Center, Institute of Basic and Clinical Physiology Sciences, Kerman University of Medical Sciences, Kerman, Iran
3. Neuroscience Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
4. Modeling in Health Research Center, Institute for Futures Studies in Health, Kerman University of Medical Sciences, Kerman, Iran
5. Department of Physiology, Faculty of Medicine, Kerman University of Medical Sciences, Kerman, Iran

Background: The sGC–cGMP/PKG signaling pathway plays an important role in regulating metabolic homeostasis, which is disrupted in obesity and menopause. Vericiguat (VER) is a drug that can enhance this pathway. This study investigated the individual and synergistic effects of VER with estrogen on metabolic parameters in ovariectomized rats with high-fat diet–induced obesity.

Methods: In this study, adult female Wistar rats were divided into two groups: sham and ovariectomized (OVX). After ovariectomy, the animals were fed either a standard diet (SD) or a 60% high-fat diet (HFD) for 4 months. Afterward, the animals in both groups received 17-β estradiol (E2) or VER at two doses (low and high) alone or in combination with estrogen for 1 month. At the end of the study, metabolic parameters were measured.

Results: Ovariectomy increased body weight, body mass index, visceral fat percentage, and blood glucose, and HFD exacerbated these changes. E2 reduced these indices in OVX animals under both diets. Vericiguat significantly improved these indices, and its effects were not significantly different from those of E2. Furthermore, VER in combination with E2 enhanced these protective effects.

Conclusion: Our data showed that VER, in addition to improving metabolic disorders induced by OVX and HFD, potentiated the effects of estrogen when used in combination with E2. Therefore, this drug may be considered a potential substitute for E2 in conditions of estrogen deficiency, such as menopause and obesity.

Keywords: Obesity, 17 β-estradiol, High-fat diet, OVX rats, Vericiguat

SP159, Effect of gallic acid on sex hormones and oxidative stress parameters in testicular injury induced by torsion/detorsion in rats

Maryam Saboorirad[1], Ahmad Muhammad Hossein[1], Mohammad Amin Edalatmanesh[1]
1. Department of Biology, Shi. C., Islamic Azad University, Shiraz, Iran

Background: Testicular torsion is a urological disorder due to spermatic cord rotation and a cause of male infertility that can lead to oxidative stress. The present study evaluated the effect of gallic acid (GA) on pituitary-gonadal axis sex hormones and oxidative stress parameters after testicular torsion/detorsion (T/D) in rats.
Methods: 30 male Wistar rats were randomly assigned to 5 groups of 6: control, sham surgery, T/D+Saline, T/D+GA50, and T/D+GA100. To induce T/D, the spermatic cords were rotated 720 degrees clockwise and reperfusion was performed for 4 hours. GA gavage was performed for 28 days. Testicular levels of malondialdehyde (MDA), glutathione peroxidase (GPx), superoxidase dismutase (SOD), catalase (CAT) and serum levels of sex hormones (LH, FSH and testosterone) were measured. Histopathological evaluation of the testes was also performed.
Results: Pathological confirmation of Oligoasthenoteratozoospermia (OAT) was performed in the T/D groups before treatment. Compared to the sham surgery group, the GA-treated groups significantly increased GPx, SOD, CAT, LH, FSH and testosterone levels, and the MDA level was significantly decreased. Improvement of the testicular histological structure and spermatogenesis were observed in the GA-treated groups.
Conclusion: GA treatment can dose-dependently reduce torsion/detorsion-induced testicular damage by ameliorating the antioxidant system.
Keywords: Gallic acid, Oxidative stress, Spermatogenesis, Reperfusion injury, Rat

SP160, Effect of exosomes extracted from PRP on sperm quality after freezing and thawing in patients with asthenoteratozoospermia

Fatemeh Karimi[1], Samad Nazemi[1] and Sareh Karimi[2]
1. Student Research Committee, Sabzevar University of Medical Sciences, Sabzevar, Iran
2. Department of Anatomy and Cell Biology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Infertility is one of the major challenges in today's societies that has affected millions of couples. According to the definition of the World Health Organization, infertility is known as the inability of couples to conceive after one year of regular, unprotected sexual intercourse. In this regard, clinicians and scientists recommend that people pay attention to fertility preservation. Fertility preservation in men is critical, and sperm freezing is an effective method in this regard, although it may have some side effects. This study investigates the effect of PRP-derived exosomes on the quality and viability of frozen sperm in men with asthenoteratozoospermia.
Methods: Semen collection of 45 men with asthenoteratozoospermia, who had been referred to the Infertility Center of Imam Reza Hospital, Mashhad for spermogram testing; divided into 3 groups: freezing without intervention (Control), incubation with exosomes one hour before freezing (Exo/Before), incubation with exosomes one hour after thawing (Exo/After). Finally, sperm parameters, including motility, morphology, chromatin maturation, DNA fragmentation, and oxidative stress, were evaluated in all samples.
Results: In this study, it was observed that in the group incubated with exosomes before freezing (Exo/Before), sperm motility was higher than control and other groups. Also, the amount of DNA fragmentation and the level of oxidative stress in the Exo/Before group were significantly lower than other groups.
Conclusion: Based on the present study, incubating semen with exosomes for about 1 hour before freezing can not only protect sperm from oxidative stress, but also improve some sperm parameters, such as motility and DFI, in men with asthenoteratozoospermia.
Keyword: Exosome, PRP, Sperm and asthenoteratozoospermia

SP161, Protective Effects of Hydrogen-Rich Water on Biochemical Parameters of Spermatogenesis in High-Fat Diet Rats

Seyyedeh Zahra Asghari[1], Mohammad Hossein Rigi[1], Elaheh Eshtad[1], Seyedeh Elnaz Nazari[1,3], Akram Aminian[1,4], Khatereh Kharazmi[1], Fereshteh Asgharzadeh[1], Amir Avan[2,5], Seyed Mahdi Hassanian[2,6], Tyler W. LeBaron[7,8], Majid Khazaei[1,2]

1. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Science, Mashhad, Iran
2. Metabolic Syndrome Research Centre, Mashhad University of Medical Science, Mashhad, Iran
3. Student research committee, Mashhad University of medical sciences, Mashhad, Iran
4. Department of Physiology and Pharmacology, Afzalipour Faculty of Medicine, Kerman University of Medical Sciences, Kerman, Iran
5. Molecular Medicine Group, Department of Modern Sciences and Technologies, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
6. Department of Medical Biochemistry, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
7. Department of Kinesiology and Outdoor Recreation, Southern Utah University, Cedar City, UT, USA 84720.
8. Molecular Hydrogen Institute, Cedar City, UT., USA 84721

Background: Obesity is a chronic, multifactorial disease strongly associated with male reproductive dysfunction, including secondary hypogonadism. Hormonal imbalances such as elevated leptin, which suppresses Leydig cell activity and testosterone synthesis, and increased estrogen, which reduces testicular size and sperm quality, contribute to impaired spermatogenesis. Additionally, excess adipose tissue elevates testicular temperature, leading to oxidative stress. Sperm cells are particularly vulnerable to oxidative damage due to limited antioxidant defenses. Therapeutic strategies that reduce oxidative stress, including antioxidants and lifestyle modifications, may help alleviate obesity-related infertility. Hydrogen-rich water (HRW), containing dissolved molecular hydrogen (H_2), has high tissue diffusibility and interacts with reactive oxygen species (ROS), exerting protective antioxidant effects. This study evaluated HRW's potential to improve reproductive hormones and oxidative stress markers in high-fat diet (HFD)-induced obese rats.

Methods: Thirty male Wistar albino rats were divided into three groups: Control (standard diet), Obese (HFD), and HRW (HFD plus HRW from week 6). After 16 weeks, serum testosterone, LH, and FSH were measured, and testes and epididymides were analyzed for malondialdehyde (MDA), superoxide dismutase (SOD), and total thiol concentrations.

Results: Results showed no differences in FSH among groups. HFD rats exhibited significantly reduced LH and elevated MDA, alongside decreased SOD and thiol levels. HRW treatment restored LH, reduced MDA, and enhanced antioxidant markers.

Conclusion: In conclusion, HRW mitigates oxidative damage, strengthens antioxidant defenses, and supports spermatogenesis, suggesting its promise as a therapeutic approach for obesity-related male infertility.

Keywords: Obesity, Hydrogen-Rich Water, Spermatogenesis, Testis

SP162, Exploring the effects of Urolithin B on the critical mechanisms of metastasis and angiogenesis in triple-negative breast cancer

Saeide Mansoori[1], Seyed Isaac Hashemy[2], Moein Eskandari[1], Azar Khorrami[3], Masoud Homayouni[4] Atefeh Ghahremanloo[1]

1. Department of Clinical Biochemistry, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Surgical Oncology Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
3. Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
4. Department of Biology, Mashhad Branch, Islamic Azad University, Mashhad, Iran

Background: Breast cancer (BC) remains a major contributor to cancer-related mortality among women worldwide, with its incidence steadily increasing. Urolithin B (UB), a bioactive metabolite of ellagic acid, has recently gained attention due to its promising anticancer potential.
Methods: A xenograft mouse model was used to evaluate the effects of UB on tumor growth, vascularity, and necrosis. Additionally, the expression levels of VEGF, VEGFR, MMP-2, and MMP-9 were analyzed, and oxidative stress markers including total thiol content, superoxide dismutase (SOD), catalase (CAT), and malondialdehyde (MDA) were measured in tumor tissues.
Results: In vivo, UB suppressed tumor growth, enhanced necrosis, and reduced tumor vascularization. It also downregulated VEGF, VEGFR, MMP-2, and MMP-9 expression, confirming its anti-angiogenic and anti-metastatic effects. Additionally, UB improved antioxidant status by increasing total thiol content, superoxide dismutase (SOD) and catalase (CAT) activities, and decreasing malondialdehyde (MDA) levels in tumor tissues.
Conclusion: UB demonstrated significant anti-tumor, anti-angiogenic, anti-metastatic, and antioxidant effects in vivo, highlighting its potential as a safe and promising candidate for further preclinical and clinical studies in breast cancer management.
Keywords: Breast cancer, Urolithin B, Metastasis, Angiogenesis

SP163, Redox-dependent functional plasticity of the cardiovascular system under metabolic, toxic, and ischemic stress

Mohammad Badavi
Department of Physiology, School of Medicine, Ahvaz Jondishapur University of Medical Sciences, Ahvaz, Iran

Background: Functional impairment of the cardiovascular system often precedes structural remodeling and represents a sensitive indicator of early disease. Oxidative stress disrupts endothelial, smooth muscle, and myocardial signaling, contributing to vascular and cardiac dysfunction across metabolic, toxic, and ischemic contexts. Here, experimental studies across multiple vascular beds and organ systems illustrate the mechanistic role of redox imbalance in cardiovascular functional plasticity.
Results: In diabetic models, impaired endothelium-dependent vasodilation in mesenteric and coronary microcirculation reflects disruption of nitric oxide– and prostaglandin-mediated signaling. Restoration of vascular responsiveness through combined physiological conditioning and polyphenol-based interventions highlights the reversibility of endothelial dysfunction and reveals synergistic mechanisms governing vascular adaptation. Conduit arteries exhibit relative resilience, underscoring regional heterogeneity in redox sensitivity.
Metabolic stress also impairs vascular smooth muscle calcium handling, contributing to endothelium-independent changes in tone, as observed in fructose-induced hypertension models. Extending these principles, myocardial ischemia/reperfusion injury demonstrates that combined redox modulation and kinase signaling stabilization improve cardiac mechanical performance and calcium-handling gene expression. Acute renal ischemia/reperfusion further induces remote myocardial oxidative stress through suppression of Nrf2-mediated antioxidant defenses, illustrating organ cross-talk in redox-mediated cardiovascular dysfunction.
Conclusion: Collectively, these studies support a unified physiological framework in which oxidative stress modulates cardiovascular functional responsiveness across vessels and heart. Functional assessments of endothelial, smooth muscle, and myocardial responses serve as sensitive mechanistic readouts, providing translational insight into early disease and potential intervention targets. These findings reinforce the value of integrating classical functional physiology with modern redox-centered perspectives in cardiovascular research.

SP164, Hypertension treatment: a comprehensive review of the 2025 AHA/ACC guidelines

Seyed Hadi Mousavi[1], Omid Fakharzadeh Moghadam[2]
1.Pharmacological Research Center of Medicinal Plants, Basic Sciences Research Institute, Mashhad
2. University of Medical Sciences, Mashhad, Iran Department of Pharmacology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: The management of hypertension continues to evolve, shifting from a purely hemodynamic focus to a comprehensive Cardiovascular-Kidney-Metabolic (CKM) approach. The 2025 American Heart Association (AHA) and American College of Cardiology (ACC) guidelines update the 2017 recommendations to reflect emerging evidence in risk assessment, pharmacotherapy and interventional strategies.
Methods: This review synthesizes key updates from the 2025 AHA/ACC Guideline for the Prevention, Detection, Evaluation and Management of High Blood Pressure in Adults. Critical changes in diagnostic criteria, risk stratification tools (specifically the transition to PREVENT™ equations) therapeutic algorithms and management of special populations were identified and analyzed in the context of recent clinical trials and epidemiological data.
Results: The 2025 guidelines replace the Pooled Cohort Equations with the PREVENT™ calculator establishing a new treatment. threshold of ≥7.5% 10year total cardiovascular disease (CVD) risk for patients with Stage 1 hypertension. Universal treatment targets are simplified to <130/80 mm Hg for most adults. Significant pharmacological shifts include the lowering of the treatment threshold in pregnancy to ≥140/90 mm Hg the prioritization of single pill combinations (SPCs) to combat therapeutic inertia and the introduction of renal denervation as a Class IIb adjunctive therapy for resistant hypertension.
Conclusion: The 2025 guidelines emphasize precision medicine through improved risk prediction and earlier more aggressive intervention in high-risk populations. Implementation of these updates is expected to optimize cardiovascular outcomes by addressing the holistic CKM risk profile of hypertensive patients.
Keywords: Hypertension, Antihypertensive agents, Risk assessment, Practice guidelines

SP165, Assessment of sleep disturbance in patients with coronary artery disease: emphasis on interview-administered sleep questionnaire and circadian melatonin profiling

Roya Hosseini[1], Nayere Askari[2], Motahareh Hatami[3]
1. Department of Biology, Faculty of Sciences, Shahid Bahonar University of Kerman, Kerman, Islamic Republic of Iran
2. Immunoregulation Research Center, Shahed University, Tehran, Islamic Republic of Iran
3. Tehran Heart Center, Tehran University of Medical Sciences

Background: Sleep disturbances are increasingly recognized as contributing factors in the development and progression of coronary artery disease (CAD). Objective assessment of circadian rhythm through melatonin profiling, combined with structured clinical sleep evaluation, may provide deeper insight into mechanisms linking sleep disruption with cardiovascular pathology. This study aimed to assess sleep disturbances in CAD patients with an emphasis on methodological procedures involving patient evaluation and timed melatonin sampling.
Methods: Of 1,259 patients referred for coronary angiography, 240 eligible individuals were enrolled. Each participant underwent a structured, in-person clinical sleep interview conducted in a controlled-light environment. Sleep quality and patterns were assessed using validated questionnaire (PSQI), along with additional items on nocturnal habits, light exposure, medication use, caffeine intake, and shift-work history. Behavioral and psychophysiological factors related to stress and daily routines were documented to control for confounding variables. Timed blood sampling was performed to characterize circadian melatonin rhythm: a night sample collected at 23:00 under dim-light conditions (<10 lux) after a 30-minute dark adaptation, and a day sample obtained at 08:00 under natural light. Patients were accompanied through low-illumination areas to avoid melatonin suppression. Samples were immediately centrifuged, and serum was stored at −80°C.
Results: Patients with sleep disturbances exhibited markedly reduced nocturnal melatonin levels and increased day/night melatonin ratios. These circadian alterations were associated with greater angiographic severity.
Conclusion: Combining structured sleep interviews with circadian melatonin profiling provides a robust approach for detecting circadian disruption in CAD patients and may enhance cardiovascular risk assessment.
Keywords: CAD, Sleep disturbance, Melatonin, Blood sampling, PSQI.

SP166, Effect of Pardihan® syrup on immune thrombocytopenic purpura (ITP)

Mohsen Naseri[1,2,3], Razieh Jafari Hajati[1], Jalaledin Shams[4], Anoshirvan Kazemnjad[5], Fatemeh Alijaniha[1], Alireza Rahmani[6]

1. Traditional Medicine Clinical Trial Research Center, Shahed University, Tehran, Iran
2. Department of Traditional Medicine, School of Persian Medicine, Shahed University, Tehran, Iran
3. Hikmat, Islamic and Traditional Medicine Department, The Academy of Medical Sciences, Tehran, Iran
4. Hematology-Oncology Unit, Internal Medicine Department, Shahed University, Tehran, Iran
5. Department of Biostatistics, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran
6. Student Research Committee, Faculty of Public Health, Iran University of Medical Sciences, Tehran, Iran

Background: immune thrombocytopenia (ITP) is an acquired autoimmune condition that causes platelet destruction and impedes their generation. Pardihan® syrup is a natural product, we investigate the effect of this syrup in enhancing blood parameters in patients with ITP.
Methods: This study was a double-blind, randomized pilot clinical trial involving 42 patients with ITP (n=21 in each group). Participants consumed for four weeks. Complete blood counts (CBCs) were obtained at baseline and subsequently repeated at weeks 2, 4, and 6.
Results: Thirty-three patients completed the study in the syrup group, platelet count significantly increased from $108\times10^3/\mu l$ to $130\times10^3/\mu l$ (P=0.001) and these changes were significant compared to the control group. White blood cell (WBC) count and absolute neutrophil count (ANC) also showed significant increases (P = 0.011 and P = 0.010, respectively).
Conclusion: Considering the favorable safety profile of Pardihan® herbal syrup and the absence of adverse effects observed during the intervention, the findings suggest that this formulation may significantly improve blood parameters particularly platelet countin in ITP patients.
Keywords: Thrombocytopenia (ITP), Platelets, Persian medicine (PM)

SP167, Injection of resistin into paraventricular nucleus produced cardiovascular responses by stimulation of glutamatergic transmission within rostral ventrolateral medulla

Abolfazl Akbari[1, 2], Gholamali Jelodar[1], Khadijeh Nasiri[2]
1. Department of Physiology, School of Veterinary Medicine, Shiraz University, Shiraz, Iran
2. Exercise Physiology Department, Sports Sciences Faculty, University of Mazandaran, Babolsar, Mazandaran Province, Iran

Background: A high level of resistin (a 12.5KDa cysteine-rich polypeptide) is associated with obesity, insulin resistance, and cardiovascular disorders such as hypertension. The paraventricular Nucleus (PVN) is involved in metabolic disorders and cardiovascular diseases, such as hypertension. Therefore, this study aimed to evaluate the cardiovascular responses of resistin injected into the lateral ventricle (LV) and the PVN and determine the mechanisms involved in producing cardiovascular responses in the rostral ventrolateral medulla (RVLM).
Methods: Adult Wistar male rats were anesthetized with urethane (1.4 g/kg intraperitoneally). Arterial pressure (AP) and heart rate (HR) were evaluated before and after all injections. This study was carried out in two stages, at the first stage, resistin was injected into the LV, AP, and HR were monitored, then the paraventricular, supraoptic, and dorsomedial nuclei of the hypothalamus were chosen to evaluate the gene expression. Afterward, resistin was injected into PVN, and cardiovascular responses were monitored. Then to detect possible neural mechanisms of resistin action, agonists or antagonists of glutamatergic, GABAergic, cholinergic, and aminergic transmissions were injected into the RVLM.
Results: Resistin injection into LV or PVN could increase AP and HR compared to the control group and before its injection. Resistin increases the activity of RVLM, paraventricular, supraoptic, and dorsomedial areas.
Conclusion: It can be concluded that the paraventricular, supraoptic, and dorsomedial nuclei of the hypothalamus are important central areas for resistin actions, and the cardiovascular response generated by resistin injection into PVN may be mediated by glutamatergic transmission within RVLM.
Keywords: Resistin, Paraventricular nucleus, Cardiovascular responses, Glutamatergic transmission, Rostral ventrolateral medulla

SP168, SARS-CoV-2–related vascular and inflammatory markers

Zohreh Arab[1], Seyed Abdolrahim Rezaee[2], Saeed Niazmand[1]
1. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Immunology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: A number of different viral species are known to have effects on the endothelium. For example, coronaviruses cause respiratory diseases and bind to receptors found within the endothelium. The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) that causes the coronavirus disease 2019 (COVID-19) is highly infectious. It binds to angiotensin-converting enzyme-2 (ACE-2), which is expressed in many cell types, particularly in the lung, including endothelial cells. Thus, molecular interaction of SARS-CoV-2 with the ACE2 receptor located in the endothelial cell surface, either at the pulmonary and systemic level, leads to early impairment of endothelial function. To determine whether endotheliopathy occurs in patients with COVID-19, markers of endothelial damage were assessed in COVID-19 patients after admission to the intensive care unit (ICU).
Methods: In a case- control study, 34 patients with COVID-19 (17 SARS-CoV-2 alpha and 17 SARS-CoV-2 omicron) were admitted to the ICU, with SARS-CoV-2 reverse transcription quantitative polymerase reaction (RT-qPCR) positive test, and 40 outpatients without COVID-19 who were admitted to the bronchoscopy department, with SARS-CoV-2 RT-qPCR negetive test, were included for comparison. The primary inclusion criteria for clinicians to ask for sampling were the absence of diabetes and cardio vascular diseases and age 30–80 years' old. Five ml of tracheobronchial secretions from all patients were collected to check the expression of ICAM-1, VCAM-1, Nrf2, NOX2, vWF and iNOS genes via qRT-PCR, TaqMan and SYBR Green assay.
Results: SARS-CoV-2 increased expression of ICAM-1, VCAM-1, NOX2, vWF and iNOS and decrease Nrf2 gene expression.
Conclusion: The initiation of a cytokine storm by the virus along with infection of endothelial cells may lead to structural and functional changes in many organs including the lungs, heart, liver and kidney.
Keywords: COVID-19, SARS-CoV-2, Endothelial dysfunction, Inflammation, Oxidative stress

SP169, Preclinical evaluation of *Tranexamic acid* prophylaxis to reduce intra-abdominal haemorrhage after surgically induced hepatosplenic trauma

Mehdi Mashayekh[1], Mohammad Ali Helforoush[2], Amirhossein Karimi[1], Reyhaneh sadat Mirbahaeddin[3]
1. Department of Clinical Sciences, Faculty of Veterinary Medicine, Ga.C., Islamic Azad University, Garmsar, Semnan, Iran
2. Department of Phytopharmaceuticals, School of Pharmacy, Shiraz University of Medical Sciences, Shiraz, Iran
3. Department of Surgery, Faculty of Veterinary Medicine, Kaz.c., Islamic Azad University, Kazerun, Fars, Iran

Background: Intra-abdominal haemorrhage from hepatic or splenic lacerations, a challenge in both trauma and elective surgery, can be mitigated by *Tranexamic acid* (TXA) an antifibrinolytic agent that inhibits fibrinolysis and stabilises clot formation. This study investigates prophylactic intravenous (IV) and topical TXA in a translational rodent model of hepatic and splenic trauma.
Methods: Twenty anaesthetised adult rats were subjected to standardised lesions of the left hepatic lobe and spleen and randomised into four groups (n = 5/group): prophylactic IV TXA, topical TXA, combined IV and topical TXA, or control (no TXA). Intraperitoneal blood loss was measured volumetrically, and time to haemostasis recorded. Blind outcome evaluation; IACUC /ARRIVE compliance.
Results: Combined IV and topical TXA yielded the lowest blood loss (mean ± SD 2.3 ± 0.4 mL) versus control (5.6 ± 0.8 mL; $p < 0.001$), IV only (3.8 ± 0.5 mL; $p = 0.02$) and topical only (4.0 ± 0.6 mL; $p = 0.03$). Both single-route TXA regimens also reduced bleeding versus control ($p < 0.01$). Time to haemostasis was shorter with combined TXA than IV only, topical only or control ($p < 0.05$), indicating an additive haemostatic effect.
Conclusion: Combined prophylactic IV and topical TXA significantly improved haemostatic control in this translational model. These findings suggest dual-route TXA may benefit high-risk abdominal surgeries (e.g. hepatic resection, splenectomy or trauma laparotomy), potentially reducing intraoperative blood loss and transfusion requirements.
Keywords: *Tranexamic* a*cid*, Hemostasis, Abdominal hemorrhage.

SP171, Myrtenol and pulmonary complications: Simple and niosomal, systemic and inhalational applications and its mechanisms of actions

Hamid Najafipour[1], Mohammad Amin Rajizadeh[2], Mohammad Hadi Nematollahi[3], Gholamreza Sepehri[4], Mitra Samareh Fekri[1], Farzaneh Rostamzadeh[5], Elham Jafari[6], Mohammad Abbas Bejeshk[7], Sedigheh Amiresmaili[7]

1. Cardiovascular Research Center and Department of Physiology, Kerman University of Medical Sciences, Kerman, Iran
2. Physiology Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
3. Applied Molecular and Cellular Research Center, and Department of Biochemistry, Kerman University of Medical Sciences, Kerman, Iran
4. Endocrinology and Metabolism Research Center and Department of Physiology, Kerman University of Medical Sciences, Kerman, Iran
5. Gastroenterology and Hepathology Research Center and Department of Physiology, Kerman University of Medical Sciences, Kerman, Iran
6. Stem cell and pathology research center and department of physiology, kerman University of medical sciences, Kerman, Iran
7. Department of Physiology, Bam University of Medical Sciences, Bam, Iran

Background: Myrtenol is a natural compound found in essential oils of some plants, such as Myrtus communis and Allium sativum. It has been studied for its potential anti-inflammatory, antioxidant properties. During the last 7 years, we have focused on investigating ameliorating effect of myrtenol on different diseases models, such as allergic asthma, cigarette smoke–induced COPD, lung ischemia-reperfusion injury (LIRI), cognitive disorders following asthma, and on urethane-induced atypical adenomatous hyperplasia (AAH), as a forerunner of pulmonary adenocarcinoma. We tested its simple and synthetic loaded-niosome forms both in intraperitoneal and inhalational administered routs, and compared it with currently standard drugs used in clinic, budesonide and dexamethasone.

Results: Overall, Inhalation of niosomal myrtenol ameliorated inflammation, oxidative stress and inhibited tissue remodeling, airway smooth muscle thickening, inflammatory cell infiltration, and goblet cell hyperplasia in asthmatic animals more potently than simple myrtenol. It reduced pulmonary neutrophil and eosinophil infiltration, downregulated pro-inflammatory cytokines IL-6, TNF-α, and mitigated histologic airway remodeling and apoptosis in asthma. Inhalation of the niosomal myrtenol protected against lung ischemia-reperfusion injury, presumably through the balance between Nrf2/Keap1 and NF-κB pathways. Myrtenol improved spatial learning, memory, synaptic plasticity impairments, and anxiety-like behaviors following asthma, by inflammation suppression and increased BDNF, and decreased IL-1β levels and NFκB expression in the hippocampus. It also decreased hyperplasia progression by reducing Bcl-2, IL-10, p53, and Ki67, and normalization of the activity of MDA, TAC, GPX, and SOD in the lung.

Keywords: Myrtenol, Niosomes, Allergic asthma, Lung IR injury, Hyperplasia, COPD, Nrf2/Keap1 pathway, NF-κB pathway, MDA, SOD, GPx, Cytokines, Cognition, LTP, BDNF, Urethane, Apoptosis

SP172, The evaluation characterization, cytotoxicity, and antibacterial activities of amorphous calcium phosphate nanoparticles produced through green synthesis of pomegranate peel extract

Sima Beigoli[1]
1. Applied Biomedical Research Center, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Green synthesis of amorphous calcium phosphate (ACP) has become increasingly popular for dental applications due to its environmental benefits, cost-effectiveness, and sustainability compared to traditional methods. ACP plays a vital role in forming dental enamel and dentin, making it essential in restorative dentistry. Using eco-friendly solvents and renewable resources, such as natural extracts like pomegranate peel, improves the biocompatibility and bioactivity of ACP, enhancing its effectiveness in tooth remineralization and repair.
Methods: The nanoparticles synthesis using Pomegranate Peel Extract has been identified by employing X-ray diffraction (XRD), zeta potential, dynamic light scattering (DLS), fourier transform infrared (FTIR) spectroscopy, and field emission scanning electron microscopy (FESEM).
Results: The study measured a zeta potential of -20.49 mV, indicating particle stability and desorption. The synthesized sample's average size in aqueous solution was approximately 278±63 nm, as determined by DLS. X-ray diffraction confirmed the presence of ACP structure, while FTIR spectroscopy analyzed the optical properties of the calcined powders. Cytotoxicity tests on KB cell lines demonstrated high cell survival rates, highlighting the nanoparticles' biocompatibility. These findings suggest that the enhanced antibacterial and biocompatible properties of the ACP nanoparticles could facilitate their use in developing advanced self-sterilizing fabrics, antibacterial coatings, and healthcare products that promote cell viability.
Conclusion: Overall, the use of green synthesis methods for ACP in dental zones holds great promise for advancing the field of restorative dentistry in a more sustainable and efficient manner.
Keywords: Antibacterial activities, amorphous calcium phosphate, Pomegranate peel extract, Cytotoxicity

SP173, The effects of Myrtenol inhalation on inflammatory and oxidative indices in lung tissue of cigarette smoked induced lung injury model

Mohammad Amin Rajizadeh[1], Soheil Pardakhti[2], Hamid Najafipour[3]
1. Physiology Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
2. Neuroscience research center, institute of neuropharmacology, Kerman University of medical sciences, Kerman, Iran
3. Cardiovascular Research Center and Department of Physiology, Kerman University of Medical Sciences, Kerman, Iran

Background: Lung damage caused by cigarette smoke can cause irreversible damage to the lungs and ultimately lead to diseases such as COPD and lung cancer. Cigarette smoke can cause inflammation and oxidative stress in lung tissue. Myrtenol, as one of the main components of the plant in question, has had significant therapeutic effects in respiratory disorders including asthma. This study investigated the effects of myrtenol on cigarette smoke-induced lung damage in rats.
Methods: In this study, 24 male rats were divided into 4 groups of 6 as follows: 1. Control group or healthy animals. 2. CS group or animals exposed to cigarette smoke for 4 weeks. 3. Treatment group or animals exposed to 50 mg of myrtenol by inhalation for 1 week after 4 weeks of cigarette smoke exposure. 4. Positive control group or animals exposed to 1 week of budesonide by inhalation after 4 weeks of cigarette smoke exposure. Finally, the animals were sacrificed and the levels of inflammatory cytokines TNF and IL-10 in the lung tissue of the animals were evaluated using the ELISA technique. The levels of oxidant and antioxidant factors in the lung tissue were also examined.
Results: The results of this study showed that exposing animals to cigarette smoke for 4 weeks caused inflammation and oxidative stress in the animals' lungs. Inhalation of myrtenol for 1 week had significant anti-inflammatory and antioxidant effects in the animals' lungs.
Conclusion: Inhaled myrtenol was able to have significant anti-inflammatory and antioxidant effects on lung damage caused by cigarette smoke.
Keywords: Cigarette smoke, lung injury, Myrtenol, Inflammation, Oxidative stress

SP174, Oral egg-derived igy as a novel adjunct therapy for helicobacter pylori-associated peptic ulcers: a randomized clinical trial

Kiaresh Ghazvini
Department of Microbiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: *Helicobacter pylori* is a significant bacterial pathogen that infects approximately 50% of the global population and is a major cause of peptic ulcers and gastric cancer. Current treatments involve a combination of antibiotics and gastric acid inhibitors, but they face challenges such as prolonged treatment duration, high costs, and increasing drug resistance. In recent years, passive immunotherapy, particularly the use of IgY antibodies extracted from egg yolk, has been considered an alternative or complementary approach. These antibodies offer advantages such as low production costs, high antibody titers, and reduced animal aggression. This study aimed to investigate the efficacy of IgY antibodies against *Helicobacter pylori* in a mouse model and clinical trial to assess bacterial load reduction and symptom improvement.
Method: IgY antibodies were extracted and purified from egg yolks of chickens immunized with killed *Helicobacter pylori*. In the animal phase, mice infected with *H. pylori* were treated with IgY, pantoprazole, or a combination of both, and tissue damage and bacterial counts were evaluated. The clinical phase consisted of a randomized, double-blind trial involving 60 patients with *H. pylori* infection, divided into an intervention group (IgY plus standard treatment) and a placebo group (placebo plus standard treatment). Treatment efficacy was assessed using the urea breath test (UBT) and improvement in clinical symptoms, including stomach pain, nausea, anorexia, belching, and bloating.
Results: The results demonstrated that IgY targeting killed *H. pylori* significantly reduced bacterial counts and gastritis severity in infected mice and prevented bacterial colonization in the prevention group ($P < 0.05$). Additionally, combination therapy with IgY and pantoprazole was more effective than monotherapy. In the clinical trial, the median UBT score in the intervention group decreased from 77 to 11 at baseline, while it remained unchanged in the placebo group (median = 55). *H. pylori* eradication rates were 66.7% in the intervention group compared to 40% in the placebo group, though no significant relationship was observed. Due to the small sample size, P-values were not a reliable indicator of significance. Based on the UBT normal range, only one patient in the placebo group worsened, whereas 10 in the intervention group and 4 in the placebo group improved. Clinical symptoms such as stomach pain, nausea, anorexia, belching, and bloating resolved more rapidly in the intervention group, with side effects (e.g., nausea) reported in only two placebo recipients.
Conclusion: IgY antibodies against *H. pylori* represent a safe and effective treatment for reducing bacterial load and alleviating clinical symptoms. However, further studies with larger sample sizes and long-term follow-ups are necessary to confirm these findings. This approach holds particular promise for patients with limited antibiotic access, such as those with immunodeficiencies.
Keywords: Clinical trial, *Helicobacter pylori*, IgY antibody, Peptic Ulcer, clinical symptoms

SP175, Berberine ameliorated monocrotaline-induced pulmonary arterial hypertension with effect on PARP1 expression in rats

Soodeh Rajabi[1], Hamid Najafipour[2], Saeideh Jafarinejad Farsangi[1], Majid Askaripour[3]
1. Physiology Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
2.Cardiovascular Research Center, Institute of Basic and Clinical Physiology Sciences, Kerman University of Medical Science, Kerman, Iran
3. Department of Physiology, School of Medicine, Bam University of Medical Sciences, Bam, Iran

Background: Pulmonary arterial hypertension (PAH) is a vascular disease in the lung characterized by pulmonary vascular remodeling leading to a rise in pulmonary vascular resistance and pressure. Berberine (BBR) is a plant derivative with antioxidant and anti-proliferative properties. We investigated the effect of BBR on vascular remodeling, expression of PARP1, miR-204, and their targets, HIF1α and NFATc2, in experimental PAH.
Methods: Twenty-four rats were divided into control (CTL), MCT, MCT + Veh and MCT + BBR. MCT (60 mg/kg) was injected subcutaneously to induce PAH. BBR (30 mg/kg daily) was administered for 3 weeks after inducing PAH. Lung pathology, expression of miRNA and mRNA, and target proteins were evaluated through H&E staining, real-time qPCR, and western blotting, respectively.
Results: Lung arteriole thickness in the MCT group increased compared to CTL group. BBR reduced arteriole thickness significantly. miR-204 expression decreased in PAH rats ($p < 0.001$). BBR significantly increased miR-204 expression ($p < 0.001$). Expression of PARP1,
HIF1α, and NFATc2 mRNA increased significantly in MCT + veh rats (all $p < 0.001$), and these were reduced after treatment with BBR ($p < 0.01$). BBR also recovered the increased expression of PARP1, HIF1α, and NFATc2 proteins that had increased in MCT + Veh group.
Conclusion:
BBR improved PAH possibly by affecting the expression of PARP1 and miR-204 and their downstream targets, HIF1a and NFATc2. BBR may be therapeutic goals in the treatment of PAH.
Keywords: pulmonary arterial hypertension, berberine, PARP1, miR-204

SP176, The Effects of the Qigongwan Herbal Compounds on Polycystic Ovary Syndrome: A Molecular and Network Pharmacology Investigation

Maziar Erfani[1], Sepideh Foji[1], Bahareh Saeedi[1], Neda Dehghan[1], Yegane Dehghan[1], Mahboubeh Derakhshani[1]
1. Department of biology, Kavian Institute of Higher Education, Mashhad, Iran

Background: *Polycystic ovary syndrome (PCOS)* is one of the most common endocrine in women, affecting approximately 8–25% of women of reproductive age. According to the Rotterdam criteria, this disorder is defined by the presence of hyperandrogenism, oligo-ovulation, and *polycystic ovarian morphology*. Furthermore, *Insulin resistance*, observed in nearly 75% of patients, plays a key role in the *pathophysiology* of *PCOS* and is associated with *dyslipidemia*, *metabolic syndrome*, and an increased risk of type 2 *diabetes*.
Methods: Although multiple pharmacological treatments are available for *PCOS*, no single therapeutic approach is effective for all phenotypes. *Metformin*, widely used as an *insulin-sensitizing* medication, is limited by the prevalence of its gastrointestinal side effects. In recent years, increasing attention has been dedicated toward complementary medical approaches such as *Traditional Chinese Medicine (TCM)*, due to its beneficial effects on *hormone regulation*, and enhanced fertility, coupled with fewer adverse effects. The herbal formula *Qigongwan (QGW)* is one of the classical *TCM* prescriptions and has shown promising outcomes in *follicular development*, *hormonal balance*, and *insulin resistance*; however, its underlying molecular mechanisms have not yet been fully elucidated.
Results: Recent advances in bioinformatics, including techniques such as network *pharmacology* and molecular docking, have provided innovative tools for investigating the multicomponent mechanisms of such treatments. Moreover, oxidative stress and dysfunction of granulosa cells have been identified as important contributors to the pathogenesis of *PCOS*.
Conclusion: A deeper understanding of these hormonal, and metabolic pathways may aid in the development of more effective and phenotype-specific therapeutic strategies for *PCOS*.
Keywords: Polycystic ovary syndrome, Qigongwan, Molecular docking, Insulin resistance

SP177, Formulation and evaluation of a boswellia-based nanoemulsion gel for topical treatment of psoriasis

Atena Mansouri[1], Elham Atabati [2], Reihaneh Alsadat Mahmoudian[3,4]
1. Cellular and Molecular Research Center, Birjand University of Medical Sciences
2. Rheumatology Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
3. Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
4. Metabolic Syndrome Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Psoriasis is a chronic inflammatory skin disorder characterized by autoimmune responses. Boswellia serrata (BS) gum resin contains various Boswellic acids (BAs), phytochemical compounds that exhibit notable anti-inflammatory properties. Despite their therapeutic potential, the clinical utility of BAs is hindered by poor systemic absorption due to their hydrophobic characteristics. Nanoemulsion systems—comprising oil, water, and surfactants—can enhance the delivery and skin permeability of lipophilic substances. This study investigates the efficacy of a topical nanoemulsion-based Boswellia gel (BNG) in alleviating psoriasis-like skin inflammation induced by imiquimod (IMQ) in a murine model.
Methods: BALB/c male mice received daily topical applications of IMQ on their right ears for 10 days to induce psoriatic lesions. From day 5 onward, mice were treated with BNG. Clinical indicators such as ear swelling, erythema, scaling, and scratching behavior were recorded. On the final day, skin samples were collected for histological examination using Hematoxylin & Eosin (H&E) and Masson's Trichrome staining to evaluate epidermal thickness, fibrosis, and immune cell infiltration.
Results: IMQ treatment resulted in clear signs of psoriasis-like inflammation by the fifth day. BNG-treated mice showed significant reductions in ear thickness, redness, desquamation, itching, and inflammatory responses compared to untreated controls. Microscopic analysis revealed restored epidermal structure and decreased dermal fibrosis in the treatment group.
Conclusion: Topical administration of the Boswellia nanoemulsion gel effectively mitigated both external symptoms and underlying histopathological changes in the IMQ-induced psoriasis model. These findings highlight BNG as a potential candidate for topical psoriasis therapy.
Keywords: Psoriasis, Boswellia, autoimmune, nanoemulsion

SP178, Effects of polyphenols in green tea *(Camellia sinensis)* in the treatment of coronavirus disease - A systematic review article

Arefeh Salehi[1], Seyed Mohammad Taghi Razavi Toosi[3,2], Rasoul Ghasemi[4]
1. Neurophysiology Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran
2. Medical Biotechnology Research Center, Faculty of Paramedical Sciences, Guilan University of Medical Sciences, Rasht, Iran
3. Cardiovascular Diseases Research Center, Department of Cardiovascular Sciences, Heshmat Hospital, Faculty of Medicine, Guilan University of Medical Sciences, Rasht, Iran
4. Neurophysiology Research Center, Faculty of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: The COVID-19 pandemic, which is caused by a new virus, has affected the lives of human societies. So far, no effective treatment has been found for it. Green tea is produced from the buds and leaves of the Camellia sinensis plant, which has not undergone oxidation and plasmolysis processes. Most of the polyphenols in green tea are catechins, which seem to be effective in treating coronavirus with their antiviral, antioxidant, anti-inflammatory, and immunomodulatory properties.
Methods: PubMed, Scopus and Google scholar databases were reviewed and articles with the key terms "polyphenols", "green tea" and "coronavirus" were searched using MeSH and Boolean operators such as "AND", "OR" and "NO" and 90 articles were selected. In addition, articles before 2000 were excluded. Finally, 30 studies were extracted and included in this review.
Results: In this study, the antiviral activity of green tea polyphenols was investigated.
It has been reported that green tea polyphenols exhibit antiviral activity, especially against single-stranded RNA viruses. The new strain that has caused a global pandemic is a single-stranded RNA coronavirus.
Conclusion: This study reviews reports and evidence for the use of green tea polyphenols as a preventive and therapeutic agent for COVID-19.
Keywords: Green tea, coronavirus, polyphenols, epigallocatechin-3-gallate, COVID-19

SP179, The Effect of Topical Aqueous Extract of Capparis decidua on Second-Degree Burn Wound Healing in Rats

Asma Rashki[1], Farzaneh Farajian Mashhadi[1], Hamid Hafezinouri[2], Abbas Ali Niazi[3]
1. Department of Pharmacology, School of Medicine, Zahedan University of Medical Sciences, Zahedan, Iran
2. Laboratory Animal Research Center, Zahedan University of Medical Sciences, Zahedan, Iran
3. Department of Pathology, School of Medicine, Zahedan University of Medical Sciences, Zahedan, Iran

Background: Second-degree burns present a significant clinical challenge due to delayed healing and risk of infection. This study assessed the wound-healing efficacy of an aqueous extract of Capparis decidua compared with silver sulfadiazine and no treatment in a standardized rat burn model.
Methods: Twenty-four male Wistar rats were randomly divided into three equal groups: negative control (no treatment), positive control (1% silver sulfadiazine), and treatment group (aqueous Capparis decidua extract). Standardized second-degree burns were induced using a heated metal plate on the shaved dorsal surface under anesthesia. Treatments were topically applied once daily for 21 days. Digital wound images were captured on days 1, 7, 14, and 21. Wound surface areas were calculated using ImageJ software.
Results: By day 21, wound contraction was ~29% in the untreated group, 87.6% with silver sulfadiazine, and 92% in the Capparis decidua group. The herbal-treated group exhibited accelerated wound contraction from day 7, as well as earlier granulation tissue formation and visible hair regrowth. These findings indicate superior re-epithelialization and dermal recovery in the Capparis-treated group.
Conclusion: Topical application of aqueous *Capparis decidua* extract significantly promoted healing of second-degree burn wounds in rats, outperforming standard treatment with silver sulfadiazine. The results support its potential development as an effective, affordable, and natural wound-healing agent.
Keywords: Burn wound healing, *Capparis decidua*, Herbal medicine, Silver sulfadiazine, Rat model

SP180, prenatal stress: unraveling the impact on brain development

Mohammad Shabani[1], Moazamehosadat Razavinasab[2], Monavareh Soti[1], Iraj Aghaei[3], Zeynab Pirmoradi[4], Fatemeh Shasavari[1]

1. Kerman Neuroscience Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
2. Department of Physiology and Pharmacology, Afzalipour School of Medicine, Kerman University of Medical Sciences, Kerman, Iran
3. Department of Neuroscience, Neuroscience Research Center, Trauma Institute, Guilan University of Medical Sciences, Rasht, Iran
4. Neuroscience Research Center, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran

Background: Prenatal Stress (PS), caused by distressing events during pregnancy, triggers the endocrine stress response, leading to cognitive deficits and alterations in neural development.
Methods: This review explores animal studies on physical and psychological stressors affecting brain function and structure, which underlie motor and cognitive impairments. The activation of the endocrine stress response due to prenatal stress is associated with cognitive deficits and developmental changes in specific neural regions, with some effects varying by sex. Understanding these changes helps in managing cognitive disturbances.
Results: The impact of PS is influenced by its timing and duration—stress during early gestation disrupts neuronal development, while stress later in pregnancy affects synaptogenesis and myelination. Acute and chronic stressors result in different outcomes, with PS interacting with genetic factors and postnatal influences such as caregiving.
Conclusion: Future research should prioritize identifying PS biomarkers for early detection and intervention. Advances in neuroimaging and epigenetics could elucidate the mechanisms linking PS to long-term neurodevelopmental changes, facilitating targeted therapies to reduce its impact.
Keywords: Prenatal stress, Brain development, Sex differences

SP181, Psychological vs. physical prenatal stress: unique influences on cognitive behavior

Iraj Aghaei[1], Moazamehosadat Razavinasab[2], Mohammad Shabani[3], Monavareh Soti[3], Yasaman Soltani[4]
1. Department of Neuroscience, Neuroscience Research Center, Trauma Institute, Guilan University of Medical Sciences, Rasht, Iran
2. Department of Physiology and Pharmacology, Afzalipour School of Medicine, Kerman University of Medical Sciences, Kerman, Iran
3. Kerman Neuroscience Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
4. PhD Candidate in Nursing, Shahid Beheshti Faculty of Nursing and Midwifery Guilan University of Medical Sciences, Rasht, Iran

Background: Prenatal stress (PS) is recognized as a significant risk factor for cognitive impairments in offspring. This study aimed to investigate the impact of physical and psychological prenatal stress on the cognitive behaviors of male and female offspring during adolescence (postnatal day 40).
Methods: Pregnant female rats were subjected to physical stress (forced swimming) or psychological stress (observing another female rat swimming) from gestational day six for a duration of 10 days. The cognitive effects of these prenatal stressors were assessed in offspring using two behavioral tasks: the Morris water maze (MWM) for spatial learning and memory, and the passive avoidance (PA) task for fear-based learning and memory.
Results: The findings revealed that the type of prenatal stressor and the offspring's sex significantly influenced cognitive outcomes. Both male and female offspring exposed to prenatal physical and psychological stress exhibited deficits in spatial learning and memory. However, PA learning and memory impairments were observed in both sexes, except for female offspring exposed to psychological stress, who showed no significant deficits in PA learning. These results suggest a complex interaction between the type of prenatal stress and sex hormones in shaping cognitive outcomes.
Conclusion: Prenatal physical and psychological stress affects offspring cognitive functions differently by sex, highlighting varying susceptibilities and the potential role of sex hormones. Further research could help mitigate cognitive impairments linked to prenatal stress.
Keywords: Prenatal Stress; physical or Psychological stress, Cognitive behavior

SP182, The role of ldt and vta neuronal hyperexcitability in behavioral and cognitive impairments due to prenatal stress

Moazamehosadat Razavinasab[1], Mohammad Shabani[2], Monavareh Soti[1], Iraj Aghaei[3], Zeynab Pirmoradi[4], Fatemeh Shasavari[1]

1. Department of Physiology and Pharmacology, Afzalipour School of Medicine, Kerman University of Medical Sciences, Kerman, Iran an, Iran
2. Kerman Neuroscience Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerm
3.Department of Neuroscience, Neuroscience Research Center, Trauma Institute, Guilan University of Medical Sciences, Rasht, Iran
4. Neuroscience Research Center, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran

Background: Prenatal stress (PS) increases the vulnerability of offspring to various cognitive and behavioral disorders, including anxiety, memory impairments, and tendencies toward substance abuse.
Methods: This study examines the electrophysiological changes in laterodorsal tegmentum (LDT) cholinergic neurons and ventral tegmental area (VTA) dopamine (DA) neurons, alongside behavioral outcomes in mice exposed to physical or psychological PS during gestation.
Results: Adolescent male offspring of PS-exposed Swiss Webster mice displayed increased locomotor activity, notable anxiety-like behaviors, memory deficits, and a preference for morphine. In LDT cholinergic neurons, exposure to PS resulted in an increased firing frequency, a decreased adaptation ratio, lower action potential thresholds, and heightened excitability. Similarly, VTA DA neurons exhibited elevated Ih current, greater frequency and amplitude of spontaneous excitatory postsynaptic currents (sEPSCs), reduced rheobase, lower firing thresholds, and enhanced spontaneous firing rates. Behavioral assessments—including the open field test, elevated plus maze, passive avoidance test, and conditioned place preference—revealed a strong correlation between these neuronal changes and the observed anxiety, drug-seeking behaviors, and cognitive deficits.
Conclusion: These findings highlight the role of hyperexcitability in LDT cholinergic and VTA DA neurons in contributing to PS-induced behavioral and cognitive impairments, likely mediated through disruptions in the mesocortical and mesoaccumbal pathways.
Keywords: Prenatal stress, Brain development, Laterodorsal tegmentum (LDT), Ventral tegmental area (VTA)

SP183, Hippocampal vulnerability to prenatal stress: insights into sex differences

Monavareh Soti[1], Mohammad Shabani[1], Moazamehosadat Razavinasab[2], Zeynab Pirmoradi[3], Fatemeh Shasavari[1], Iraj Aghaei[4]

1. Kerman Neuroscience Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman
2. Department of Physiology and Pharmacology, Afzalipour School of Medicine, Kerman University of Medical Sciences, Kerman, Iran
3. Neuroscience Research Center, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
4. Department of Neuroscience, Neuroscience Research Center, Trauma Institute, Guilan University of Medical Sciences, Rasht, Iran

Background: Prenatal stress (PS) increases the vulnerability of offspring to various cognitive and behavioral disorders, including anxiety, memory impairments, and tendencies toward substance abuse. The hippocampus, vital for learning and memory, is highly susceptible to PS. The ventral hippocampus regulates stress and emotions, while the dorsal hippocampus governs cognitive functions like spatial memory.

Methods: This review focuses on animal studies examining the sex-specific effects of physical PS on the structure and function of the hippocampus, as hippocampal impairments are likely responsible for PS-related deficits in learning and memory.

Results: PS causes morphological and functional changes in the hippocampus, leading to learning and memory deficits. Sex-specific effects of PS vary by developmental stage: Prepubertal Phase: Males show increased hippocampal dendritic complexity, while females exhibit reductions. Postpubertal Phase: Rising testosterone reverses earlier male changes, reducing dendritic spines in CA1, CA3, and DG subregions, worsening learning deficits and neurogenesis impairments. PS also affects neurotransmitter systems differently: Males: Lower GluA1-4 AMPA receptor subunits, causing cognitive dysfunction. Females: Higher nitric oxide (NO) levels, linked to inflammation and altered hippocampal proliferation.

Conclusion: In summary, PS profoundly impacts offspring brain development, with sex-specific vulnerabilities and long-term effects on mental health and cognition. Understanding these mechanisms is essential for developing prevention and treatment strategies.

Keywords: Prenatal stress, Brain development, Sex differences, Hippocampus, Hypothalamic–pituitary–adrenal axis (HPA), Learning and memory

SP184, The effect of non-specific tactile stimulation on altered responses of neurons in the somatosensory cortex of a rat model with autism induced by valproic acid

Mohammad Reza Afarinesh[1], Bibi Marzieh Ahmadi[1], Mansoure Sabzealizadeh[1], Vahid Sheibani[1]
1. Neuroscience Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran

Background: This study investigated how tactile stimulation influences neural responses in the barrel cortex of male and female mice modeled for autism.
Methods: Autism was induced in *Wistar* rats via prenatal exposure to valproic acid (Val) at embryonic day 12.5. Pregnant females received 600 mg/kg Val or saline as control. After birth, pups were divided into control, Val, and Val-TS groups, with the latter receiving tactile stimulation (TS) for 21 days. At 28–33 days old, neuronal activity in the barrel cortex was recorded in response to whisker displacement using single-unit recordings.
Results: In males, Val and Val-TS groups showed significantly decreased excitatory responses to whisker displacement compared to controls ($P< 0.05$). Females exposed to Val exhibited increased OFF responses, which normalized with TS treatment. ON responses in females of both Val and Val-TS groups significantly increased following whisker stimulation ($P< 0.05$). Analysis of inhibitory responses using the Conditioning Test Ratio (CTR) revealed that TS significantly affected both ON and OFF responses in layer IV, with Val-TS groups showing higher CTR than control and Val groups across sexes ($P< 0.05$). Similar trends appeared in layer V, where higher CTRs were noted in males of the Val-TS group; no significant changes were observed in females.
Conclusion: Neural responses in the barrel cortex are modulated by sex and treatment conditions, underscoring the complexity of sensory processing in autism models. The findings highlight sex-dependent neural adaptations and suggest that tactile interventions may differentially influence neural excitability and inhibition.
Keywords: Autism, tactile stimulus, Barrel cortex, Rat

SP185, Multifaceted approaches to an autism model: from pathophysiology to interventions and risk factors

Farahnaz Taheri[1], Khadijeh Esmaeilpour[2], Gholamreza Sepehri[2], Vahid Sheibani[2]
1. Neurology Research Center, Institute of Neuropharmacology, Kerman University ofMedical Sciences, Kerman, Iran
2. Neuroscience Research Center, Institute of Neuropharmacology, Kerman University ofMedical Sciences, Kerman, Iran

Background: Autism Spectrum Disorder (ASD) is a complex neurodevelopmental disorder with heterogeneous symptoms. This integrated analysis summarizes key findings from six interrelated studies investigating diverse mechanistic and therapeutic aspects in the valproic acid (VPA) rat model of autism.
Methods: The prenatal VPA model (E12.5) was employed. A comprehensive behavioral battery assessed social interaction, spatial and recognition memory, anxiety, and repetitive behaviors. Electrophysiological recordings evaluated hippocampal long-term potentiation (LTP). Pharmacological interventions targeted the histaminergic system (H3R antagonist ciproxifan/CPX and H2R antagonist famotidine/FAM). A non-pharmacological intervention involved chronic exposure to Mozart's sonata K.448. Additional studies investigated transgenerational transmission to the F2 offspring and the synergistic impact of maternal *Toxoplasma gondii* infection.
Results: Prenatal VPA consistently induced core autistic-like deficits: impaired sociability, social and spatial memory, and suppressed hippocampal LTP. CPX (3 mg/kg) robustly ameliorated these cognitive and synaptic impairments via an H2R-dependent pathway. Music intervention independently improved sociability and spatial memory. Notably, autistic-like traits (anxiety, repetitive behavior, memory deficits) were transmitted to the F2 generation, with a pronounced maternal-line effect. Furthermore, maternal toxoplasmosis acted as a synergistic environmental risk factor, exacerbating VPA-induced cognitive deficits in offspring.
Conclusion: This work demonstrates that behavioral deficits in the VPA model stem from impaired synaptic plasticity and are amenable to both targeted pharmacological modulation of the histamine H3R/H2R system and non-pharmacological sensory intervention. The findings underscore a complex multifactorial etiology for ASD, involving dysregulated neural circuits, maternal epigenetic contributions, and gene-environment interactions.
Keywords: Autism spectrum disorder, Valproic acid, Histamine H3 receptor, Music therapy, Transgenerational transmission

SP186, The effect of transcranial direct current stimulation (tdcs) of the temporo-parieto-occipital junction and dorsolateral prefrontal cortex on selected aspects of sensory and cognitive processing in children with autism spectrum disorder

Fatemeh Kazemi[1], Mohammadreza Afarinesh[2], Mansoureh Sabz Alizadeh[2]
1. Neuroscience Research Center, Kerman University of Medical Sciences, Kerman, Iran
2. Neuroscience Research Center and Neuropharmacology Institute, Kerman University of Medical Sciences, Kerman, Iran

Background: Autism Spectrum Disorder (ASD) is a neurodevelopmental condition characterized by impairments in social interaction, accompanied by sensory and cognitive processing deficits. Transcranial direct current stimulation (tDCS) is a non-invasive neuromodulation technique that has been proposed as a complementary intervention for improving neural functioning. While most studies have focused on stimulation of the dorsolateral prefrontal cortex (DLPFC), the temporo-parieto-occipital junction (TPOJ), which plays a critical role in multisensory integration and higher cognitive processing, has received less attention in children with ASD.
Methods: This randomized, double-blind, sham-controlled clinical trial was conducted on children with ASD aged 6–9 years. Participants were randomly assigned to active tDCS over the left DLPFC, active tDCS over the right TPOJ, or corresponding sham groups. Active stimulation was delivered at an intensity of 1.5 mA for 20 minutes per session, five sessions per week for two consecutive weeks. Outcome measures included autism severity assessed by the Gilliam Autism Rating Scale, sensory processing evaluated using the Sensory Profile, and cognitive performance measured through selected CANTAB tasks.
Results: Active DLPFC stimulation resulted in a significant reduction in autism severity compared with baseline and sham stimulation ($p < 0.05$). In contrast, active TPOJ stimulation led to a significant improvement in sensory processing scores ($p < 0.05$). Both stimulation sites demonstrated significant between-group improvements in spatial working memory errors compared with sham groups.
Conclusion: tDCS applied to the DLPFC and TPOJ produced region-specific effects on sensory and cognitive processing in children with ASD, suggesting that targeted cortical stimulation may serve as a promising complementary intervention.
Keywords: Autism spectrum disorder, Transcranial direct current stimulation, Cognitive processing, Sensory processing

SP187, Protective effects of melatonin on prenatal restraint stress induced memory impairment in offspring rats

Ali Hosseini-Sharifabad[1], Mohammad Rabbani[1], Mina Kiaroosta[1]
1. Department of Pharmacology and Toxicology, School of Pharmacy and Pharmaceutical Sciences Research Center, Isfahan University of Medical Sciences, Isfahan, Iran

Background: Pregnant mothers experience different type of stresses which affect the fetus brain physiological processes like memory. Therefore, it is attractive to find the protective agents that are safe in the pregnancy and neutralize the stress induced manifestations. The aim of current study was to investigate the protective effects of melatonin on memory impairment induced by prenatal restraint stress in offspring rats.
Methods: In this experimental study, pregnant rats were randomly assigned to control, restraint stress group and four melatonin treated groups that received 3, 5, 10, and 50 mg/kg of melatonin concomitant with restraint stress. Restraint stress daily induced from 10th to 21st day of pregnancy. Melatonin was daily injected intraperitoneally before the restraint stress. One month after the birth, the memory of offspring was evaluated by measurement of "Discrimination" and "Recognition" indices using Object Recognition Task.
Results: From the data, administration of 3 or 5 mg/kg melatonin did not show significant differences in Discrimination and Recognition indices compared to restraint stress group while injection of 10 or 50 mg/kg of melatonin significantly increased the above indices ($P<0.001$). There is no significant difference in indices values for 10 or 50 mg/kg of melatonin.
Conclusion: The findings showed that prenatal restraint stress induced memory impairment in one month offspring rats. Administration of melatonin in high doses actively prevent restraint stress induced memory impairment.
Keywords: Melatonin, Restraint stress, Memory, Offspring rats, ORT

SP188, Brain injury resulting from inflammation and oxidative stress in animal models of neurodegenerative diseases

Alireza Sarkaki[1], Parisa Habibi[2]
1. Department of Physiology, faculty of Medicine, Islamic Azad University, Ahvaz Branch, Ahvaz, Iran
2. Department of Physiology, faculty of Medicine, Tehran University of Medical Sciences, Tehran, Iran

Abstract: Neurodegenerative diseases are characterized by the progressive degeneration of neurons and the disruption of neural network function. Growing evidence indicates that neuroinflammation and oxidative stress, two key drivers of cellular damage which play pivotal roles in the initiation and progression of neurodegeneration. In animal models of diseases such as Alzheimer's disease, Parkinson's disease, amyotrophic lateral sclerosis (ALS), and multiple sclerosis (MS), the activation of microglia and astrocytes, accompanied by increased production of inflammatory cytokines such as TNF-α, IL-1β, and IL-6, exacerbates neuronal death and synaptic dysfunction. Furthermore, the production of reactive oxygen and nitrogen species, mitochondrial dysfunction, lipid peroxidation, and DNA damage are recognized as hallmarks of oxidative stress in these models. These two processes synergistically create a destructive cycle that accelerates the progression of tissue damage. Studies using various animal models indicate that inhibiting inflammatory pathways, such as NF-κB and the NLRP3 inflammasome, while enhancing antioxidant defense systems, can reduce the severity of neurodegeneration. Overall, animal models serve as vital tools for understanding the complex interplay between inflammation and oxidative stress, providing a valuable platform for the development of novel therapeutic strategies.

Keywords: Neuroinflammation, Oxidative stress, Neurodegeneration, Animal model, Microglia, ROS

SP189, Evaluation of local platelet-rich plasma administration on sensory reinnervation following acellular nerve grafting in sciatic nerve injury

Morteza Behnam-Rassouli[1], Hananeh Ahmadnia[1], Esmail Riahi[2], Ali Moradi[3]
1. Department of Biology, Faculty of Science, Ferdowsi University of Mashhad, Mashhad, Iran
2. Department of Physiology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
3. Orthopedic Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Sciatic nerve injury leads to significant sensory deficits in addition to motor dysfunction, and restoration of sensory function is essential for functional recovery. The use of acellular nerve grafts combined with biological adjuvants such as platelet-rich plasma (PRP) may enhance peripheral nerve regeneration. This study aimed to evaluate and compare the effects of rat acellular nerve allografts (ANA) and chicken acellular nerve xenografts (ANX) combined with local PRP injection on sensory function recovery following sciatic nerve transection in adult male Wistar rats.
Methods: In this experimental study, eighty adult male Wistar rats were randomly divided into eight groups (n = 10): healthy control, negative control (10-mm sciatic nerve gap), ANA + saline, ANA + methylprednisolone (30 mg/kg), ANA + PRP, ANX + saline, ANX + methylprednisolone (30 mg/kg), and ANX + PRP. All grafts were implanted into a 10-mm sciatic nerve defect. Treatments were locally administered in a volume of 500 µl. Sensory behavioral assessments, including responses to mechanical and thermal stimuli, were performed over a 16-week postoperative period.
Results: Local PRP administration significantly enhanced sensory recovery in both ANA and ANX groups compared to saline- and methylprednisolone-treated animals. Rats receiving PRP showed a marked reduction in sensory response thresholds, indicating improved sensory reinnervation across the nerve gap.
Conclusion: These findings demonstrate that acellular nerve grafts effectively support sensory regeneration following sciatic nerve injury, and that local PRP injection markedly accelerates sensory functional recovery. Moreover, chicken acellular nerve xenografts exhibit sensory regenerative potential comparable to rat acellular nerve allografts, suggesting their suitability as an alternative scaffold for peripheral nerve repair.
Keywords: Peripheral nerve injury, Sensory recovery, Acellular nerve grafts, Sciatic nerve regeneration, Platelet-Rich plasma (PRP).

SP190, Electrophysiological evaluation of sciatic nerve regeneration following transplantation of decellularized nerve scaffold and local PRP injection

Esmail Riahi[1], Hananeh Ahmadnia[2], Morteza Behnam-Rassouli[2], Ali Moradi[3]

1. Department of Physiology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
2. Department of Biology, Faculty of Science, Ferdowsi University of Mashhad, Mashhad, Iran
3. Orthopedic Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: The combination of decellularized nerve scaffold and platelet-rich plasma (PRP) is a good alternative for bridging sciatic nerve defects. Therefore, we hypothesized that PRP treatment and transplantation of Acellular Nerve Allograft (ANA) and Acellular Nerve Xenograft (ANX) would work synergistically to promote nerve regeneration.
Methods: The study involved 80 rats divided into eight groups: healthy controls, negative controls, ANA / ANX transplants together with saline, methylprednisolone (30 mg/kg), or PRP. The experimental involved involved transplanting grafts in a 10-mm gap in the sciatic nerve, administering treatments in a 500 µl volume, and conducting electrophysiological evaluations.
Results: Electrophysiological results in the 16th week after surgery showed that the PRP-treated groups achieved significantly higher compound muscle action potential (CMAP) peak amplitude.
Conclusion: The study found that the chicken's ANX was similar to the rat's ANA 16 weeks after implantation, and a local PRP injection on the 14th day improved re-innervation across a 10 mm sciatic nerve gap.

SP191, behavioral analysis of nerve scaffold transplantation and local platelet-rich plasma injection for motor function recovery in wistar rats with sciatic nerve injury

Hananeh Ahmadnia[1], Morteza Behnam-Rassouli[1], Esmail Riahi[2], Ali Moradi[3]
1. Department of Biology, Faculty of Science, Ferdowsi University of Mashhad, Mashhad, Iran
2. Department of Physiology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
3. Orthopedic Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Optimizing treatment strategies to enhance efficiency and accelerate nerve repair is crucial for improving post-injury recovery. This study compares the effects of decellularized rat allografts and chicken xenografts, combined with local platelet-rich plasma (PRP) injection, on sciatic nerve regeneration in male Wistar rats.
Methods: Eighty rats were randomly divided into eight experimental groups (n = 10 per group):
1. Healthy Control Group – No injury or treatment.
2. Negative Control Group – Sciatic nerve resection (10 mm) without intervention.
3. Decellularized Rat Nerve Allograft (ANA) Groups – Saline, methylprednisolone (30 mg/kg), PRP.
4. Decellularized Chicken Nerve Xenograft (ANX) Groups – Saline, methylprednisolone (30 mg/kg), PRP.
Each graft was transplanted into the 10 mm gap created in the sciatic nerve, followed by local treatment administration (500 µl). Behavioral evaluations were conducted to assess motor function recovery.
Results: PRP enhanced the efficacy of transplanted grafts, significantly improving Sciatic Functional Index (SFI) scores and promoting sciatic nerve regeneration.
Conclusion: After 16 weeks, chicken-derived xenografts exhibited comparable regenerative effects to rat-derived allografts. Local PRP injection on day 14 post-injury further improved re-innervation across the 10 mm sciatic nerve gap, suggesting its therapeutic potential for nerve repair applications.
Keywords: Peripheral Nerve Injury, Decellularized Nerve Allografts, Sciatic Functional Index (SFI), Sciatic Nerve Regeneration, Platelet-Rich Plasma (PRP).

SP192, Histological evaluation of sciatic nerve repair in wistar rats: effects of decellularized allografts, xenografts, and platelet-rich plasma

Hananeh Ahmadnia[1], Ali Moradi[2], Esmail Riahi[3], Morteza Behnam-Rassouli[1]
1. Department of Biology, Faculty of Science, Ferdowsi University of Mashhad, Mashhad, Iran
2. Orthopedic Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Physiology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran

Background: Given the limited availability of autografts and allografts, decellularized xenografts have emerged as a promising alternative for nerve tissue transplantation. This study aims to evaluate the effects of decellularized rat and chicken neural scaffold transplantation, combined with local injection of platelet-rich plasma (PRP), on sciatic nerve regeneration in adult male Wistar rats.
Methods: Eighty rats were randomly assigned into eight experimental groups (n = 10 per group):
Control Group: No injury or treatment.
Negative Control Group: 10 mm sciatic nerve resection without treatment.
Decellularized Rat Nerve Allograft Groups (+ saline, methylprednisolone 30 mg/kg, PRP).
Decellularized Chicken Nerve Xenograft Groups (+ saline, methylprednisolone 30 mg/kg, PRP).
Drug administration was performed locally at the transplantation site (500 µl) on the 14th day post-surgery. After 16 weeks, sciatic nerves were excised, processed histologically, stained with H&E, and analyzed via light microscopy.
Results: Histological analysis revealed significantly enhanced axonal growth and sciatic nerve regeneration in the PRP-treated groups, compared to untreated controls.
Conclusion: Transplantation of decellularized chicken nerve xenografts demonstrated comparable structural integrity and functional effects in sciatic nerve regeneration, relative to decellularized rat nerve allografts.
Keywords: Sciatic Nerve Repair, Decellularized allograft, Decellularized Xenograft, Histological Evaluation, Platelet-Rich Plasma (PRP).

SP193, A promising approach for peripheral nerve regeneration using thiolated chitosan hydrogel containing taurine

Simin Nazarnezhad[1], Nariman Rezaei[2], Majid Salehi[2]
1. Tissue Engineering Research Group (TERG), Department of Anatomy and Cell Biology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Tissue Engineering, School of Medicine, Shahroud University of Medical Sciences, Shahroud, Iran

Background: Peripheral nerve injuries (PNIs) remain a significant clinical challenge due to the limited regenerative capacity of long-gap nerve damage and the shortcomings of autografts. In recent years, hydrogels have emerged as a promising scaffold material in nerve tissue engineering owing to their high-water content, tunable mechanical properties, and ability to mimic the extracellular matrix (ECM). This presentation represents recent advances in hydrogel design, focusing on bioactive and multifunctional formulations that enhance neural regeneration. One notable innovation is the use of thiolated chitosan hydrogel, which offer improved solubility, biodegradability, and mucoadhesiveness.
Methods: We evaluated the regenerative potential of thiolated chitosan hydrogels incorporated with varying concentrations of Taurine—an amino acid known for its neuroprotective effects. *In vitro* findings demonstrated that Taurine enhanced cell viability and proliferation of PC12 cells, especially at 1% concentration.
Results: *In vivo*, this formulation significantly improved sciatic nerve regeneration in a rat crush injury model, as shown by functional recovery (via walking-footprint and sensory tests), reduced muscle atrophy, and favorable histopathological outcomes.
Conclusion: In summary, the integration of biologically active molecules like Taurine into tailored hydrogel matrices represents a promising direction in peripheral nerve regeneration. Further translational research is necessary to optimize these systems for human application and regulatory approval.
Keywords: Peripheral nerve regeneration, hydrogel, thiolated chitosan, taurine

SP194, Novel therapeutic approaches in neurodegenerative animal models: restoring cellular function via extracellular vesicles and targeted mitochondrial transplantation

Ali Sepehrinezhad[1,2]
1. Neuroscience Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Neuroscience, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Neurodegenerative diseases including Alzheimer's disease (AD), Parkinson's (PD), and multiple Sclerosis (MS) have common pathologies in the disruption of cellular functionality, such as the accumulation of proteins and mitochondrial damage, as well as neuroinflammation. The aim of this review is to compile the present breakthroughs in the different models of these neurodegenerative disorders using the new regenerative approach of extracellular vehicles (EVs) and mitochondrial transplantation.
Results: In AD models, EVs loaded with specific miRNAs or enzymes have been shown to reduce amyloid-beta and tau pathologies, mitigate neuroinflammation, and improve memory. Similarly, in PD models, EVs delivering neurotrophic factors or autophagy-inducing cargo reduce alpha-synuclein aggregation and protect dopaminergic neurons, improving motor function. For MS, EVs derived from mesenchymal stem cells demonstrate potent immunomodulatory effects, reducing demyelination and promoting remyelination in experimental autoimmune encephalomyelitis (EAE) models. Complementing this, mitochondrial transplantation directly targets bioenergetic deficits. In PD models, transplanted healthy mitochondria rescue dopaminergic neurons from degeneration and restore motor control. In AD models, this approach improves synaptic ATP levels and reduces neuronal stress. While less explored in MS, early evidence suggests mitochondrial transfer can enhance the survival of oligodendrocyte precursors. Despite promising preclinical results, key challenges remain for translation, including optimizing targeted delivery, ensuring mitochondrial viability, and scaling production. This review concludes that both EVs and Mitochondrial transplantation are a paradigm shift from traditional symptomatic treatments in AD, PD, and MS to mechanism-based therapies with hope to arrest and even reverse the progress of these diseases in their earliest stages. Future studies will therefore need to focus on hybrid strategies to deliver to the human brain.
Keywords: Extracellular vesicles, mitochondrial transplantation, neurodegeneration, animal models, oxidative stress, ATP, inflammation

SP195, Chronobiome, sleep disorders, and health: rethinking time-based interventions

Nayereh Askari[1,2], Touba Ghazanfari[1], Mohammadreza Vaez Mahdavi[2], Sara Ghafarpour[1]
1. Immunoregulation Research Center, Shahed University, Tehran, Iran
2. Faculty of Basic Sciences, Shahed University, Tehran, Iran
3. Health Equity Research Center, Shahed University, Tehran, Iran

Background: Metabolic processes, shaping the sleep–wake cycle, endocrine secretion, cardiometabolic balance, immune regulation, and stress reactivity. Disturbances in these rhythms—stemming from night-shift work, social jet lag, circadian misalignment, or nocturnal light exposure—lead to profound chronodisruption and heighten the risk of cardiovascular disease, hypertension, metabolic dysfunction, diabetes, neuropsychiatric disorders, and neurodegenerative conditions such as Alzheimer's and Parkinson's disease.
Methods: As a rapidly expanding field, chronotherapy aims to optimize the timing of medications, nutrition, physical activity, and controlled light exposure according to an individual's biological timing system. Evidence increasingly suggests that time-based interventions may improve therapeutic efficacy, reduce adverse effects, and enhance symptom control in patients with sleep and circadian disturbances.
Results: Within this evolving field, our data complement existing evidence and provide additional practical insights. We investigated circadian gene expression profiles in white blood cells of both cardiac patients and individuals exposed to chemical warfare agents. Our findings reveal that the expression patterns of core circadian genes exhibit strong correlations with melatonin rhythmicity and interview-based assessments of sleep quality. Notably, disrupted circadian gene expression was associated with diminished cellular resilience to oxidative stress, suggesting a mechanistic link between chronobiome alterations and heightened susceptibility to systemic dysfunction.
Conclusion: The emerging concept of the chronobiome provides an integrative framework for understanding how cellular timing networks influence health trajectories. By combining evidence from the literature with our own molecular data, this work highlights the potential of chronobiome-based biomarkers to guide personalized, time-sensitive clinical interventions and inform the design of future chronomedicine trials.
Keywords: Chronobiome, Circadian Genes, Sleep Disorders, Chronotherapy

SP196, Socio-economic status and sleep disturbances

Mohammad-Reza Vaez-Mahdavi[1], Leila Nasiri[1]
1. Health Equity Research Center, Shahed University, Tehran, Iran

Background: Socio-economic status (SES) is a key determinant of health, with established links to sleep disturbances, including poor quality, short duration, and insomnia. These sleep issues are prevalent and may critically explain how low SES is associated with poorer health outcomes. Understanding this relationship is vital for effective public health intervention.
Methods: A comprehensive narrative review was conducted to synthesize evidence from observational studies. Studies examining associations between SES indicators (income, education, occupation, perceived status) and sleep disturbances in adult populations. The review qualitatively analyzed patterns, consistency, and potential mechanisms across the literature.
Results: The synthesis of evidence reveals a consistent and inverse relationship between SES and sleep disturbances. Lower income, educational attainment, and occupational status were each associated with a higher prevalence and severity of sleep problems, including subjective sleep complaints and objectively measured short sleep. Key pathways explaining this relationship include heightened psychosocial stress, less control over work schedules and sleep environments, greater financial insecurity, and uneven access to healthcare. The association appears strongest for measures of income and perceived financial strain.
Conclusion: There is robust and coherent evidence that lower socio-economic status is a significant contributor to sleep disturbances. These findings highlight sleep as a key dimension of health inequality. Addressing sleep disparities requires multi-level interventions that target the structural and psychosocial factors linked to low SES. Clinicians should be aware of socio-economic context when assessing sleep health, and public health strategies should aim to reduce the socio-economic burdens that undermine healthy sleep.
Keywords: Socio-Economic Status, Sleep Disturbances, Health Equity

SP198, Artificial intelligence in sleep assessment and chronotherapy: innovations and future directions

Marzieh Hatami[1], Nayere Askari[2,3]
1. Shahid Beheshti University, Tehran, Iran
2. Faculty of Basic Sciences, Shahed University, Tehran, Iran
3. Health Equity Research Center, Shahed University, Tehran, Iran

Background: Sleep disorders are highly prevalent conditions associated with significant cognitive, psycho-logical, and cardiometabolic consequences. Conventional diagnostic tools, particularly polysomnography, are time-consuming, costly, and dependent on expert interpretation. In recent years, artificial intelligence (AI) has emerged as a promising approach to enhance the accuracy, efficiency, and accessibility of sleep disorder assessment. The objective of this review was to summarize current evidence on the application of AI-based methods in the evaluation and diagnosis of sleep disorders.
Methods: This study was conducted as an evidence-based narrative review. Peer-reviewed articles, systematic reviews, and meta-analyses focusing on AI applications in sleep medicine were identified through PubMed and MEDLINE databases. Studies addressing automated sleep stage classification, detection of sleep disorders—particularly obstructive sleep apnea—and the use of wearable technologies were included.
Results: The reviewed evidence indicates that AI algorithms, including machine learning and deep learning models, demonstrate high accuracy in automated sleep stage scoring and detection of sleep disorders using physiological signals such as electroencephalography, electrocardiography, and respiratory parameters. Several studies report performance comparable to or exceeding conventional manual scoring. Additionally, AI-enabled wearable devices facilitate long-term, real-world sleep monitoring, although most validated applications currently focus on sleep apnea.
Conclusion: Artificial intelligence represents a powerful complementary tool in sleep medicine, offering scalable and objective assessment of sleep disorders. Further large-scale clinical validation and standardization are required to support widespread clinical implementation.
Keywords: Artificial Intelligence, Sleep Disorders, Machine Learning, Polysomnography, Sleep Assessment

SP199, Next-generation hypnotics: mechanisms, efficacy, and future directions in precision treatment of insomnia

Reza Askari[1]
1. Ziaeian Hospital - Tehran University of Medical Sciences, Tehran, Iran

Background: Insomnia is one of the most prevalent disorders encountered in psychiatric practice. Despite the availability of multiple pharmacological options, patients demonstrate considerable variability in therapeutic response and tolerability to hypnotic drugs. This heterogeneity limits the effectiveness of conventional trial-and-error prescribing strategies. The present review aims to summarize evidence-based factors underlying differential drug response in insomnia and to compare classical and newer pharmacological treatments from a personalized medicine perspective.
Methods: A narrative evidence-based review was conducted using published clinical guidelines, randomized controlled trials, systematic reviews, and meta-analyses focusing on pharmacological treatments for insomnia. Emphasis was placed on mechanisms of action, effects on sleep architecture, safety profiles, and clinical phenotypes associated with differential drug response.
Results: Evidence indicates that variability in response to hypnotic medications is strongly influenced by individual differences in circadian rhythm regulation, hyperarousal state, hypothalamic–pituitary–adrenal axis activity, psychiatric comorbidities, and drug metabolism. Classical agents such as benzodiazepines and Z-drugs are effective for short-term symptom relief but are associated with tolerance, dependence, and alterations in sleep architecture. In contrast, dual orexin receptor antagonists provide sleep promotion by suppressing wakefulness pathways and demonstrate a more physiological sleep profile with lower abuse potential. Melatonergic agents are particularly beneficial in circadian rhythm-related insomnia but exhibit modest hypnotic effects.
Conclusion: Differential response to insomnia pharmacotherapy reflects the biological and clinical heterogeneity of the disorder rather than treatment failure. Adopting a personalized medicine approach—tailoring drug selection to individual insomnia phenotypes and patient characteristics—may enhance treatment efficacy, safety, and long-term outcomes in clinical practice.
Keywords: Insomnia, Pharmacotherapy, Personalized Medicine, Orexin Receptor Antagonists, Hypnotic Drugs

SP200, Impact of sleep disturbance on immune regulation: relationship between poor sleep quality, melatonin, and the ctla-4 immune checkpoint in sulfur mustard–exposed veterans

Sara Ghaffarpour[1], Ensie Sadat Mirsharif[1], Bahman Rahimlou[1], Nayereh Askari[1,2], Touba Ghazanfari[1]
1. Immunoregulation Research Center, Shahed University, Tehran, Iran
2. Faculty of Basic Sciences, Shahed University, Tehran, Iran

Background: Sleep disturbance influences immune function, yet the underlying mechanisms remain incompletely understood. CTLA-4 is a key immune checkpoint receptor predominantly expressed on regulatory T cells (Tregs) and plays a central role in maintaining immune homeostasis. This study aimed to investigate the association between poor sleep quality, melatonin levels, and CTLA-4 expression in peripheral blood leukocytes of sulfur mustard–exposed veterans from Sardasht, compared with age- and sex-matched healthy controls.
Methods: In this cross-sectional study, blood samples were collected from exposed veterans and matched controls. Sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI). CTLA-4 mRNA expression in leukocytes was quantified using quantitative real-time PCR (qPCR), and serum melatonin levels were measured by ELISA. Data analysis included comparison of means between groups and correlation analyses between PSQI scores, melatonin, and CTLA-4 expression.
Results: CTLA-4 expression was negatively correlated with PSQI scores and positively correlated with serum melatonin levels. Comparison of means indicated that veterans with good sleep quality exhibited CTLA-4 expression levels similar to controls, whereas those with severe sleep disruption showed significantly reduced CTLA-4 expression.
Conclusion: These findings provide novel human evidence that sleep disruption in sulfur mustard–exposed veterans is associated with decreased CTLA-4 expression, while higher melatonin levels correspond to increased CTLA-4. The results suggest a mechanistic link between sleep, circadian regulation, and immune checkpoint modulation, highlighting the relevance of sleep- and circadian-targeted interventions to maintain immune homeostasis in chemically exposed populations.
Keywords: CTLA-4, Sleep Disturbance, Melatonin, Sulfur Mustard.

SP201, Sleep disturbances and melatonin dysregulation in chemical veterans: insights from the pittsburgh sleep quality index and salivary biomarkers

Leila Nasiri[1], Nayere Askari[2,3], Mohammad-Reza Vaez-Mahdavi[1], Fatemeh Azar[4]
1. Health Equity Research Center, Shahed University, Tehran, Iran
2. Department of Biology, Faculty of Basic Sciences, Shahed University, Tehran, Iran
3. Immunoregulation Research Center, Shahed University, Tehran, Iran
4. Department of Psychology, Faculty of Humanities, Allameh Tabatabaei University, Tehran, Iran

Background: Sleep disturbances are prevalent among veterans exposed to chemical warfare agents, significantly impacting their quality of life. Emerging evidence suggests that circadian rhythm dysregulation, particularly involving melatonin, may underlie these sleep impairments, though the relationship between subjective sleep quality and objective hormonal markers in this population remains underexplored.
Methods: This case-control study evaluated sleep quality in severely exposed chemical veterans from Sardasht compared to age- and sex-matched healthy controls. Sleep was assessed using the Pittsburgh Sleep Quality Index (PSQI). In parallel, salivary melatonin concentrations were measured during both daytime and nighttime to examine circadian endocrine function.
Results: Veterans demonstrated significantly higher total PSQI scores and greater impairments across all individual sleep domains (sleep quality, duration, efficiency, disturbances, and latency) compared to controls ($p<0.05$). Concurrently, salivary melatonin levels, particularly nighttime concentrations, were significantly reduced in the veteran group. A significant inverse correlation was observed between nighttime salivary melatonin levels and PSQI scores ($r<0$, $p<0.05$), indicating that lower melatonin concentrations were associated with more severe sleep disruption.
Conclusion: These findings indicate a significant dysregulation of the circadian melatonin system in chemical veterans, which is closely linked to their subjectively reported sleep disturbances. The combined use of subjective sleep assessment and objective circadian biomarkers provides a robust model for understanding the pathophysiology of sleep disorders in this vulnerable population. This integrative approach supports the development of chronobiology-informed interventions, such as melatonin supplementation or chronotherapy, to improve sleep and potentially mitigate adverse cardiovascular, metabolic, and neurocognitive health outcomes.
Keywords: Sleep Disturbances, Melatonin, Pittsburgh Sleep Quality Index (PSQI)

SP202, Protective effects of regular exercise on modulation of inflammation in sleep-deprived rats on cognitive functions

Maryam Salari[1,2], Khadijeh Esmaeilpour[2], Lily Mohammadipoor-Ghasemabad[2], Farahnaz Taheri[2,3], Mahmoud Hosseini[2], Vahid Sheibani[2]

1. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Neuroscience Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
3. Neurology Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran

Background: Sleep deprivation and inflammation impair cognitive function by increasing oxidative stress and impairing hippocampal plasticity, and their combined effects exacerbate the results. This study investigated whether moderate-intensity treadmill exercise can reduce these cognitive and neurodegenerative deficits in male rats.

Methods: Rats were divided into five groups: saline, exercise, treadmill sham, inflammation + sleep deprivation, and exercise + inflammation + sleep deprivation. The exercise + inflammation + sleep deprivation group performed treadmill exercise for six weeks, followed by seven days of 1 mg/kg lipopolysaccharide (LPS) and 24 h of sleep deprivation. Cognitive function was assessed using the Morris Water Maze (MWM) to examine spatial memory.

Results: In the MWM, the inflammation + sleep deprivation group showed significant increases in total distance traveled and escape latency compared with the saline and exercise + inflammation + sleep deprivation groups.

Conclusion: In general, inflammation and sleep deprivation impair cognition by disrupting hippocampal plasticity, but moderate exercise appears to help mitigate these effects.

Keywords: Treadmill Exercise, Sleep Deprivation, Inflammation, Long-Term Potentiation, Learning and Memory, Lipopolysaccharide

SP203-210, From Idea to Product: Commercialization of Basic Science Research

Seyed Mehdi Rezayat[1], Mahmoud Reza Jafari[2], Fatemeh Gheibi[3], Seyed Ali Mousavi Shaegh[4], Sina Mozaffari[4], Seyed Mohammad Khatami Maab[5], Hananeh Zarrin Nahad6

1. Faculty Member, Department of Pharmacology, Tehran University of Medical Sciences, Tehran, Iran
2.Faculty Member, Mashhad University of Medical Sciences, Founder of Exir Nano Sina Knowledge-Based Company, Mashhad, Iran
3. Faculty Member, Department of Medical Nanotechnology, Mashhad University of Medical Sciences, Mashhad, Iran
4. Faculty Member, Mashhad University of Medical Sciences, Mashhad, Iran
5. Iran Nanotechnology Innovation Council (INIC)
6. Exir Nano Sina Knowledge-Based Company

Introduction: Basic sciences including physics, chemistry, biology, mathematics, and computer science, constitute the fundamental backbone of the science and technology system and play a pivotal role in the development of engineering sciences, medicine, and emerging technologies. A substantial portion of contemporary technological advances, ranging from the discovery of fundamental laws of nature and the development of advanced materials to the design of novel pharmaceuticals and the enhancement of communication and computing systems, is rooted in the achievements of basic scientific research. Indeed, without targeted and sustained investment in fundamental research, the emergence of many strategic technologies such as artificial intelligence, biotechnology, nanotechnology, photonics, data science, and renewable energy would not have been possible. Consequently, countries pursuing sustainable development and enhanced economic competitiveness regard investment in basic sciences and the training of highly skilled human capital as a strategic priority.

Owing to their knowledge-generating nature and high capacity for fostering radical innovation, basic sciences play a decisive role in transforming various industries. For example, fundamental research in biology-particularly in genetics and cell biology-has laid the groundwork for the development of novel drugs, genetic engineering technologies, and personalized therapeutic approaches. Similarly, in the energy sector, basic research in materials physics and chemistry has led to significant advances in high-capacity batteries, more efficient solar cells, and innovative methods for sustainable energy production. Such evidence underscores the indispensable role of basic sciences in scientific and technological transformations and highlights their direct contribution to the formation and strengthening of a knowledge-based economy.

Despite their importance, the development and effective utilization of basic science achievements-especially in developing countries, face numerous challenges. Reduced or unstable research funding, weak structured linkages between universities and industry, the absence of effective policies to support the commercialization of research outcomes, and shortages of specialized human resources are among the most significant obstacles in this domain. Moreover, the long-term nature of fundamental research and its limited short-term economic returns often result in lower prioritization within support frameworks. This is in contrast to the experience of leading countries, which demonstrates that smart and sustained investment in basic sciences yields long-term economic growth, the development of strategic technologies, and increased economic resilience.

Within this context, the symposium **"From Idea to Product: Commercialization of Basic Science Research"** is organized with the aim of examining established pathways and practical experiences in transforming basic science ideas into technological products, as well as analyzing the challenges associated with their commercialization. The following key themes will be discussed through expert presentations and active participant engagement:

A) Industry and the Commercialization of Research Outcomes

The successful commercialization of scientific achievements requires the establishment of effective, stable, and bidirectional relationships between universities and industry. While industries benefit from scientific research outcomes, they must also communicate their technological needs and challenges to research institutions so that academic investigations are directed toward application-oriented pathways aligned with real industrial demands. Such interactions enhance the effectiveness of scientific projects, accelerate the transition from knowledge to technology, and facilitate the market entry of innovations. This symposium will analyze challenges, successful experiences, and effective approaches in this area.

B) Models of Collaboration and Effective Stakeholder Engagement in Commercializing Basic Science Ideas

In many developed countries, various models have been designed and implemented to strengthen collaboration among universities, research centers, and industry. These include the establishment of science and technology parks, joint innovation centers, knowledge-based companies, and technology transfer systems, all of which contribute to the formation of an efficient innovation ecosystem. Such mechanisms enable universities to respond more effectively to industrial needs while allowing industries to leverage scientific capabilities.

C) Supportive Policies and Strategies for Advancing Ideas to Market

The development of effective collaboration among universities, industry, and research institutions requires the formulation and implementation of coherent national-level support policies. The creation of funding mechanisms, provision of financial incentives and facilities, support for joint research and development projects, and supporting of start-ups and knowledge-based enterprises are among the measures that can facilitate the transition from idea to product. Furthermore, facilitating patent registration, technology transfer, and marketing processes plays a critical role in the successful commercialization of scientific innovations.

Overall, systematic collaboration among universities, research centers, and industry-recognized as a core pillar of innovation and advanced technology development-plays a crucial role in achieving long-term economic, social, and scientific objectives and in paving the way toward sustainable development and global competitiveness.

D) Challenges and Barriers Facing Basic Sciences in the Knowledge-Based Economy

This symposium will also address the major challenges involved in transforming ideas into products and commercializing outcomes in the field of basic sciences, including:

- Shortages of specialized human resources in basic science disciplines
- Limitations in financial and infrastructural resources
- Weak effective communication between academic and industrial sectors
- Misalignment of university curricula with labor market needs and the requirements of a knowledge-based economy
- Complexity and length of administrative processes in research and commercialization pathways

Conclusion: Establishing an effective linkage between basic sciences and the knowledge-based economy requires a systematic, multi-level approach grounded in collaboration among governments, universities, industry, and other stakeholders. Sustained investment in fundamental research, development of skilled human capital, facilitation of commercialization and technology transfer processes, and support for technology-driven entrepreneurship are among the key prerequisites for achieving a sustainable, innovative, and knowledge-based economy. By providing a platform for experience sharing, expert perspectives, and scientific dialogue, this symposium seeks to clarify existing challenges and propose practical solutions in this field. The event will conclude with a final synthesis of discussions presented by the symposium chair.

Keywords: From idea to product development, Commercialization, Knowledge-based economy, Integration of basic sciences and industry, Advanced technologies.

SP211, Mechanistically approach to heart brain axis

Zakieh Sadat Sheikhalishahi [1]
1. Department of physiology, Medicine faculty, Shiraz University of medical sciences, Shiraz, Iran

Background: The heart–brain axis represents a tightly coordinated bidirectional network in which neural, hormonal, and immunoinflammatory pathways continuously integrate cardiovascular and central nervous system function. Through autonomic circuits—including sympathetic and parasympathetic efferents as well as cardiac afferent projections—signals regarding cardiac rhythm, contractility, hemodynamics, and metabolic status are relayed to central autonomic hubs such as the nucleus tractus solitarius, dorsal motor nucleus of the vagus, insular cortex, and amygdala. Neuroendocrine mediators and systemic inflammatory signals further shape this reciprocal communication, enabling psychological, emotional, and behavioral states to modulate cardiovascular physiology, while cardiac pathology can in turn induce maladaptive neuroplasticity within central autonomic networks.
Methods: A narrative literature review was conducted using PubMed, Scopus, and Web of Science databases. Peer-reviewed articles published between 2018 and 2025 were screened using keywords related to the heart–brain axis, autonomic regulation, myocardial ischemia, and neurocardiology. Out of approximately 120 retrieved records, 52 experimental and clinical studies were selected based on relevance, methodological quality, and citation impact.
Results: The reviewed studies consistently demonstrate that myocardial ischemia induces not only cardiac structural and electrophysiological alterations but also significant changes within central autonomic networks. These changes include enhanced sympathetic drive, reduced vagal tone, neuroinflammatory activation, and maladaptive neuroplasticity in brainstem and limbic regions.
Conclusion: Collectively, these findings highlight the heart–brain axis as a critical mediator of ischemia-related cardiac dysfunction. Targeting autonomic and central regulatory pathways may offer novel therapeutic strategies to restore autonomic balance and improve cardiovascular outcomes in myocardial ischemia.
Keywords: Heart–Brain axis, Myocardial ischemia, Autonomic nervous system, Neurocardiology, vagus nerve, Central autonomic network

SP212, Assessment of teriflunomide treatment on behavioral and oxidative stress markers in a rat model of traumatic brain injury

Hadi Moatamed Jahromi[1,2], Arsalan Pahlousay[3], Somayeh Keshavarz[1]
1. Department of Physiology, School of medicine, Shiraz University of medical sciences, Shiraz, Iran
2. Student research committee, School of medicine, Shiraz University of medical sciences, Shiraz, Iran
3. Department of Physiology, School of medicine, Tehran University of medical sciences, Tehran, Iran

Background: Traumatic brain injury (TBI) causes significant cognitive and motor impairments due to primary mechanical damage and secondary processes such as excitotoxicity, oxidative stress, and inflammation. The hippocampus, key for learning and memory, is especially vulnerable to such injury. Currently, no effective pharmacological treatments exist, and care remains supportive. Teriflunomide, an approved multiple sclerosis drug with anti-inflammatory and antioxidant properties that can cross the blood–brain barrier, shows neuroprotective potential in preclinical models of brain injury.
Methods: This study investigated teriflunomide's effects on behavior, oxidative stress, and hippocampal integrity in a rat TBI model. Forty-two male Sprague-Dawley rats were divided into sham, TBI + vehicle, and TBI + teriflunomide groups. TBI was induced by a weight-drop method under anesthesia. Behavioral tests, including the open field and Morris Water Maze, assessed anxiety-like behavior and spatial learning/memory seven days post-injury. Biochemical analyses measured oxidative stress and antioxidant enzyme activities in hippocampal tissue.
Results: Results showed that TBI increased anxiety behaviors and impaired spatial memory, along with elevated lipid peroxidation (MDA) and reduced antioxidant enzyme activities (GPx, SOD, CAT). Teriflunomide treatment alleviated anxiety-like behavior, improved cognitive performance, reduced oxidative damage, and restored antioxidant defenses.
Conclusion: The findings suggest teriflunomide's neuroprotective effects likely stem from its anti-inflammatory and antioxidant actions, preserving hippocampal function and structure. This supports its therapeutic potential for mitigating TBI-related cognitive deficits. Further research is needed to clarify underlying mechanisms, optimize dosing, and confirm safety.
Keywords: Traumatic brain injury, Teriflunomide, Behavioral assessment, Oxidative stress

SP213, Electrophysiological evaluation of lutein's dose-dependent effects on hippocampal synaptic plasticity in the 2vo rat model of vascular dementia

Hamideh Asadinezhad[1]
1. Department of physiology, School of Medicine, Student Research Committee of Iran University, Iran University of Medical Sciences, Tehran, Iran

Background: Synaptic dysfunction is a key feature of vascular dementia (VD), and investigating hippocampal synaptic transmission and plasticity provides insight into the cellular mechanisms underlying cognitive deficits. This study aimed to examine the effects of low and high doses of lutein on hippocampal CA3-CA1 synaptic function in a rat model of VD using in vivo field potential recordings.
Methods: Rats were anesthetized and positioned in a stereotaxic frame on day 30 post-bilateral carotid occlusion. Electrodes were inserted to stimulate the Schaffer collateral pathway and record field excitatory postsynaptic potentials (fEPSPs) in the CA1 region. Basal synaptic transmission (BST) was assessed using input-output curves, short-term plasticity was evaluated via paired-pulse ratio (PPR) at multiple interstimulus intervals, and long-term potentiation (LTP) was induced by high-frequency stimulation (HFS). Data were analyzed to quantify changes in synaptic strength and plasticity in response to lutein administration.
Results: VD induced by 2VO (Two-Vessel Occlusion) led to decreased BST and LTP impairment. Low-dose lutein selectively increased PPR, suggesting enhancement of presynaptic neurotransmitter release probability, without fully restoring BST. High-dose lutein restored BST and LTP but did not alter PPR, indicating post-synaptic mechanisms. Both doses prevented deficits in LTP induction, although via distinct pre- versus post-synaptic pathways.
Conclusion: Electrophysiological recordings demonstrate that lutein ameliorates synaptic dysfunction in VD through dose-dependent mechanisms. Low doses primarily modulate presynaptic release, whereas high doses enhance postsynaptic responsiveness, highlighting differential pathways for memory and synaptic plasticity recovery. These findings underscore the utility of field potential analysis in evaluating therapeutic interventions for VD.
Keywords: Lutein, Synaptic plasticity, Hippocampus, Vascular dementia, Dose-dependent, Rat model, Electrophysiology

SP214, Physiological coupling of the heart–brain axis in response to itbs and cTBS

Babak Aliyari [1]
1. Department of physiology, Medicine faculty, Shiraz University of medical sciences, Shiraz, Iran

Background: Cardiovascular homeostasis depends on continuous bidirectional interaction between the central nervous system and peripheral autonomic pathways. While brainstem and subcortical structures mediate reflexive cardiovascular control, growing evidence demonstrates that higher cortical regions play a critical role in autonomic regulation. The prefrontal and insular cortices are key components of the central autonomic network, integrating cognitive, emotional, and interoceptive information with cardiovascular function. Alterations in these regions—particularly the insula—have been associated with impaired heart rate variability (HRV), autonomic imbalance, and increased arrhythmic vulnerability.
Methods: This presentation synthesizes recent human studies examining the brain–heart axis using multimodal neurophysiological approaches and non-invasive brain stimulation. Combined electroencephalography (EEG) and electrocardiography (ECG) are employed to assess cortical processing of cardiac afferent signals via heartbeat-evoked potentials (HEPs) and autonomic output via HRV measures. In addition, transcranial magnetic stimulation (TMS), specifically theta burst stimulation (TBS), is reviewed as a causal method to modulate cortical autonomic control. A multimodal neuro–oculo–cardiac learning framework integrating EEG, EOG, and ECG signals using a Transformer-based architecture with physiologically constrained objectives is proposed.
Results: Recent evidence indicates that TBS modulates both central and peripheral components of the brain–heart axis. Continuous TBS alters HEPs, suggesting changes in cortical interoceptive processing, whereas intermittent TBS enhances interoceptive network activity and autonomic indices such as HRV. Multimodal modeling captures interactions between fast cortical dynamics and slower autonomic regulation.
Conclusion: These findings support a hierarchical and plastic brain–heart axis in which cortical networks exert top-down control over cardiovascular function. Integrating neurostimulation with multimodal physiological modeling offers a robust framework for advancing neurovisceral research and translational applications.
Keywords: Heartbeat-Evoked potentials, Trans cranial magnetic stimulation, Theta burst stimulation, Autonomic nervous system, Neurovisceral integration

SP215, The psychotic heart: unraveling the brain-heart dialogue in psychosis

Ardeshir Nabizadeh[1]
1. Neuroscience Research Center, Institute of Neuroscience and Cognition, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: Severe mental illnesses, including schizophrenia and bipolar disorder, further extend the clinical relevance of heart–brain interactions.
Results: High rates of cardiovascular disease and autonomic dysfunction in these conditions highlight the bidirectional interplay between central neural networks and cardiac function. The central autonomic network—integrating cortical regions such as the prefrontal cortex, anterior insula, and anterior cingulate cortex with subcortical vagal control centers—mediates this communication, while interoceptive signals from the heart influence brain activity, evidenced by altered heartbeat-evoked potentials and baroreflex sensitivity in psychiatric patients. Shared genetic and molecular pathways affecting ion channels, inflammatory mediators, and autonomic regulation further underscore the multisystemic nature of these disorders.
Conclusion: This integrative perspective supports precision medicine strategies and interventions targeting autonomic function to improve both psychiatric and cardiovascular outcomes.

SP216, Synergistic cardioprotection: resistance exercise and hawthorn (crataegus oxyacantha) extract modulate oxidative stress following ischemia-reperfusion injury in diabetic rats

Hamidreza Choobdari[1], Kamal Ranjbar [2], Ebrahim Zarrinkalam[3], Alireza Komaki [4], Iraj Salehi [4], Bayan Fayazi[5]

1. Departmant of Exercise physiology, Faculty of sport science, Bu-ali sina university, Hamedan, Iran
2. Department of Physical Education and Sport Science, Bandar Abbas Branch, Islamic Azad University, Bandar Abbas, Iran
3. Department of Physical Education and Sport Sciences, Hamedan Branch, Islamic Azad University, Hamedan, Iran
4. Neurophysiology Research Center, Hamadan University of Medical Sciences, Hamadan, Iran
5. Faculty of Physical Education and Sport Science, Razi University, Kermanshah, Iran

Background: The development of effective therapeutic strategies to limit myocardial infarction size following ischemia-reperfusion (IR) injury is of significant clinical importance, particularly in diabetic populations. This study aimed to investigate the cardioprotective potential of resistance training and Crataegus oxyacantha (hawthorn) extract, both individually and in combination, against IR-induced myocardial injury in a diabetic rat model.

Methods: Fifty male Wistar rats were randomly allocated into five groups (n=10): sedentary control (SC), sedentary diabetic (SD), resistance-trained diabetic (RD), diabetic treated with C. oxyacantha extract (CD), and a combined intervention group (RCD). Diabetes was induced in all groups except SC. The RD and RCD groups underwent a 10-week progressive ladder-climbing resistance training protocol (5 days/week). The CD and RCD groups received a daily oral gavage of C. oxyacantha extract (100 mg/kg). Following the interventions, myocardial IR injury was induced by ligating the left anterior descending (LAD) coronary artery for 30 minutes, followed by 90 minutes of reperfusion. Infarct size and levels of cardiac injury biomarkers (LDH, CK-MB) and oxidative stress markers (GPx, MPO) were subsequently analyzed.

Results: The sedentary diabetic (SD) group exhibited a significant increase in infarct size and elevated serum levels of LDH and CK-MB compared to the non-diabetic control (SC). In contrast, the combined intervention group (RCD) demonstrated the most pronounced protective effects, showing a significant reduction in these injury indices compared to the SD group. At the molecular level, the combined treatment synergistically enhanced the activity of the antioxidant enzyme GPx and markedly reduced the level of the proinflammatory oxidant enzyme MPO following reperfusion.

Conclusion: A 10-week regimen combining resistance training with Crataegus oxyacantha extract supplementation provides superior cardioprotection against IR injury in diabetic rats compared to either intervention alone. The observed synergy suggests that the underlying mechanism is likely related to a potent attenuation of the oxidative stress pathway that is typically exacerbated during ischemia-reperfusion. This combined therapeutic approach warrants further investigation for clinical application in diabetic cardioprotection.

Keywords: Diabetic Cardiomyopathy, Ischemia-Reperfusion Injury, Myocardial Oxidative Stress, Crataegus oxyacantha Extract, Resistance Exercise Training

SP217, DNA repair gene changes in chemical veterans: evidance of accelerated biological ageing

Masoumeh Gholami[1], Iman Shahidifar[1], Fatameh Farshadnia[2], MohammadNaser Shafei[3]
1. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Science, Mashhad, Iran
2. Applied Biomedical Research Center, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
3. Division of Neurocognitive Sciences, Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: The cuneiform (CnF) and pedunculopontine tegmental nuclei (PPT) are important mesencephalic structures involved in central cardiovascular regulation. However, the exact roles of these nuclei on blood pressure and heart rate, especially under normal and hypoxia conditions, remain unclear. This study aimed to investigate their functions by inhibiting these nuclei with cobalt chloride ($CoCl_2$) and examining cardiovascular responses under normal conditions and hypoxia-induced by potassium cyanide (KCN).
Methods: Rats were divided into seven groups: 1) injection saline microinjection into the CnF, 2) intravenous KCN, 3) $CoCl_2$ microinjection into the CnF, 4) KCN with $CoCl_2$ in the CnF, 5) saline microinjection into the PPT, 6) $CoCl_2$ microinjection into the PPT, 7) KCN with $CoCl_2$ in the PPT. Anesthesia was performed with urethane (1.5 g/kg, i.p.), and the femoral artery was catheterized and connected to a pressure transducer. Systolic blood pressure (SBP), mean arterial pressure (MAP), and heart rate (HR) were continuously recorded via PowerLab. Treatments included intravenous injection of KCN and microinjection of $CoCl_2$ into the PPT and CnF nuclei using a stereotaxic device.
Results: Inactivation of the nuclei by $CoCl_2$ did not affect baseline cardiovascular parameters. Stimulation of the chemoreflexes by intravenous KCN injection significantly increased SBP and MAP ($P<0.01$ to $P<0.001$) and decreased heart rate ($P<0.01$). Inactivation of both the CnF and PPT reduced SBP and MAP ($P<0.05$ to $P<0.01$) compared to KCN alone, without affecting HR.
Conclusion: This study showed that CnF and PPT nuclei do not regulate basal BP but attenuate KCN-induced hypertension under hypoxia.
Keywords: Cuneiform Nuclei (CnF), Pedunculopontine Tegmental Nuclei (PPT), COCL2, KCN, Blood Pressure

SP218, Empagliflozin Improves Cardiac Functional Parameters in a High-Fat Diet-Induced Metabolic Syndrome Model

Reihaneh Ghasemi Tarie[1], Alireza Esteghamati[2], Kamran Rakhshan[1], Mansoor Keshavarz[1]
1. Physiology department, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
2. Endocrinology and Metabolism Research Center (EMRC) Vali-Asr Hospital, Tehran University of Medical Sciences, Tehran, Iran

Background: Metabolic syndrome is the most prevalent metabolic disorder. This syndrome significantly increases the risk of developing cardiovascular diseases (CVD) and type 2 diabetes, making it a critical public health concern. Empagliflozin, a selective sodium-glucose co-transporter 2 (SGLT2) inhibitor, has gained attention for its potential cardiovascular benefits in addition to its role in managing hyperglycemia. This study aims to investigate the effects of Empagliflozin on cardiac structure and function in a rat model of metabolic syndrome induced by a high-fat diet.

Methods: In this study, 24 rats were divided into 4 groups: 1. Control, 2. Control+Empagliflozin, 3. Metabolic Syndrome, 4. Metabolic Syndrome+Empagliflozin. To induce the metabolic syndrome model, rats were subjected to a high-fat diet comprising 60% fat for a duration of 16 weeks. At the end of week 8, the disease was successfully induced. Subsequently, from week 9 to week 16, the rats in the Metabolic Syndrome+Empagliflozin Group received Empagliflozin orally at a dosage of 10 mg/kg for 8 weeks. This intervention aimed to assess the therapeutic effects of Empagliflozin on the metabolic parameters adversely affected by the high-fat diet. At the conclusion of the study, the animals were anesthetized, and echocardiography was performed to evaluate cardiac function and structure.

Results: Echocardiographic results indicate that although statistical analyses showed no significant differences among the groups in structural cardiac parameters—including IVSd, IVSs, LVIDd, LVIDs, LVPWd, LVPWs, EDV, and ESV—functional cardiac indices were markedly impaired in the metaolic syndrome group compared with the control group. Specifically, the metaolic syndrome group exhibited significant reductions in SV (0.33 ± 0.02 vs. 0.54 ± 0.03, $p < 0.05$), EF (69 ± 2 vs. 83 ± 1, $p<0.001$), and FS (34 ± 2 vs. 47 ± 2, $p<0.01$). Additionally, treatment with Empagliflozin in the Metabolic Syndrome+Empagliflozin group resulted in a significant improvement in these functional parameters relative to the Metabolic Syndrome group (0.50 ± 0.04 vs 0.33 ± 0.02, $p<0.05$, 79 ± 1 vs 69 ± 2, $p<0.001$, 42.1 ± 1.1 vs 34 ± 2, $p<0.011$).

Conclusion: This study demonstrates that Empagliflozin can improve cardiac functional parameters, such as ejection fraction and fractional shortening. However, it does not significantly affect cardiac structure, as no notable changes were observed in the metabolic syndrome model during the study period. Further research is needed to explore its long-term effects and underlying mechanisms.

Keywords: Metabolic Syndrome, Cardiometabolic Syndrome, Sodium-Glucose Transporter 2 Inhibitors, Empagliflozin

SP219, The role of pre- and post-synaptic mechanisms in anticonvulsant action of deep brain stimulation

Parisa Zarei[1], Javad Mirnajafi-Zadeh[1], Yaghoub Fathollahi[1], Amir Shojaei[1], Mohammad Reza Raoufy[1]
1. Department of Physiology, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran

Background: Deep brain stimulation (DBS) is an alternative treatment for epilepsy. However, the best parameters and the anticonvulsant mechanisms of DBS have remained poorly understood. In the present study, we investigated the anticonvulsant effects of low- and high-frequency stimulation (LFS and HFS) of olfactory bulbs on kindled seizures.
Methods: Rats were kindled using semi-rapid electrical stimulation (6 stimulations per day) of the hippocampal CA1 region. Full kindled animals received either LFS (1 Hz) or HFS (130 Hz) in the olfactory bulb at 5 min, 6 h, 24 h, and 30 h after the last kindling stimulation.
Results: Applying DBS alleviated the seizure severity in the kindled rats and decreased the parameters of excitatory postsynaptic currents (EPSCs), while increased these parameters in inhibitory postsynaptic currents (IPSCs). The excitation-to-inhibition (EPSC/IPSC) ratio decreased following DBS application in kindled animals. Paired-pulse ratio did not change. The failure rate was decreased, and the efficacy and potency were increased in a kindled group. Applying DBS in kindled rats restored these changes. Interestingly, there was no significant difference between LFS and HFS anticonvulsant actions.
Conclusion: Obtained results showed that the olfactory bulb may be introduced as a suitable DBS target for treating epilepsy. In addition, applying DBS at both low- and high-frequencies exerts similar anticonvulsant effects. Both pre- and post-synaptic mechanisms may be involved in anticonvulsant action of DBS.
Keywords: Epilepsy, Deep Brain Stimulation, Olfactory Bulb, Hippocampus, Seizure

SP220, Modulation of synaptic plasticity and cognitive function in rats by rabies glycoprotein c-terminal peptide

Hamid Gholami Pourbadie[1], Samira Choopani[1], Mohsen Ilkhanizadeh-Qomi[1], Esmail Dalvand[1], Mohammad Sayyah[1], Rouzbeh Bashar[2], Majid Golkar[3]

1. Department of Physiology and Pharmacology, Pasteur Institute of Iran, Tehran, Iran
2. WHO Collaborating Center for Reference and Research on Rabies, Pasteur Institute of Iran, Tehran, Iran
3. Department of Parasitology, Pasteur Institute of Iran, Tehran, Iran

Background: The rabies virus specifically infects brain neurons, and its wild-type strain inherently inhibits apoptosis. It encodes five proteins, including glycoprotein RVG, which integrates into the host cell's plasma membrane. Our previous research found that RVG expression in hippocampal cells enhances memory and potentiates synaptic plasticity, dependent on its PDZ-binding motif (PBM) located at the carboxyl terminus. In this study, we aim to express a peptide from the carboxyl end of RVG, named Neurovita 2 (NV2), in the dorsal hippocampus, to investigate its effects on learning, memory, and synaptic plasticity.

Methods: 2 µl of a lentiviral vector (108 T.U. /ml) carrying the NV2 or ΔNV2 (lacking the four C-terminal amino acids) genome was microinjected into the dorsal hippocampus of male Wistar rats. In a subsequent experiment, one week after the lentiviral vector treatment, we microinjected lipopolysaccharide (LPS) 30 minutes pre-training into the dorsal hippocampus. Spatial and inhibitory memory tests were done using the Morris water maze and shuttle box test, respectively. The presence of NV2/ΔNV2-expressing neuronal cells was confirmed through fluorescent microscopy after the rats were euthanized.

Results: Results showed that LPS impaired spatial learning and memory. However, NV2, but not ΔNV2, ameliorated the spatial learning and memory deficits in LPS-treated rats. Moreover, NV2 expression in the dorsal hippocampus mitigated LPS-induced deficits in both short- and long-term synaptic plasticity.

Conclusion: Our findings suggest that NV2 expression in the hippocampus can enhance synaptic function and improve memory performance in a neuroinflammation rat model, warranting further studies on its effects in neurodegenerative conditions.

Keywords: Rabies virus, Neurovita 2 (NV2), Synaptic Plasticity, Hippocampus, Learning and Memory

SP221, Alterations in dopaminergic and cholinergic neuronal excitability induced by prenatal stress: implications for neurodevelopmental disorders and addiction

Mohammad Shabani[1], Moazamehosadat Razavinasab[2]
1. Kerman Neuroscience Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
2. Department of Physiology and Pharmacology, Afzalipour School of Medicine, Kerman University of Medical Sciences, Kerman, Iran

Background: Neuronal activity within the mesocortical system is crucial in shaping susceptibility to drug addiction and neurodevelopmental disorders.
Methods: This study investigates the impact of prenatal stress on dopaminergic (DA) neurons in the ventral tegmental area (VTA) and cholinergic neurons in the laterodorsal tegmentum (LDT) using whole-cell patch-clamp techniques in adolescent male offspring.
Results: Ex vivo analysis of VTA slices revealed heightened excitability in DA VTA neurons and cholinergic neurons in the LDT. Cholinergic neurons displayed increased firing rates, lowered action potential thresholds, and enhanced Ih currents. Correspondingly, DA neurons exhibited elevated frequency and amplitude of spontaneous excitatory postsynaptic currents (sEPSCs), decreased rheobase, and reduced firing thresholds.
Conclusion: These results indicate that prenatal stress induces hyperexcitability in both dopaminergic and cholinergic systems, providing valuable insights into the neurobiological mechanisms associated with addiction and neurodevelopmental disorders.
Keywords: Brain development, Prenatal stress, Neurodevelopmental disorders

SP222, Dorsal hippocampal vulnerability and 5-ht7 receptor-mediated modulation: linking regional electrophysiological divergence to therapeutic response in autism

Mona Rahdar[1], Morteza Salimi[2], Mohammad Reza Raoufy[2], Mahyar Janahmadi[3]
1. Department of Physiology, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran
2. Department of Physiology, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran
3. Neuroscience Research Center and Dep. of Physiology, Institute of Neuroscience and Cognition and School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: The dorsal and ventral hippocampus (dHPC, vHPC) exhibit distinct electrophysiological and oscillatory properties that differentially support cognitive and emotional functions. Disruption of these regional dynamics has been implicated in autism spectrum disorder (ASD). In parallel, serotonergic dysfunction, particularly involving the 5-HT7 receptor (5-HT7R), has emerged as a key contributor to hippocampal circuit abnormalities in ASD. In this study, we examined dorsal-ventral hippocampal vulnerability and evaluated whether 5-HT7R modulation could reverse electrophysiological and behavioral deficits in a prenatal valproic acid (VPA) model of autism.
Methods: Male rats prenatally exposed to VPA underwent behavioral assessments of social interaction, repetitive behavior, cognition, and motor coordination. Whole-cell patch-clamp recordings were performed in CA1 pyramidal neurons of the dHPC and vHPC to assess intrinsic excitability. In vivo local field potentials were recorded to analyze oscillatory activity across specific frequency bands during awake immobility. The effects of chronic 5-HT7R activation were tested using the selective agonist LP-211.
Results: VPA-exposed rats exhibited robust ASD-like behaviors. Electrophysiological analyses revealed region-specific alterations, with significantly increased excitability in dorsal CA1 neurons compared to ventral counterparts. Oscillatory recordings demonstrated enhanced delta and theta power and disrupted gamma activity, predominantly in the dHPC. Autism induction was associated with upregulation of 5-HT7Rs in CA1. Activation of 5-HT7Rs with LP-211 restored neuronal excitability, improved synaptic function, and alleviated behavioral deficits, including stereotypy, anxiety, motor dysfunction, and cognitive impairments.
Conclusion: These findings highlight dorsal hippocampal hyperexcitability and aberrant network oscillations as core features of ASD. Importantly, 5-HT7R-mediated modulation restored hippocampal function and behavior, suggesting that targeting serotonergic mechanisms may represent a promising therapeutic strategy for autism.
Keywords: Autism, Hippocampus, Neuronal Excitability, Oscillatory Activitiy, 5-HT7R

SP223, Intra-nasal air-puffing ameliorates cognitive function in acutely sleep-deprived individuals

Hanieh Riazi[1], Amir Shojaei[1]
1. Department of Physiology, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran

Background: Acute sleep deprivation, affecting over 30% of the global population, leads to significant cognitive deficits like reduced alertness and impaired attention. Despite its widespread occurrence, effective interventions remain limited. This study investigated the effect of intra-nasal air-puffing on cognitive impairments resulted from partial acute sleep deprivation, utilizing behavioral assessments and electroencephalography (EEG).
Methods: We recruited 26 adult participants (male and female) who first underwent an EEG recording and a numerical Stroop test (NST) to establish baseline cognitive performance. Subsequently, participants restricted their sleep to 3-7 a.m. for next 24 h. The following day, the control group performed NST with normal breathing, while the air-puff treated group received a 3-min intra-nasal air-puffing at 5 Hz before the test. We then assessed changes in EEG activity and cognitive performance.
Results: Acute sleep deprivation in the control group resulted in significant cognitive impairments in NST, including increased error rate, decreased reaction time, and reduced percentage of missing rate. Intra-nasal air-puffing in the treatment group, mitigated the effect of acute sleep deprivation on NST parameters. In addition, applying intra-nasal air-puff following sleep deprivation restored the changes in the power of both low-frequency (delta and theta) and high-frequency (beta and gamma) brain oscillations, and recovered EEG signal complexity. Furthermore, intra-nasal air-puff application recovered functional connectivity within the default mode network, particularly in the gamma band.
Conclusion: These findings suggest that olfactory epithelium stimulation using intra-nasal air-puff can alleviate cognitive impairments induced by acute sleep deprivation, likely by restoring neural activity in cognitive processing regions.
Keywords: Acute Sleep Deprivation, Electroencephalography, Numerical Stroop Test, Olfactory Epithelium Stimulation, Cognitive Function

SP224, Combination therapy in alzheimer disease

Vahid Hajali[1] and Bahareh Paivar[2]
1. Department of Neuroscience, School of Medicine, Medical University, Mashhad, Iran
2. Faculty of Nursing, Medical University, Quchan, Iran

Background: Alzheimer's disease (AD) is the prominent cause of dementia worldwide. Although the number of AD patients is rapidly growing, to date, there is no effective treatment for this neurodegenerative disorder. The majority of current management of patients with AD involves the development of drugs that only provide symptomatic treatment. Since AD pathogenesis is complex and multifactorial, use of multimodal pharmacological and non-pharmacological interventions addressing several molecular targets involved in AD pathological processes could be an efficient approach to modify the course of AD progression. The cholinesterase inhibitors (ChEIs) and non-competitive NMDA receptor antagonist are two classes of medications have been approved for the treatment of AD.
Methods: This review comprises key studies in terms of the efficacy, safety and tolerability of combination therapy in AD. Relevant experimental and clinical studies were identified through PubMed and Google scholar search.
Results: It was found through the several clinical and pre-clinical studies that efficacy of combination therapy for alleviating the clinical and pathological features of AD is higher than that of monotherapy. Moreover, it was highlighted that combination therapy could be more effective, mostly when started early, at slowing the rate of cognitive impairment.
Conclusion: This review shows that combining multimodal pharmacological and non-pharmacological interventions could potentially provide a superior advantage over monotherapy for treatment of moderate to severe AD patients.
Keywords: Alzheimer's disease, Combination therapy, Monotherapy

SP225, Neural over-excitability linked to Kir4.1 astrocytic channel loss in valproate-induced autism

Shima Davoudi[1], Mahyar Janahmadi[2], Gila Behzadi[2]
1. Neurophysiology Research Center, Institute of Neuroscience and Cognition, Shahid Beheshti University of Medical Sciences, Tehran, Iran
2. Department of Physiology, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: Autism spectrum disorder is a neurodevelopmental condition marked by impaired social communication and neuronal hyperexcitability. Astrocytic Kir4.1 channels play a critical role in maintaining neuronal stability by clearing excess extracellular potassium during neuronal activity. Although gain-of-function mutations in astrocytic Kir4.1 channels have been reported in children with ASD, the underlying pathophysiological mechanisms remain unclear. This study investigates the contribution of astrocytic Kir4.1 channel dysfunction to neuronal excitability in a valproic acid (VPA)-induced autism model, using PA6 as a selective Kir4.1 inhibitor.
Methods: Electrophysiological properties of hippocampal CA1 pyramidal neurons were assessed via whole-cell patch-clamp recordings in the presence of PA6 (3 μM) in aCSF. Moreover, cresyl violet staining was employed to measure neuronal soma size and evaluate passive membrane property alterations.
Results: Both astrocytic Kir4.1 inhibition in control rats and prenatal VPA exposure led to increased input resistance and voltage threshold, alongside reduction in time constant, membrane capacitance, utilization time, rheobase, and latency of onset-hallmarks of i neuronal hyperexcitability. Notably, Kir4.1 inhibition did not further alteration neuronal output in VPA-exposed offspring. In addition, PA6 treatment in control animals resulted in a shift toward smaller soma sizes in CA1 pyramidal neurons.
Conclusion: The findings suggest that astrocytic Kir4.1 channel dysfunction contributes to neuronal hyperexcitability, resembling the excitability profile observed in VPA-induced autism. Kir4.1 channels may therefore represent a promising therapeutic target for modulating neural activity in ASD.
Keywords: Autism Spectrum Disorder, Valproic Acid, Kir4.1 Channel, Neuronal Excitability

SP226, Electrophysiological characteristics and clinical outcomes in children with cardiac arrhythmia undergoing electrophysiological study and ablation

Feisal Rahimpour[1], Zeinab Tanouri[1]
1. Angiography operating room, Imam Reza Hospital, University of Medical Sciences, Mashhad, Iran

Background: Catheter ablation is an established therapy for pediatric arrhythmias. This study aims to describe the electrophysiological (EP) characteristics, ablation targets, and clinical outcomes in a pediatric cohort undergoing EP study and ablation.
Methods: We conducted a retrospective analysis of 87 pediatric patients (54% male, mean age 10.58 ± 4.63 years) who underwent EP study and ablation. Data collected included demographic details, cardiac anatomy, baseline ECG, indication for procedure, detailed EP parameters pre- and post-ablation, ablation target, acute results, and complications. Statistical analysis included descriptive statistics and cross-tabulations with chi-square tests.
Results: The most common cardiac anatomy was normal (43.7%). Documented Paroxysmal supraventricular tachycardia (PSVT) was the primary indication (55.2%). The most frequently induced arrhythmia was Atrioventricular nodal reentry tachycardia (AVNRT) (29.9%), followed by Atrioventricular reentrant tachycardia (AVRT) (21.8%). The most common ablation target was the slow pathway (26.4%). The acute success rate was high (93.1%), with a very low complication rate (1.1%). Pre-ablation, the mean cycle length was 702.97 ms, PR interval 123.10 ms, and QT interval 368.74 ms. Post-ablation, there were significant changes in several parameters, including a shortening of the VA Wenckebach point (from 341.09 ms to 287.81 ms). No statistically significant associations were found between sex and other categorical variables like cardiac anatomy, indication, or outcome.
Conclusion: This study provides a detailed profile of EP characteristics in a pediatric population, demonstrating successful outcomes across a variety of substrates and arrhythmia mechanisms, with a low incidence of complications.
Keywords: Pediatric Cardiology, Catheter Ablation, Electrophysiology, Arrhythmia, AVNRT, AVRT, Outcomes

SP227, Neonatal NMDA blockade alters the LTP, LTD and cognitive functions in male and female Wistar rats

Nastaran Golitabari[1], Forouzan Mohammadian[1], Mohammad Amani[1]
1. Department of Physiology, Medicine faculty, Ardabil University of Medical Sciences, Ardabil, Iran

Background: There is compelling evidence that neonatal blockade of NMDA receptors by phencyclidine (PCP) is associated with cognitive impairment in adulthood but little is known about the effects of early life PCP treatment on synaptic function later in life. Here, we sought to determine whether early life exposure to PCP alters the electrophysiologic function of hippocampal CA1 neurons in adult rats. this study suggests that blockade of NMDA receptors during early life deteriorates the short-term and long-term synaptic plasticity and complex response profile of CA1 neurons in adulthood.
Methods: Male and female Wistar rats received either saline or PCP postnatal days 7, 9, and 11, and then underwent separate behavioral and electrophysiology tests in adulthood. For electrophysiology study a concentric bipolar stimulating electrode was placed in Schaffer collateral pathway and a recording electrode was lowered into the CA1 stratum radiatum until the maximal response was observed.
Results: Neonatal PCP treatment did not alter basic synaptic transmission and had only a modest effect on frequency following capacity but significantly decreased the paired-pulse facilitation in the Schaffer collateral pathway.
Conclusion: The electrophysiology data were comparable in male and female rats and reliably associated with impaired spatial reference and working memories in these animals. Overall, this study suggests that blockade of NMDA receptors during early life deteriorates the short-term and long-term synaptic plasticity and complex response profile of CA1 neurons in adulthood.
Keywords: NMDA receptors, PCP, Learnind and Memory, Synaptic Plasticity

SP228, Epilepsy, cognitive impairments and dopaminergic system

Abdolrahman Sarihi[1], Maryam Sharifi[1], Javad Mirnajafi-Zadeh[2]
1. Neurophysiology Research Center, Hamadan University of Medical Sciences, Hamadan, Iran
2. Department of Physiology, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran

Background: Epilepsy is the third most common neurological disorder that affects 1–2% of the global population. Recurrent seizure in epilepsy caused neuronal hyperexcitability and cognitive impairments. Synaptic responses in the hippocampus may be modulated by different neurotransmitters including dopamine. As a part of serial studies, we investigated the role of dopamine receptor subtypes in synaptic plasticity and working memory impairments in kindled rats.
Methods: Chemical kindling was induced through intraperitoneal injection of a sub-threshold dose (37.5 mg/kg) of pentylentetrazole (PTZ) every other day in adult rats. After achieving full-kindled state, working memory was assessed by Y-maze test in separate groups. Quinpirole hydrochloride (D2-like receptor agonist; 5µg/2.5µL) or SKF38393 hydrochloride (D1-like receptor agonist; 5 and 10µg/µL) were microinjected into the lateral ventricle 30 or 25 min before behavioral test. Haloperidol (D2-like receptor antagonist; 2µg/µL) was given 15 minutes prior to the administration of quinpirole hydrochloride.
Results: Our results demonstrated that activation D2-like receptors by quinpirole hydrochloride restored working memory impairment in PTZ-kindled rats. Haloperidol completely blocked the effect of quinpirole hydrochloride in kindled rats. On the other hand, activation of D1-like receptors by SKF38393 had not significant effects on memory impairment in kindled rats.
Conclusion: These findings suggest that targeting D2-like receptors may offer new therapeutic strategies for cognitive impairments in epilepsy.
Keywords: Epilepsy; Dopaminergic System; Working Memory; PTZ Kindling

SP229, Participation of ventral tegmental area in social memory encoding in rats

Mahsa Ahmadi[1], Sana M Barghi[1], Javad Mirnajafi-Zadeh[1,2], Amir Shojaei[1,2]
1. Physiology Department, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran
2. Institute for Brain and Cognition, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran

Background: Social memory is essential for species that live in social groups. The ventral tegmental area (VTA), a midbrain structure, plays a key role in social behaviors, yet its specific role in social memory is not completely understood. In this study, we aimed to investigate the involvement of the VTA in social memory and the related dopaminergic pathways through a pharmacological approach.
Methods: Male Wistar rats (weighing 270-290 g) were exposed to a 10-minute familiarization session with a novel animal. Two hours later, a social memory test was performed using three-chamber test. In one group, the VTA was inhibited during the familiarization session via injection of lidocaine hydrochloride (2%, 0.5 µL). To explore the dopaminergic pathways involved in social memory formation, haloperidol (100 nM, 0.5 µL) was administered before the familiarization session. It was injected into the medial septum or ventral hippocampus in separate groups. Local field potentials were recorded during the familiarization session.
Results: Inhibition of the VTA during the familiarization phase significantly impaired social memory. Furthermore, blocking dopamine receptors in the ventral hippocampus had no effect on social memory, while blockade in the medial septum significantly reduced the memory discrimination index. It also diminished functional connectivity between the ventral hippocampus, medial prefrontal cortex, and VTA during memory encoding.
Conclusion: These findings suggest that the VTA is involved in the formation of social memory, at least partially via the dopaminergic projection to the medial septum.
Keywords: Social Memory, Ventral Hippocampus, Ventral Tegmental Area, Dopamine Receptors, Local Field Potentials

SP230, The role of dopamine D2-like receptors on hippocampal long-term potentiation in control and kindled rats

Maryam Sharifi[1,2], Shahrbanoo Oryan[1], Alireza Komaki[2,3], Abdolrahman Sarihi[2,3], Javad Mirnajafi-Zadeh[4]
1. Department of Animal Biology, Faculty of Biological Science, Kharazmi University, Tehran, Iran
2. Neurophysiology Research Center, Hamadan University of Medical Sciences, Hamadan, Iran
3. Department of Neuroscience, School of Sciences and Advanced Technology in Medicine, Hamadan University of Medical Sciences, Hamadan, Iran
4. Department of Physiology, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran

Background: The precise functions of dopamine D2-like receptors in modulating synaptic plasticity in seizure remain poorly understood. This study investigates the impact of D2-like receptors on synaptic plasticity in the CA1 region of the hippocampus following kindled seizures in rats.
Methods: The animals were categorized into kindled and control groups. Kindling was achieved through a series of injections with a sub-convulsive dose of pentylenetetrazole (PTZ; 37.5 mg/kg). Field potentials were recorded from the stratum radiatum of the CA1 region following stimulation of the Schaffer collaterals in anesthetized rats. Long-term potentiation (LTP) was generated and the effect of quinpirole hydrochloride, a D2-like receptor agonist (microinjected into the lateral ventricle 30 minutes before the induction of LTP) was investigated. Haloperidol, a D2-like receptor antagonist, was also used to check whether D2-like receptor are involved.
Results: Our study reveals that the activation of D2-like receptors has a complex, dual impact on LTP in control and kindled animals. In control rats, the administration of quinpirole (at doses of 2.5, 5, 10, and 20 μg/2.5 μL) produced a U-shaped effect on synaptic plasticity. In contrast, in kindled rats, a microinjection of quinpirole (5 μg/2.5 μL) was able to restore LTP that had been compromised. Furthermore, haloperidol (2 μg/μL), effectively inhibited the effects induced by quinpirole in both experimental groups.
Conclusion: These findings emphasized the essential function of D2-like receptors in mediating synaptic plasticity, revealing their significant therapeutic potential for mitigating neural dysfunction associated with seizure.
Keywords: D2-like Receptor; Seizure; Hippocampus; Long-Term Potentiation

SP231, Post-encoding ventral tegmental area inhibition impairs social memory consolidation in rats

Zahra Abdi[1], Mahmoud Rezaei[1], Javad Mirnajafi-Zadeh[1], Amir Shojaei[1]
1. Department of Physiology, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran

Background: Social memory is essential for healthy social interactions. While the ventral hippocampus and medial prefrontal cortex (mPFC) are known to support its formation, the ventral tegmental area's (VTA) role—despite its influence on hippocampal activity—remains unclear. This study examines whether the VTA contributes to social memory consolidation.
Methods: Rats underwent surgery for electrode implantation in the mPFC, ventral hippocampus, and VTA, along with bilateral VTA cannula insertion. After recovery and habituation, they were exposed to a novel conspecific (encoding), followed by 2 hours of sleep (consolidation), then tested for social memory (retrieval). Immediately post-encoding, animals received lidocaine or saline in the VTA. Local field potentials were recorded during memory retrieval phase of the social memory assessment.
Results: Bilateral VTA inhibition with lidocaine after exposure to a novel conspecific significantly reduced the discrimination index in the social memory test. Exploration time did not differ between groups, and no correlation was found between discrimination index and exploration, indicating a specific impairment in social memory. No such effect was seen in object recognition. VTA inhibition also altered theta and gamma oscillatory power in the mPFC, ventral hippocampus, and VTA.
Conclusion: VTA activity is required for the consolidation of social memory, but not for object recognition memory. This highlights the VTA's specific contribution to the consolidation of socially relevant experiences. The VTA likely participates in this process by modulating neuronal population activity in the consolidation of social memory.
Keywords: Social Memory, Memory Consolidation, Ventral Hippocampus, Medial Prefrontal Cortex, VTA

SP232, Evaluation of the protective effect of ethyl vanillin on behavioral changes in a male rat model of Alzheimer's disease: the role of oxidative stress

Alireza Komaki[1], Leila Karimitabar[2], Masoumeh Rashno[3], Masoumeh Kourosh Arami[2], Fatemeh Ramezani Aliakbari[2], Shahab Ghaderi[1]

1. Department of Neuroscience, School of Science and Advanced Technologies in Medicine, Hamadan University of Medical Sciences, Hamadan, Iran
2. Department of Physiology, School of Medicine, Hamadan University of Medical Sciences, Hamadan, Iran
3. Asadabad School of Medical Sciences, Asadabad, Iran

Background: Alzheimer's disease (AD) is a common neurodegenerative disorder that primarily affects the elderly and lacks a definitive cure. Given the antioxidant properties and positive effects of antioxidants in AD, this study investigated the protective effect of ethyl vanillin (EV), a potent antioxidant, on behavioral changes, focusing on oxidative stress in a male rat model of AD.
Methods: Thirty-two adult male Wistar rats were randomly assigned to four groups: control; ethyl vanillin (EV, 30 mg/kg/day); aluminum chloride ($AlCl_3$, 100 mg/kg/day); and EV + $AlCl_3$, all administered by gavage for 42 days. Learning and memory were assessed using the shuttle box (passive avoidance learning), novel object recognition (cognitive memory), Morris water maze (spatial memory), and open field (locomotor activity) tests. Anxiety-like behavior was evaluated by the elevated plus maze. Biochemical data were obtained using colorimetric kits and a spectrophotometer.
Results: $AlCl_3$ significantly impaired passive avoidance, spatial and recognition memory, and locomotor activity. EV treatment improved all behavioral parameters and showed anxiolytic effects. $AlCl_3$ reduced SOD, GPx, CAT activities and GSH levels, while increasing MDA in the cortex and hippocampus. EV reversed these biochemical alterations and reduced oxidative stress.
Conclusion: Ethyl vanillin demonstrated significant neuroprotective effects in the male rat model of AD and improved behavioral and cognitive functions. Moreover, ethyl vanillin reduced lipid peroxidation and oxidative stress through enhancing the level of various enzymes, thereby exerting neuroprotective effects. Therefore, it can be concluded that EV shows promising potential as a therapeutic agent for AD and possibly other neurodegenerative disorders.
Keywords: Alzheimer's Disease; Ethyl Vanillin; Oxidative Stress; Behavioral Effects

SP233, Young plasma transfusion improves resilience to chronic stress in elderly rats through the AMPK/SIRT1/PGC-1α pathway in the hippocampus

Arshad Ghaffari-Nasab[1,2], Gonja Javani[3], Pouya Karimi[1,2]
1. Department of Basic Medical Sciences, Maragheh University of Medical Sciences, Maragheh, Iran
2. Drug Applied Research Center, Tabriz University of Medical Sciences, Tabriz, Iran
3. Neurosciences Research Center, Tabriz University of Medical Sciences, Tabriz, Iran

Background: Aging-related cellular and molecular alterations in the brain contribute to behavioral deficits and reduced resilience to stress. Evidence suggests that factors in young plasma may exert restorative effects in age-related disorders. This study aimed to investigate the effect of young plasma therapy on stress resistance and the mitochondrial biogenesis pathway in the hippocampus of aged rats subjected to chronic mild stress.
Methods: 30 male Wistar rats (20-22 months old) were divided into three groups: control, chronic mild stress (CMS), and stress plus young plasma (CMS+YP). Animals in the CMS group underwent a four-week chronic mild stress protocol. The CMS+YP group experienced both chronic mild stress and administration of young plasma for four weeks.
Results: Behavioral assessments showed that young plasma treatment significantly improved stress-tolerance indices and reduced behavioral sensitivity to stress. Moreover, increased AMPK phosphorylation, SIRT1 expression, and PGC-1α activity confirmed the restoration of cellular energetic balance and improved mitochondrial function in hippocampal tissue.
Conclusion: Overall, the results of this study suggest that young plasma can be considered a promising biological approach to enhance stress resistance in aging. Activation of the AMPK/SIRT1/PGC-1α pathway, a key axis in regulating cellular and mitochondrial energy homeostasis, appears to partly mediate these effects.
Keywords: Aging, Chronic Stress, Young Plasma Therapy, Mitochondrial Energy Homeostasis

SP234, Comparative effects of rTMS and tACS on sleep architecture in rats: An EEG-based study

Farideh Bahrami[1,2], Zeinab Shankayi[1,2], Mehdi Niazi[1,2]
1. Neuroscience Research Centre, Baqiyatallah University of Medical Sciences, Tehran, Iran
2. Department of Physiology and Medical Physics, School of Medicine, Baqiyatallah University of Medical Sciences, Tehran, Iran

Introduction: Specifically, repetitive transcranial magnetic stimulation (rTMS) generates depolarizing electrical currents in neurons just beneath the scalp using localized magnetic fields. Several clinical trials have used this technique for neurological and psychiatric conditions, and positive effects on sleep parameters have been documented. However, the heterogeneity of results and variations in rTMS protocols indicate further research is necessary due to the heterogeneity of results. Transcranial electrical stimulation, on the other hand, appears to strengthen memory, regulate temporal lobe cortical activity, induce beta waves, and stabilize learned sequences the next day. This study investigates the effects of tACS stimulation on sleep and compares them with rTMS.
Methods: EEG and EMG recordings were used to investigate the sleep patterns of 20 Wistar rats. An experimental group of rats was divided into three groups: one group was stimulated by TMS at 1 and 10 Hz every day for one week, another group was stimulated by intraperitoneal injection of 125 grams of melatonin per rat, and a third group was not stimulated at all, they were not treated. Through a channel cannulated on the skull surface, stimulation with a conductive solution of normal saline at a rate of 15 mA for ten minutes at a frequency of 10 Hz was done in the tACS treated group.
Results: There were significant improvements in both REM (23%) and NREM (57%) sleep after rTMS with 1Hz ($P<0.001$). In contrast, the increase was better than the 10 Hz stimulation (19% in REM and 49% in NREM), ($P<0.01$), which was the same as melatonin effect, 18% in REM and 47% in NREM. There was also an increase of 21% and 46% in REM and NREM sleep following tACS stimulation.
Conclusion: In rats, rTMS stimulation with specific selective protocols increases REM and NREM sleep, which has a greater impact on rats at 1 Hz than at 10 Hz. In addition to TMS, a selective protocol increases rat sleep rates, but this effect is smaller for NREM sleep than for rTMS. Electrical and magnetic stimulations can increase sleep as well as the selected drug melatonin, and in some cases even better.
Keywords: rTMS, tACS, REM Sleep, NREM Sleep, Melatonin

SP235, Effects of tonic and phasic ventral tegmental area stimulation on learning-associated cell proliferation in the dentate gyrus

Zohreh Tavassoli[1, 2], Yaghoub Fathollahi[1]
1. Department of Physiology, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran
2. Neuroscience Research Centres, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: The ventral tegmental area (VTA) regulates hippocampal functions through dopaminergic signaling, but its role in modulating neurogenesis in distinct dentate gyrus (DG) sub-regions during learning is unclear. This study investigated how tonic (1 Hz) and phasic (100 Hz) VTA electrical stimulation affects learning-dependent cell proliferation in the dorsal (dDG), intermediate (iDG), and ventral (vDG) dentate gyrus.
Methods: A tripolar stainless steel electrode was implanted in the VTA. The VTA was stimulated using either a tonic protocol or a phasic protocol. To assess the effects of VTA stimulation on behavior, mice performed behavioral tasks such as the passive avoidance task and the Barnes maze with or without electrical stimulation. Cell proliferation was examined under different stimulation conditions, and dopamine receptor antagonists were used to link the effects specifically to VTA activation.
Results: Tonic stimulation impaired spatial learning in the Barnes maze but enhanced passive avoidance memory, whereas phasic stimulation had no effect. Tonic stimulation selectively increased cell proliferation in the iDG, an effect blocked by the dopamine D2 receptor antagonist haloperidol, whereas phasic stimulation showed no significant impact. Spatial training itself reduced the proliferation changes induced by VTA stimulation, emphasizing the interaction between learning and neurogenesis.
Conclusion: These findings suggest that VTA activity patterns differentially regulate neurogenesis along the DG axis, with tonic signaling preferentially targeting the iDG through D2 receptor-dependent mechanisms. The results demonstrate how VTA firing patterns integrate reward-related signals with hippocampal plasticity during distinct memory processes.
Keywords: VTA, Cell Proliferation Disparity, Hippocampus, Memory

SP236, Pharmacology-driven tissue repair: advances in regenerative wound healing

Ali M Sharifi[1,2]
1. Tissue Engineering Group (TEG), National Orthopaedic Centre of Excellence for Research and Learning (NOCERAL), Department of Orthopaedic Surgery, Faculty of Medicine, University of Malaya, Kuala Lumpur, 50603, Malaysia,
2. Department of Pharmacology, School of Medicine, Iran University of Medical Sciences, Tehran, Iran

Background: Pharmacology-Driven Tissue Repair: Advances in Regenerative Wound Healing" explores the evolving interface between drug therapeutics and regenerative biology, with a particular emphasis on how pharmacological modulation accelerates the regenerative capacity of endogenous and exogenous stem cells.
Methods: This lecture will detail how small molecules, biologics, and targeted delivery platforms can activate dormant resident stem and progenitor cells, enhance their proliferation, and guide lineage-specific differentiation to rebuild damaged tissue.
Results: Emerging evidence demonstrating how pharmacological cues reshape the wound microenvironment—by tempering excessive inflammation, promoting angiogenesis, optimizing extracellular matrix remodeling, and reducing oxidative and metabolic stress—will be highlighted as key drivers of endogenous repair. Additionally, the session will examine how pharmacologic agents significantly enhance the therapeutic performance of transplanted stem cells. These include drugs that increase cell survival, improve mitochondrial fitness, strengthen paracrine secretion of trophic and immunomodulatory factors, and overcome hostile wound conditions that limit engraftment. Examples such as pro-angiogenic mimetics, hypoxia-inducible factor stabilizers, antifibrotic drugs, and bioactive scaffolds will illustrate how combinatorial strategies can amplify stem-cell–mediated tissue regeneration.
Conclusion: Together, these advances showcase a new translational paradigm in which pharmacology does not merely support wound healing but actively orchestrates regenerative processes. By harnessing drug-driven enhancement of intrinsic and cell-based repair mechanisms, regenerative medicine is poised to deliver more durable, effective therapies for chronic wounds, trauma, and degenerative disease.

SP237, Mitochondrial transfer: mechanisms, therapeutic potential, and regenerative applications

Pezhman Hafez[1]
1. Yakin Health Management Sdn Bhd, Kuala Lumpur, Malaysia

Background: Mitochondrial dysfunction is increasingly recognised as a central mechanism underpinning biological aging and the progression of age-related diseases. Accumulation of mitochondrial DNA mutations, excessive reactive oxygen species generation, impaired oxidative phosphorylation, defective mitophagy, and disturbances in mitochondrial fusion–fission dynamics collectively impair cellular bioenergetics and accelerate functional decline. These changes contribute to genomic instability, metabolic insufficiency, and increased susceptibility to degenerative disorders, placing mitochondrial impairment at the core of multiple hallmarks of aging.
Methods: Therapeutic strategies aimed at restoring mitochondrial performance demonstrate growing potential. Pharmacologic agents such as Coenzyme Q10, Nicotinamide Mononucleotide, Resveratrol, Elamipretide (SS-31), and Methylene Blue have shown the ability to enhance ATP production, stimulate NAD^+-dependent mitochondrial biogenesis, reduce oxidative injury, and improve electron transport chain efficiency. Regenerative approaches, including mesenchymal stromal cell therapy, extracellular vesicle-mediated mitochondrial transfer, and direct mitochondrial transplantation, introduce complementary mechanisms by supplying functional mitochondria or mitochondrial components to compromised cells.
Results: Advances in biomarker development, including lactate-to-pyruvate ratio, FGF-21, GDF-15, and circulating cell-free mitochondrial DNA, support improved early detection of mitochondrial stress and more precise therapeutic monitoring. Despite promising findings, challenges persist in ensuring targeted mitochondrial delivery, immunological compatibility, and standardising quality-control measures for therapeutic mitochondria.
Conclusion: Overall, preserving mitochondrial function represents a foundational strategy for extending human healthspan, positioning mitochondrial-targeted interventions as a promising direction in longevity therapeutics.
Keywords: Mitochondrial Dysfunction; Aging Biology; Bioenergetics; Regenerative Therapies; Cellular Longevity

SP238, Drug eluting scaffolds: integrating drug delivery with tissue regeneration

Rana Imani[1]
1. Faculty Member of Biomedical Engineering Department, Amirkabir University of Technology (Tehran Polytechnic), Tehran, Iran

Background: Tissue engineering (TE) has revolutionized regenerative medicine by integrating scaffolds, cells, and bioactive molecules to repair or replace damaged tissues; the core triad of TE are scaffolds, cells, and biochemical signals. Although advances in biomaterials development and scaffold fabrication techniques have led to significant progress in TE, the effective delivery of bioactive agents, such as growth factors (GFs), antibiotics, anti-inflammatories, and small molecules, remains a challenge due to their short half-lives and uncontrolled release kinetics.
Methods: This presentation explores the synergistic potential of drug delivery systems (DDS) embedded within tissue-engineered scaffolds, emphasizing their role in enhancing regenerative outcomes through controlled spatiotemporal release of therapeutic agents.
Results: The drug-activated scaffolds as a transformative solution, combining structural support with localized, sustained drug release to modulate cellular behaviours (proliferation, differentiation, ECM production) and mitigate systemic side effects are highlighted.

SP239, The impact of bioactive phytochemicals on stem cells and their applications in regenerative medicine

Ahmad Ghorbani[1,2]
1. Pharmacological Research Center of Medicinal Plants, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Pharmacology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Nutrition plays a crucial role in the health and functionality of stem cells. A balanced diet rich in essential nutrients, including vitamins, minerals, and antioxidants, can support the ability of stem cells to repair damaged tissues. This article aims to review the effects of bioactive phytochemicals on the stem cell functions, along with their corresponding molecular mechanisms.
Methods: A comprehensive literature search was conducted using the Google Scholar, PubMed/Medline, and Scopus databases, employing keywords such as "stem cells" "phytochemicals" "flavonoids", "differentiation", and "herbal". The inclusion criteria focused on in vivo and in vitro studies examining the effects of phytochemicals on the proliferation, differentiation, and activities of stem cells.
Results: Bioactive phytochemicals derived from fruits, vegetables, and medicinal plants can modulate the stem cell microenvironment and influence their proliferation, differentiation, and secretions. These compounds, including flavonoids and anthocyanins, can protect various types of stem cells (such as adipose-derived stem cells and bone marrow-derived stem cells) from apoptosis induced by stressful conditions like hypoxia, radiation, and oxidative stress. The incorporation of bioactive phytochemicals into stem cell therapies may enhance the therapeutic efficacy of these treatments. This can involve pre-treating stem cells with specific phytochemicals before transplantation to improve their functional capacity. Furthermore, phytochemicals can be utilized to preserve stem cells during ex vivo expansion and storage.
Conclusion: Evidence suggests that bioactive phytochemicals can modulate stem cell function and have the potential to enhance the therapeutic efficacy of stem cells in regenerative medicine.
Keywords: Differentiation, Plants, Phytochemicals, Proliferation, Stem Cells

SP240, HUVEC-derived exosomes deliver curcumin to suppress breast cancer cell migration

Naime Majidi Zolbanin[1], Marziyeh Asadi[2], Shahram Emami[3], Reza Jafari[4], Vahid Shafiei-Irannejad[5]
1. Department of Pharmacology and Toxicology, Faculty of Pharmacy, Tabriz University of Medical Sciences, Tabriz, Iran
2. Student Research Committee, Urmia University of Medical Sciences, Urmia, Iran
3. Department of Pharmaceutics, School of Pharmacy, Urmia University of Medical Sciences, Urmia, Iran
4. Department of Medical Immunology, Sarab Faculty of Medical Sciences, Sarab, Iran
5. Cellular and Molecular Research Center, Cellular and Molecular Medicine Research Institute, Urmia University of Medical Sciences, Urmia, Iran

Background: Curcumin is a polyphenol known for its anti-cancer properties. However, its low solubility in water limits its delivery to cells. Exosomes are cell-derived vesicles that can serve as carriers for various substances, offering advantages such as improved solubility and immune evasion. In this study, the delivery of curcumin using exosomes derived from human umbilical vein endothelial cells (HUVECs) was investigated in triple-negative human breast cancer cells (MDA-MB-231).
Methods: HUVECs were cultured to extract exosomes. Then, Curcumin-loaded exosomes were characterized by HPLC, DLS zeta sizer, TEM, and flow cytometry methods. Subsequently, MDA-MB-231 cells were cultured, and cell viability, scratch healing test, and expression levels of MMP9—a protein involved in cell migration—were evaluated.
Results: The results showed the curcumin-loaded exosomes had an acceptable shape and particle size (40-200 nm). The amount of curcumin encapsulated within the exosomes was confirmed by HPLC analysis. Curcumin-loaded exosomes produced a greater reduction in cancer cell viability than curcumin, significantly inhibited wound closure in the scratch healing assay, and markedly downregulated MMP-9 protein levels.
Conclusion: Curcumin-loaded exosomes exhibited anti-cancer effects by inhibiting the growth and migration of cancer cells, demonstrating significant potential as an effective treatment for cancer cells, in vitro. However, more investigations on animal models and clinical trials should be done in the future.
Keywords: Breast Cancer, Curcumin, Exosome, HUVEC, MDA-MB-231

SP241, Comparison between sodium valproate loaded chitosan with valproate encapsulated in liposome for the treatment of seizure in mouse

Iman Kamel Attar[1], Bahareh Amin[2], Hasan Azhdari Zarmehri[3], Iraj Kohsari[4], Ali Musavi Shayegh[5], Mahdiye Derakhshan[6], Mohammad Mohammadzadeh[7]

1. Department of Physiology and Pharmacology, School of Medicine, Sabzevar University of Medical sciences, Sabzevar, Iran
2. Department of Physiology and Pharmacology, School of Medicine, Sabzevar University of Medical sciences, Sabzevar, Iran
3. Department of Physiology, School of Medicine, University of Medical sciences, Torbat Heydarieh, Iran
4. Helsa Industry and Development Group, Tehran, Iran
5. Orthopedic Research Center, Ghaem Hospital, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
6. Helsa Industry and Development Group, Tehran, Iran
7. Cellular and Molecular Research Center, Sabzevar University of Medical sciences, Sabzevar, Iran

Background: Epilepsy is a chronic neurological disease that affects about 1% of the world's population. 30% of this 1% of people have drug-resistant epilepsy and do not respond well to existing medications. One hypothesis for these people is that there is a blood-brain barrier that does not allow the drug to pass through and therefore reach the brain. One way to overcome this problem is to use nanoparticles that can carry the drug inside and cross this barrier.
Methods: In this study, the drug sodium valproate was synthesized in the form of liposomal and chitosan formulations. Mice were epileptically induced using the pentylen tetrazole method. Four stages of seizures in mice were examine. Four groups of mice were separated, including control, valproate, liposome, and chitosan groups, and all three drugs (valproate, liposome-encapsulated drug, and chitosan-encapsulated drug) were compared with the control group for each stage of seizure separately.
Results: All three drugs significantly delayed the onset of the first phase.
All three drugs significantly delayed the onset of the second phase, and the effect of the nano-synthesized drugs was significantly greater. The effectiveness of chitosan was significantly greater than that of other drugs in delaying the onset of the fourth stage. The effectiveness of chitosan was significantly greater than that of other drugs in delaying the onset of the fourth stage. All drugs completely eliminated the fifth stage of seizures.
Conclusion: Ultimately, can be concluded that drugs synthesized using nanotechnology cross the blood-brain barrier to a greater extent and are available to the brain in higher concentrations, resulting in greater effects with lower doses and fewer side effects.
Keywords: Seizure, Epilepsy, Valproate, Chitosan, Liposome

SP242, Effect of α-bisabolol on SREBP1c, Caveolin-1, MCAD and apoB100 gene expression in Hepg2 cell line steatosis signaling pathway using 3d cell culturing

Farhad Manoochehri[1], Mohammad Raman Moloudi[2], Roozbeh Fakhimi[1], Zakariya Vahabzadeh[3], Esmaeil Izadpanah[3,4], Alina Abdollahi[3]

1. Medical Student, Student Research Committee, Kurdistan University of Medical Sciences, Sanandaj, Iran
2. Liver and Digestive Research Center, Kurdistan University of Medical Sciences, Sanandaj, Iran
3. Cellular and Molecular Research Center, Research Institute for Health Development, Kurdistan University of Medical Sciences, Sanandaj, Iran
4. Department of Medical Physiology and Pharmacology, Faculty of Medicine, Kurdistan University of Medical Sciences, Sanandaj, Iran

Background: This study aimed to investigate the effects of α-bisabolol, a natural compound with anti-inflammatory and antioxidant properties, on non-alcoholic fatty liver disease (NAFLD). Using a 3D HepG2 cell culture model, researchers evaluated how α-bisabolol influences the expression of SREBP1c, Caveolin-1, MCAD, and apoB100 genes involved in the steatosis signaling pathway.

Methods: In this experimental study, HepG2 cell line was used. Cells were cultured in DMEM (Dulbecco's Modified Eagle's medium) with 10% FBS (Fetal bovine serum) and 1% proper antibiotics. After that cells were treated with oleate and palmitate fatty acids in a ratio of 2 to 1 in the final concentration of 1.2 mM for 24 hours. Then for another 24 hours cells were treated with 1, 2.5 and 5 µM α-bisabolol using collagen-based 3D cell culturing. Finally, glutathione peroxidase activity and expression of SREBP1c, caveolin-1, apoB100 and MCAD genes were evaluated using one-way analysis of variance (one-way ANOVA) and Post Hoc tests in case of facing significant difference ($p<0.05$) between experimental groups.

Results: The findings showed that α-bisabolol at all concentrations significantly increased glutathione peroxidase activity ($p<0.05$). It also significantly reduced the expression of Caveolin-1, SREBP1c and apoB100 and increased expression of MCAD at all concentrations ($p<0.05$).

Conclusion: The results of this study showed that α-bisabolol with its antioxidant effects, reduction effect on Caveolin-1 and SREBP1c and increment effect on MCAD gene expression, has protective properties against NAFLD.

Keywords: α-Bisabolol, NAFLD, 3D cell culturing, Gene expression, Antioxidant

SP243, Regenerative potential of menstrual blood-derived exosomes

Elahe Mahdipour[1]
1. Department of Medical Biotechnology and Nanotechnology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Menstrual blood-derived stem cells (MenScs) produce exosomes which are highly regenerative. Exosomes or small extracellular vesicles are nanoscale secretory vesicles produced by almost all cells. They carry diverse cargos from nucleic acids to proteins and lipids thereby facilitate cellular communications. We have analyzed various regenerative potentials of these small vesicles using in vitro and in vivo disease models.
Methods: Streptozotocin was used to establish diabetes in animals. These animals were used to evaluate the regenerative benefits of MenSc-exosomes on wound healing process and well on regeneration of pancreatic beta islets. Burn model was created using exposure of skin to hot water for few seconds. In all models, treatments was applied after model confirmation. Various assays including, Real-Time PCR, Immunohistochemistry, angiogenesis, cell migration, coculture techniques were used to investigate the mechanism of MenSc-exosome regenerative effects.
Results: Results from wound healing experiments indicated that MenSc-exosomes have immune regulatory properties and reduce inflammation. Moreover, therapeutic applications of these exosomes significantly enhanced angiogenesis and reduced wound scar compared to untreated groups. MenSc-exosomes also hasten the re-epithelialization and wound closure. These results were further confirmed in in vitro studies. Using streptozotocin induced diabetic model we could show that MenSc-exosomes regenerates pancreatic beta-cell islet mass through PDX-1 pathway.
Conclusion: Using various experimental models, we demonstrated diverse regenerative capabilities of MenSc-exosomes. Among their extensive potentials, induction of angiogenesis and regulation of inflammation and immune responses seem to be fundamental to their regenerative effects.
Keywords: Menstrual Blood, Stem Cell, Exosome, Regeneration, Repair

SP244, The liver as an endocrine organ: The hepatokines

Mohammad Khaksari Haddad[1]
1. Physiology and Pharmacology Department, Kerman University of Medical Sciences, Kerman, Iran

Background: The liver is major organ that secretes several factors that act as endocrine or paracrine signals. These include-fetuin-A, FGF21, betatrophin, selenoprotein P, IGF-1, HGF, and ANGPTL family– will be briefly described here.
Results: Fetuin-A is a glycoprotein secreted from the liver under conditions of high glucose levels. Elevated glucose induces the liver to secrete fetuin-A, which caused insulin resistance on both skeletal muscle and liver, thus inducing a diabetic stat e. In contrast, in mice, FGF-21 is secreted from the liver and induces increased insulin sensitivity. In humans, however, insulin sensitivity may be reduced by FGF-21. In mice, it also may be responsible for fasting-induced inhibition of reproduction. Betatrophin is a liver hormone that induces proliferation of pancreatic β-cells and a higher output of insulin in mice. Selenoprotein P is a glycoprotein and it regulates selenium metabolism, but its excess related to insulin resistance and cardiovascular disease.IGF-1 synthesized mainly in the liver, and it involved in anabolic effects, bone growth, cell proliferation, protein synthesis, energy metabolism, aging ,neurogenesis, growth disorders, sarcopenia, and neoplastic risk.HGF is synthesized by mesenchymal cells of liver and it exerts pleiotropic effects, including: liver regeneration, renal repair, angiogenesis, neurogenesis, immune modulation, and contributes to energy metabolism and insulin sensitivity. ANGPTL (Angiopoietin-like) family proteins, ANGPTL3, and 4, regulate lipid metabolism, may have inflammatory or proangiogenic effects in cancer. ANGPT6, stimulates energy expenditure, improve insulin sensitivity and has metabolic protective effects.
Conclusion: This review highlights the role of novel hepatokines integrating liver biology with management of metabolic diseases and inflammation.
Keywords: Hepatokines, Metabolic Diseases, Inflammation, Endocrine Function, Liver

SP246, The effects of peptide if7-conjugated dendrimer loaded with doxorubicin on colorectal cancer

Omid Reza Tamtaji[1], Mehdi Shafiee Ardestani[2], Abdolkarim Talebi Taheri[3], Hamed Mirzaei[4], Fatemeh Nabavizadeh[1,5]

1. Electrophysiology Research Center, Neuroscience Institute, Tehran University of Medical Sciences, Tehran, Iran
2. Department of Radio Pharmacy, Faculty of Pharmacy, Tehran University of Medical Sciences, Tehran, Iran
3. Department of Clinical Biochemistry, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
4. Research Center for Biochemistry and Nutrition in Metabolic Diseases, Kashan University of Medical Sciences, Kashan, Iran
5. Department of Physiology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran

Background: Colon cancer prevalence and mortality are increasing. Long-term treatment of this disease with chemotherapy drugs such as doxorubicin is often accompanied by drug resistance and cardiovascular complications, Therefore, reducing the side effects associated with these drugs is very important, a promising strategy to reduce the side effects of these drugs is the use of nanotechnology-based drug delivery systems. The study aimed to investigate effect of a dendrimer targeted with peptide IF7 containing doxorubicin (DOX) in a HCT116 colon cancer cell line.
Methods: Dendrimer targeted with peptide IF7 containing doxorubicin was synthesized. Then, the effects of this formulation evaluated in vitro on the HCT116 colon cancer cell line. The IC50 of the nanodrug was investigated using MTT. Effect of the nanodrug on the expression of Caspase 3, Bcl-2, and Bax proteins was investigated using Western blotting, and apoptosis was investigated using flow cytometry in the HCT 116 colon cancer cell line.
Results: The synthesized dendrimer targeted with peptide IF7 containing doxorubicin showed lowest IC50 compared to dendrimer without peptide IF7 ($p<0.0001$). In addition, it reduced the amount of Bcl2 proteins and increased the levels of Bax and caspase 3 proteins ($p<0.0001$). Flow cytometry results also showed significant apoptosis in the dendrimer targeted with peptide IF7 containing doxorubicin group ($p<0.0001$).
Conclusion: The formulation of dendrimer targeted with peptide IF7 to form a nanocarrier for doxorubicin had the ability to enhance drug delivery by precisely targeting colon cancer cells. It also regulated proteins involved in the apoptosis pathway.
Keywords: Colon Cancer, Dendrimer, Doxorubicin

SP247, Therapeutic effect of an anti-tuberculosis agent, isoniazid, and its nano-isoform in ulcerative colitis

Atieh Yaghoubi[1,2], Fereshteh Asgharzadeh [3], Majid Khazaei [3], Saman Soleimanpour [1,2]
1. Antimicrobial Resistance Research Center, Bu-Ali Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Microbiology and Virology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
4. Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Isoniazid (INH), a first-line anti-tuberculosis drug, also exhibits anti-inflammatory activity by inhibiting IL-1 and ROS production, activating PPARγ expression, and inhibiting NF-κB and AP-1 activity. This study investigates the anti-inflammatory effect of INH, alone and in combination with sulfasalazine-loaded nanoparticles (NPs), in a mouse model of ulcerative colitis.
Methods: To investigate the anti-inflammatory effect of INH and NPs in the ulcerative colitis mouse model, we evaluated the effect of INH on clinical symptoms and colonic mucosal histology in colitis.
Results: The present study demonstrates that the combination therapy of INH with sulfasalazine, as well as NPs, reduces the symptoms of ulcerative colitis and improves disease activity index, including body weight, diarrhea, rectal bleeding, colonic length, spleen weight, and colon histopathological score in the DSS-induced colitis mice model.
Conclusion: Our results suggest that the nanoforms of INH with sulfasalazine enhance the therapeutic effect of the drugs in the treatment of ulcerative colitis.
Keywords: Anti-Tuberculosis Agent, Isoniazid, Nano-Isoform, Ulcerative Colitis

SP248, Ameliorative effect of hepatocytes and hepatocyte-derived exosomes on ccl_4-induced liver fibrosis in male wistar rats

Sahar Rahimi[1], Ali Derakhshani[2], Nader Shahrokhi[3], Seyedeh Mahdieh Khoshnazar[4]
1. Physiology Research Center, Kerman University of Medical Sciences, Kerman, Iran
2. Research Center for Hydatid Disease in Iran, School of Medicine, Kerman University of Medical Sciences, Kerman, Iran
3. Physiology Research Center, Kerman University of Medical Sciences, Kerman, Iran
4. Gastroenterology and Hepatology Research Center, Institute of Basic and Clinical Physiology Sciences, Kerman University of Medical Sciences, Kerman, Iran

Background: Chronic liver injury frequently culminates in hepatic fibrosis, a condition driven by activated stellate cells and the excessive deposition of collagen. Hepatocytes combat this by restoring parenchymal function, yet their role extends beyond direct tissue repair. Exosomes serve as key mediators of intercellular signaling, exerting potent antifibrotic effects while fostering an environment conducive to regeneration.
Methods: Liver fibrosis was induced in male Wistar rats via CCl4 injection. Following eight weeks of exposure, treatment was administered via tail vein injection using hepatocytes and hepatocyte derived exosomes dilated in PBS. Control groups received nothing in negative control group, olive oil in sham group, CCl4 for fibrosis group, PBS for PBS control group after ccl4 injection. Biochemical markers, oxidative stress indices, protein expression (α-SMA, Desmin), and gene expression were evaluated.
Results: The fibrosis group exhibited extensive liver damage, including significant fibrous tissue deposition, elevated liver, metabolic disturbances (increased plasma glucose, uric acid, cholesterol, triglycerides), and oxidative stress. Fibrosis markers were highly expressed, including α-SMA and Desmin as well as fibrosis-related genes. Treatments significantly alleviated fibrosis associated damage. Demonstrating reductions in AST, ALT, metabolic markers, oxidative stress, and gene expression of MMP2, PDGFRB, TGF-β, TMEM176b, and TMSB10. Histological analysis revealed minimal residual fibrosis, reinforcing their potential as a promising cellular and non cellular therapeutic approach for liver fibrosis.
Conclusion: Hepatocytes and hepatocyte derived exosomes demonstrated therapeutic potential for liver fibrosis, these findings highlight the promise of Hepatocyte derived exosomes as an advanced, cellular and non-cellular therapeutic strategy for hepatic fibrosis.
Keywords: Liver Fibrosis, Hepatocyte, Extracellular Vesicles, CCl4, Hepatocyte Derived Exosomes

SP249, The role of gut microbiota in hippocampal synaptic plasticity alteration induced by chronic morphine administration

Negin Saeedi[1], Fereshteh Pourabdolhossein[2], Masoud Dadashi[3], Mahyar Janahmadi[1], Gila Behzadi[1], Narges Hosseinmardi[1]

1. Department of Physiology, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran
2. Department of Physiology, School of Medicine, Babol University of Medical Sciences, Babol, Iran
3. Department of Microbiology, School of Medicine, Alborz University of Medical Sciences, Karaj, Iran

Background: The gut-microbiota-brain axis is implicated in the pathology of substance use disorders. Given the brain's ability to reorganize itself in response to internal and external stimuli, opioid-induced dysbiosis may lead to modulation of synaptic plasticity in various brain regions, including the hippocampus. In this study, fecal microbiota from a saline donor was transplanted into morphine-treated rat to assess the effects of gut microbiota on electrophysiological properties.
Methods: Fecal donor rats received saline (1 ml) subcutaneously every 12 hours for 9 days. The microbiota of these donor animals was then gavage into the recipient animals every 24 hours for 17 days. After 7 days of gavage, recipient animals were treated with morphine (10 mg/kg) subcutaneously for 9 days. After the rats were made dependent on morphine, synaptic plasticity (short-term and long-term) was examined using field potential recordings from the hippocampal CA1 region following stimulation of the Schaffer-collateral pathway.
Results: Following high-frequency stimulation to induce long-term potentiation, the slope of the excitatory postsynaptic field potential was increased in morphine-treated animals. FMT from saline donor rats reduced morphine-induced LTP.
Conclusion: Dysbiosis induced by chronic morphine administration induces metaplasticity. The results demonstrate the modulating effects of FMT from saline donors on synaptic plasticity.
Keywords: Addiction, Synaptic Plasticity, Gut-Brain Axis, Microbiota, Hippocampus

SP250, Comparative effects of calorie restriction and time-restricted feeding on reducing hepatic inflammation in aged rat

Alireza Raji-Amirhasani[1,2], Mohammad Khaksari[1,2]
1. Endocrinology and Metabolism Research Center, Kerman University of Medical Sciences, Kerman, Iran
2. Physiology Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran

Background: Aging is a process associated with chronic low-grade inflammation (inflammaging), which can impair liver function and predispose individuals to diseases such as non-alcoholic fatty liver disease (NAFLD) and liver fibrosis. Reducing inflammation through dietary interventions is considered an effective approach to improving liver health in the elderly. This study was designed to compare the effects of two dietary regimens, calorie restriction (CR) and time-restricted feeding (TRF), on hepatic inflammation in aged rats.
Methods: In this experimental study, aged rats were divided into three groups: a control group with ad libitum feeding, a CR group that received a diet with 30% fewer daily calories for one month, and a TRF group that had free access to a standard diet for 8 hours per day for one month. At the end of the intervention, liver tissues were collected to measure the levels of inflammatory cytokines TNF-α, IL-6, and IL-1β.
Results: The results showed that both CR and TRF significantly reduced the levels of TNF-α, IL-6, and IL-1β in liver tissue compared to the control group. Body weight reduction was observed in the CR group, while the TRF group did not show significant weight loss.
Conclusion: These findings indicate that both calorie restriction and time-restricted feeding can reduce aging-related hepatic inflammation. TRF, by maintaining body weight, may be considered a simple and practical strategy to reduce liver inflammation in elderly individuals who do not require weight loss.
Keywords: Aging, Hepatic Inflammation, Calorie Restriction, Time-Restricted Feeding, Inflammatory Cytokines

SP251, The effect of *Lactobacillus delbrueckii* and *Lactobacillus rhamnosus* probiotics as a therapeutic supplement on improving histological scores in a mouse model of inflammatory bowel disease

Fateme Mohamadi[1,4], Majid Khazaei[2,3], Mahmoud Mahmoudi[1], Khatereh Kharazmi[2], Seyed-Alireza Esmaeili[1]

1. Immunology Department, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Science, Mashhad, Iran
3. Metabolic Syndrome Research Centre, Mashhad University of Medical Science, Mashhad, Iran
4. Immunology Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Inflammatory bowel disease (IBD), encompassing Crohn's disease and ulcerative colitis, is an autoimmune disorder characterized by recurrent periods of relapse and remission. Its etiology involves a complex interplay of genetic predisposition, environmental factors, microbial dysbiosis, and immune system dysfunction. Aberrant immune activation promotes the release of cytokines and chemokines, recruiting immune cells that exacerbate tissue damage through the generation of reactive oxygen species. Due to the limited efficacy and adverse effects associated with current therapeutic strategies, there is growing interest in novel interventions. Recent evidence underscores the significance of tolerogenic probiotics in modulating intestinal inflammation and enhancing mucosal repair, suggesting their therapeutic potential. Based on these findings, the present study examined the effects of tolerogenic probiotic supplementation in an IBD mouse model.

Methods: *Lactobacillus delbrueckii* and *Lactobacillus rhamnosus* were cultured to obtain approximately 10^9 bacteria for daily administration over a 7-day prophylactic phase and a 7-day treatment period. Colitis was induced using acetic acid in BALB/c mice, which were then divided into healthy, colitis, probiotic, mesalazine, and combination-therapy groups. Disease activity was assessed daily, and on day 13, colon tissues were collected for histopathological evaluation.

Results: The results demonstrated that both probiotic treatment alone and in combination with mesalazine effectively reduced intestinal inflammation. These interventions helped preserve crypt architecture, decrease mucosal injury, and partially restore goblet cell populations.

Conclusion: Overall, administration of these probiotic strains, particularly alongside mesalazine, appears to be a promising therapeutic strategy for reducing inflammation and protecting the intestinal mucosa and epithelial barrier in ulcerative colitis.

Keywords: IBD, Autoimmune Disease, Probiotics, *Lactobacillus Delbrueckii*, *Lactobacillus Rhamnosus*

SP252, The therapeutic impact of Artrestan (Sacubitril/Valsartan) in the rat model of acetic acid-induced ulcerative colitis

Khatereh kharazmi[1], Majid Khazaei[1,2], Seyedeh Elnaz Nazari[1]
1. Department of Medical Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Metabolic Syndrome Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Ulcerative colitis (UC) is a long-term disease characterized by cycles of inflammation and remission. While anti-inflammatory medications, particularly Mesalazine, have proven useful in managing the disease, none have demonstrated the required effectiveness for complete treatment. This research evaluated Artrestan (Sacubitril/Valsartan), which has shown tissue-protective properties, as a potential treatment for UC animal model.
Methods: UC was induced by an intrarectal injection of 4% acetic acid. Following this, treatments including Normal saline (N/S), Artrestan at 60 mg/kg, Mesalazine at 100 mg/kg, and a combination of Artrestan 60 mg/kg with Mesalazine 100 mg/kg were administered via gavage for a duration of 5 days. The macroscopic evaluation included measuring the Disease Activity Index (DAI), which consists of diarrhea, weight loss, rectal bleeding, and colon weight. It also involved assessing oxidant/antioxidant indicators and conducting a histological examination using H&E staining on the colonic tissue.
Results: Artrestan improved DAI by decreasing weight loss rate, rectal bleeding and fecal viscosity, and also decreased histopathological lesion score, which consist of inflammation, crypt damage, and ulceration in colon tissue sections. Furthermore, Artrestan enhanced the activity of superoxide dismutase (SOD) and catalase while reducing malondialdehyde (MDA) levels in colon tissue compared to the colitis group. All these effects were more dominant in combination group.
Conclusion: Artrestan provides protective benefits for the colon by inhibiting neutrophil accumulation, reducing reactive oxidants, and maintaining antioxidant activity. These properties contribute to a faster recovery from acetic acid-induced colon inflammation, highlighting its potential for treating and preventing UC in the future.
Keywords: Ulcerative colitis, Artrestan (Sacubitril/Valsartan), Mesalazine, oxidative stress

SP253, Brain Reward System and DBS: Novel Therapies for Addiction

Hojatollah Alaei[1]
1. Department of Physiology, Faculty of Medicine, Isfahan University of Medical Sceinces, Isfahan, Iran

Background: Chronic opioid use (e.g. morphine) induces addiction by dysregulating the brain's reward system. In the mesocorticolimbic reward circuit, dopaminergic projections from the ventral tegmental area (VTA) to the nucleus accumbens (NAc) are central, while the medial prefrontal cortex (mPFC) modulates VTA excitability.
Results: Recent studies show that electrical stimulation of key reward centers (such as VTA and the amygdala) can attenuate drug-seeking behaviors in animal models. For example, high-frequency (150 μA) stimulation of the VTA suppressed morphine-conditioned place preference. Similarly, low-intensity (25 μA) stimulation of the central amygdala (CeA) inhibited both acquisition and expression of morphine CPP, likely via modulation of dopamine and GABA signaling. Moreover, combining CeA stimulation with D1 receptor blockade markedly reduced morphine CPP and even induced conditioned aversion. Another study found that DBS of the lateral hypothalamus during conditioning prevented the development of morphine preference.
Conclusion: Collectively, these findings suggest that advanced neuromodulation approaches (invasive DBS or noninvasive temporal interference stimulation) targeting reward circuitry can effectively mitigate addictive behaviors.

SP254, Effect of *Astragalus fasciculifolius* on morphine induced cpp and hippocampal bdnf and tnf α expression under restraint stress

Fatemeh Azizi[1,2], Mehrdad Shahrani [1,2], Nasim Shahrani[3], Maryam Anjomshoa[1]
1. Medical Plants Research Center, Basic Health Sciences Institute, Shahrekord University of Medical Sciences, Shahrekord, Iran
2. Department of Physiology, School of Medicine, Shahrekord University of Medical Sciences, Shahrekord, Iran
3. Student Research Committee, Shahrekord University of Medical Sciences, Shahrekord, Iran

Background: Addiction is a major global health issue, and morphine—despite its medical use—causes strong dependence and is difficult to quit. This study aimed to examine the effect of *Astragalus fasciculifolius* (*AF*) on morphine-induced conditioned place preference (CPP) in mice exposed to restraint stress.
Methods: Male mice were divided into control, morphine, morphine + stress, and AF treated groups. After behavioral testing, blood and hippocampal samples were collected to assess oxidative stress markers, antioxidant capacity, and the expression of BDNF and TNF α genes in the hippocampus.
Results: Morphine increased the conditioning score in the CPP test and produced rewarding effects. Restraint stress significantly reduced this score and inhibited morphine's rewarding effect. Motor activity was also significantly decreased in the morphine + acute stress group compared with the morphine group. AF extract at all doses significantly increased hippocampal total antioxidant capacity, with the strongest effect at 450 mg/kg. Doses of 150, 450, and 800 mg/kg reduced hippocampal malondialdehyde levels, and the 450 mg/kg dose produced the lowest serum malondialdehyde level.
Conclusion: Stress reduces the rewarding effects of opioids, while AF extract may mitigate these effects and influence reward related learning. Changes in hippocampal gene expression suggest possible neurobiological mechanisms, although further studies are needed to confirm these findings and explore potential therapeutic applications for opioid addiction.
Keywords: *Astragalus fasciculifolius*, Conditioned Place Preference, Morphine, Brain-Derived Neurotrophic Factor, Tumor Necrosis Factor-alpha

SP255, Effect of the dopamine D2 receptor antagonist injection into the lateral habenula nucleus on the rate of morphine self-administration in male rats

Farahnaz Ataei[1], Saeed Khatamsaz[1], Hojatallah Alaei[2], Mehrdad Shariati[3]
1. Department of Biology, Kaz.C., Islamic Azad University, Kazerun, Iran
2. Department of Physiology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran
3. Department of Biology, Zand Institute of Higher Education, Shiraz, Iran

Background: Addiction is considered one of the most serious public health issues. The lateral habenula (LHb) is an important brain region. According to the role of LHb in addiction, the present study was planned to investigate effect of the dopamine D2 receptor antagonist injection into the LHb on the process of morphine addiction.
Methods: The anesthetized animals were placed in the stereotaxic device. LHb was bilaterally cannulated. Then, jugular vein was catheterized. After recovery, an 11-day self-administration protocol was performed. Eticlopride hydrochloride whith different concentrations (0.5,1 and 2 μg/rat), as a selective D2 receptor antagonist injected before self-administration sessions. Also, animals received morphine during each self-administration session. Finally, the number of active and passive lever pressing as well as the number of self-infusions was recorded and measured.
Results: Morphine increased the number of active lever pressing in the morphine group than the Saline group ($P < 0.05$), and dopamine D2 receptor antagonist (1 and 2 μg/rat) infusion decreased the changes than morphine group ($P < 0.05$).
Conclusion: Blockade of dopamine D2 receptors within the LHb decreases morphine self-administration, indicating that D2-mediated signaling in the LHb contributes to the reinforcing properties of morphine. These findings highlight the LHb–dopamine interface as a potential target for pharmacological interventions aimed at modulating opioid reinforcement.
Keywords: Addiction, Dopamine D2 receptor, Eticlopride, Lateral Habenula, Morphine Self-Administration

SP256, The effect of gut microbiota disruption on morphine-associated anxiety-like behaviors in mice

Zahra Jokar[1], Parham Reisi[1,2], Somayeh, Shahidani[1], Hojatallah Alaei[1], Mohammad Sadegh Damavandi[3,4], Hossein Khanahmad[5]

1. Department of Physiology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran
2. Applied Physiology Research Center, Cardiovascular Research Institute, Isfahan University of Medical Sciences, Isfahan, Iran
3. Department of Microbiology and Virology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
4. Antimicrobial Resistance Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
5. Department of Genetics and Molecular Biology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran

Background: Anxiety is a frequent comorbidity of chronic opioid use and withdrawal. Recent evidence suggests that gut microbiota critically modulates emotional behavior, yet its specific involvement in morphine-induced anxiety remains insufficiently characterized.
Methods: Adult male mice were administered a broad-spectrum antibiotic cocktail for 11 consecutive days to induce gut dysbiosis. Following this, animals received either single or repeated morphine injections. Anxiety-like behaviors were assessed using the elevated plus maze (EPM) test, measuring time spent in open arms and number of open-arm entries as indices of anxiety.
Results: Repeated morphine administration significantly increased anxiety-like behavior, as evidenced by reduced time in open arms and fewer open-arm entries. However, this anxiogenic effect was markedly attenuated in mice pretreated with antibiotics, suggesting that microbiota disruption modulates emotional reactivity to morphine. Antibiotic treatment alone did not significantly alter baseline anxiety-related behavior, indicating a specific interaction with opioid exposure.
Conclusion: These findings underscore the critical role of gut microbiota in shaping anxiety-like responses associated with morphine administration. Disruption of microbial composition via antibiotics mitigated morphine-induced anxiety, pointing to a gut–brain regulatory pathway that influences affective states during opioid exposure. Modulating the gut microbial environment may offer a novel therapeutic strategy to prevent or reduce the emotional side effects associated with opioid use and withdrawal.
Keywords: Morphine, Anxiety-like Behavior, Antibiotics, Opioid, Addiction

SP257, Transcranial photobiomodulation in the treatment of addiction: neurobiological mechanisms and clinical challenges

Mohammad Mazaheri [1]
1. Applied Physiology Research Center, Cardiovascular Research Institute, Isfahan University of Medical Sciences, Isfahan, Iran

Background: Transcranial Photobiomodulation (tPBM) is a non-invasive therapeutic modality that uses red and near-infrared light (photon energy) to alter the biological activities of neural cells. This promising method is employed widely in the treatment of mental, neurodegenerative, and substance use disorders. Here, the mechanisms of action and challenges of utilizing the tPBM for drug addicts are discussed.
Methods: Lasers and light-emitting diodes (LEDs) are the sources of photon energy in the tPBM. Wavelength, radiant exposure, and operation modes are the most determining parameters in the tPBM. On the other hand, among the crucial criteria of drug addiction, craving stands out as a potent factor contributing to ongoing drug abuse and relapse following a period of abstinence. Various randomized clinical trials studied the effects of tPBM on drug addiction; some of the results are mentioned below.
Results: The tPBM caused statistically significant reductions in the addiction-related scores, such as opioid craving. Some studies showed that a decrease in opioid craving is associated with improvement of psychopathological disorders such as anxiety and depression.
Conclusion: The tPBM could improve brain functions by modulatory effects that occur after the absorption of photons by mitochondrial Cytochrome c oxidase (CCO) molecule, which triggers a broad range of biochemical events, from increased Adenosine triphosphate (ATP) biosynthesis to inhibiting neuroinflammation. Drug addiction is often accompanied by psychopathological disorders. Therefore, improvement of anxiety and depression by tPBM could explain how it may reduce opioid craving. Light penetration into the tissue and variation in treatment protocols are the major challenges in tPBM therapy.
Keywords: Transcranial Photobiomodulation, Drug Addiction, Opioid Craving

SP258, Involvement of microglial cells in pain hypersensitivity and hippocampal nociplasticity following adolescent morphine exposure

Kawsar Alami[1], Yaghoub Fathollahi[1], Saeed Semnanian[1], Hossein Azizi[1]
1. Department of Physiology, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran

Background: Adolescents are especially prone to opioid misuse, and morphine exposure during this period is associated with increased pain sensitivity and altered hippocampal function. Microglia, key mediators of neuroinflammation and synaptic remodeling, may mediate these effects. This study investigated the involvement of microglia in the long-term consequences of adolescent morphine exposure on pain processing and hippocampal nociplasticity.
Methods: Adolescent male Wistar rats were administered morphine following acute, subchronic, or chronic schedules; the chronic regimen was selected for subsequent experiments based on initial outcomes. To assess the involvement of microglia, minocycline was co-administered with morphine. In adulthood, their pain sensitivity was measured under normal and neuropathic conditions. Following neuropathy, hippocampal inflammatory gene expression and synaptic plasticity in the Schaffer-CA1 pathway of the dorsal hippocampus were also evaluated.
Results: Subchronic and chronic morphine exposure during adolescence significantly lowered baseline mechanical and thermal pain thresholds. Chronic exposure also led to enhanced mechanical allodynia and thermal hyperalgesia following neuropathy, effects that were significantly reduced by minocycline. Interestingly, while neuropathy increased hippocampal expression of inflammatory mediators in adults, this response was suppressed in rats exposed to morphine during adolescence. Furthermore, adolescent morphine exposure resulted in reduced baseline synaptic transmission and long-term potentiation (LTP) in the hippocampus following neuropathy. These synaptic deficits were not reversed by minocycline.
Conclusion: It is concluded that microglia contribute to the development of pain hypersensitivity following adolescent morphine exposure, although hippocampal microglia may not be directly involved in this process.
Keywords: Opioid, Sciatic neuropathy, Hyperalgesia, Allodynia, Synaptic plasticity

SP259, The acute morphine injection effects on electrophysiological properties of the ventrolateral periaqueductal gray neurons in rats exposed to opioids during adolescence

Nasrin Houshmandi[1], Hossein Azizi[1], Mahyar Janahmadi[2], Amir Shojaei[1], Saeed Semnanian[1]
1. Department of Physiology, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran
2. Department of Physiology, Faculty of Medical Sciences, Shahid Beheshti University, Tehran, Iran

Background: Adolescence is a critical period in neurodevelopment, marked by structural and functional brain changes that increase vulnerability to risky behaviors, including drug abuse. Evidence suggests that chronic morphine exposure during adolescence leads to long-lasting alterations in the opioid system, pain perception, opioid analgesic tolerance. The ventrolateral periaqueductal gray (vlPAG) is a key structure in this process. Previous studies also have indicated that even acute morphine administration can induce electrophysiological changes in brainstem regions such as the locus coeruleus (LC). This study aimed to investigate the long-term effects of adolescent morphine exposure on the electrophysiological properties of vlPAG neurons in adult rats subsequent to acute morphine exposure.
Methods: Adolescent rats, specifically those between postnatal days (PND) 31 and 40, were administered morphine or normal saline injections twice daily. Following a drug-free interval, both groups were administered a single acute dose of morphine in adulthood (PND 60 and 75). Twenty-four hours later, the electrophysiological characteristics of vlPAG neurons were assessed using whole-cell patch-clamp techniques.
Results: Exposure to morphine during adolescence, followed by an acute morphine challenge in adulthood, led to a marked decrease in resting membrane potential and neuronal gain in vlPAG neurons.
Conclusion: Exposure to morphine during adolescence results in enduring neurophysiological changes in neurons of the ventrolateral periaqueductal gray (vlPAG), altering their excitability in adulthood when challenged with opioids. These findings underscore adolescence as a critical period susceptible to long-term neuroadaptations induced by opioid exposure.
Keywords: vlPAG, Opioid Adolescence, Acute Morphine, Whole-Cell Patch-Clamp

SP260, Baclofen modulates TRPV1 via PKC in spinal DRG of morphine-tolerant rats

Shima Mehrabadi[1,2]
1. Department of Medical Physiology, Faculty of Medicine, Neyshabur University of Medical Sciences, Iran
2. Healthy Ageing Research Centre, Neyshabur University of Medical Sciences, Iran

Background: Tolerance and dependence to anti-nociceptive effect of morphine restricted its use. Nowadays co-administration of morphine and other drugs suggests diminishing this tolerance. Baclofen is one of the drugs that may be beneficial in the attenuation of tolerance to morphine. Studies have shown that changes in TRPV-1 expression during administration of morphine have a pivotal role in developing morphine tolerance. Therefore, the effect of baclofen on TRPV-1 expression during chronic administration of morphine was investigated in this study.
Methods: A total of 48 rats were divided into four groups of control, morphine single injection, morphine tolerance, and morphine tolerance + baclofen. To induce morphine tolerance in rats, animals received 10 mg/kg of i.p. morphine sulfate once a day for 10 days. In the treatment group, baclofen (0.5 mg/kg) was injected for 10 days, before morphine injection. Finally, to evaluate baclofen treatment on morphine analgesia and hyperalgesia, thermal hyperalgesia and formalin test were used. TRPV-1 and PKC expression and protein production in DRG of spinal cord were then evaluated by real-time PCR and Western blot.
Results: In baclofen treatment group, thermal hyperalgesia and formalin test improved in comparison with morphine tolerance group. In morphine tolerance group, both TRPV-1/PKC gene expression and protein levels increased in comparison with the control group. However, following the baclofen treatment, the TRPV-1 and PKC levels decreased.
Conclusion: Baclofen can enhance anti-nociceptive effect of morphine by modulating TRPV-1 channel and PKC activity.
Keywords: Baclofen, Morphine, Protein kinase C, Spinal Cord

SP261, Use and abuse of morphine

Mozhgan Ghobadi Pour[1]
1. Department of Physiology, Faculty of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran

Background: Pain remains a major source of stress worldwide. Morphine (MOR), the principal alkaloid of "*Papaver somniferum*", is the gold-standard central analgesic due to its potent efficacy, yet it carries a high risk of dependence. Several synthetic opioids, such as febtanyl and phenoperidine, are derived from MOR. Combining MOR or other opioid analgesics with low-dose excitatory opioid receptor antagonists has been proposed to enhance analgesia while reducing adverse effects. Given the growing clinical and societal challenges related to opioid misuse, a comprehensive understanding of current patterns of MOR use and abuse is essential. This review examines MOR consumption trends, diagnostic and screening challenges, and treatment strategies for MOR, heroin, and morphine sulfate abuse, while also exploring mechanisms underlying their role in substance-use disorders.
Methods: This narrative review synthesizes evidence from animal studies, human investigations, and postmortem analyses. Data on detection methods, pharmacokinetics, tissue distribution, and recent advances in monitoring and clinical management of opioid misuse are critically reviewed.
Results: Although MOR is highly effective for pain relief, substantial evidence highlights its strong reinforcing properties, which contribute to misuse and dependence.
Conclusion: Despite its central role in pain management, MOR poses significant overdose risks, primarily due to respiratory depression, and exhibits high abuse liability. Further preclinical and clinical research is needed to develop safer and more effective strategies for addiction prevention and treatment.
Keywords: Analgesic, Dependence, Heroin, Opioids, Morphine

SP262, From biological clocks to smart algorithms: the fundamentals of circadian rhythms and ai applications

Behzad Garmabi[1]
1. Neuroscience Research Center, Shahroud University of Medical Sciences, Shahroud

Background: Circadian rhythms regulate biological timing across nearly all organisms, synchronizing molecular, physiological, and behavioral processes with the 24-hour day. Understanding these endogenous clocks has become crucial for improving health, cognition, and productivity. Concurrently, artificial intelligence (AI) has emerged as a transformative tool for analyzing complex biological data, offering new ways to model timing, adaptation, and prediction.
Results: Decades of research have identified the molecular and neural components of circadian regulation, including core clock genes (CLOCK, BMAL1, PER, CRY) and the suprachiasmatic nucleus as the master pacemaker in mammals. Recent studies apply machine learning to circadian data, enabling the classification of rhythmic patterns, prediction of sleep and metabolic disorders, and optimization of light and activity cycles. AI-driven chronotherapeutic models now aid personalized treatment scheduling and work–rest optimization. The intersection of circadian biology and AI reveals shared principles such as feedback regulation, oscillatory stability, and adaptive learning. AI models inspired by biological clocks could improve temporal coherence in autonomous systems, while circadian insights enhance algorithmic design for dynamic, context-aware applications. However, challenges in data integration, interpretability, and bioethical considerations persist.
Conclusion: Integrating circadian science with AI bridges natural and artificial intelligence, fostering innovation in health, technology, and human performance. Advancing this interdisciplinary frontier requires collaborative strategies that model time as both a biological and computational dimension.
Keywords: Circadian Rhythm, Biological Clocks, Artificial Intelligence, Machine Learning, Chronobiology

SP263, Melatonin suppression–mediated circadian and behavioral disturbances

Shima Mohammadi[1]
1. Neuroscience Research Center, Shahroud University of Medical Sciences, Shahroud

Background: Circadian rhythmicity is a fundamental biological process that regulates behavioral and physiological functions across the 24-hour cycle. Disruption of this rhythmicity is closely linked to altered emotional and cognitive states.
Methods: In this study, we investigated the effects of melatonin suppression—induced either by continuous light exposure (LL) or pinealectomy (PIN×)—on circadian organization and affective behavior in male Wistar rats.
Results: Both manipulations profoundly disrupted locomotor activity rhythms, resulting in a complete loss of circadian entrainment. Behavioral assessment revealed that LL and PIN× rats displayed heightened anxiety-like behavior, evidenced by reduced central exploration in the Open Field and decreased open-arm time in the Elevated Plus Maze. Moreover, both groups exhibited diminished active coping responses in the Forced Swim Test, indicative of depressive-like behavior. These behavioral changes were accompanied by a significant reduction in serum melatonin levels relative to control rats maintained under standard light–dark conditions. No statistical differences were detected between the LL and PIN× groups, suggesting that continuous light exposure mimics the effects of pinealectomy in curtailing melatonin synthesis.
Conclusion: Collectively, these results highlight the critical role of melatonin in maintaining circadian integrity and emotional balance. Suppression of melatonin, whether through environmental or surgical manipulation, appears sufficient to induce profound circadian disruption accompanied by anxiety- and depression-like behaviors. These findings underscore melatonin's dual regulatory role in temporal homeostasis and affective state modulation.
Keywords: Circadian Rhythm, Melatonin, Rats, Wistar, Anxiety, Depressive Disorder

SP264, The empathic clock: Integrating affective states into circadian-aware intelligent systems

Hamed Ghazvini[1]
1. Department of Neuroscience, Faculty of Advanced Technologies in Medicine, Mazandaran University of Medical Sciences, Sari, Iran

Background: The concept of an empathic clock suggests that circadian systems modulate emotional sensitivity, social cognition, and the capacity for empathy across the 24-hour cycle. Disruptions in circadian rhythms, such as those caused by shift work, jet lag, or sleep disorders, are associated with mood instability, irritability, and impaired social functioning.
Methods: This narrative review examines evidence connecting circadian regulation with affective processing and empathic behavior.
Results: Experimental and clinical studies indicate that misalignment between internal clocks and external time correlates with higher rates of depression, anxiety, and social withdrawal. Research on clock genes, hormonal rhythms (e.g., melatonin and cortisol), and brain regions involved in emotional regulation supports a temporal organization of affective states. Work in social neuroscience shows that sleep loss and circadian disruption impair emotion recognition, theory of mind, and prosocial decision-making. These findings suggest that circadian systems provide a temporal scaffold for emotional resilience and social connectedness. The Empathic Clock framework integrates chronobiology, affective neuroscience, and social psychology, emphasizing how time-of-day and circadian alignment may modulate empathy, compassion, and interpersonal sensitivity.
Conclusion: This perspective has implications for mental health, occupational scheduling, and the timing of psychotherapeutic interventions. Recognizing empathy as partially time-structured highlights circadian alignment as a potential target for enhancing emotional well-being and social functioning. Future research should clarify mechanisms, identify vulnerable chronotypes, and test time-based strategies to support empathic capacity in clinical and everyday contexts.
Keywords: Circadian Rhythm, Empathy, Emotions, Sleep Wake Disorders, Affect

SP265, Morning preference is associated with better visual memory in students

Bita Dadjou[1], Tayebeh Mohtashami[2]
1. Department of Clinical Psychology, Shahrood Branch, Islamic Azad University, Shahrood, Iran
2. Student Research Committee, School of Medicine, Shahroud University of Medical Sciences, Shahroud, Iran

Background: The circadian rhythm is observable in almost all biological functions. Based on the preference for daily sleep-wake behavior or rest, physical or mental performance, the human population is classified into three categories known as chronotypes. Morning types are early risers, perform better physically and mentally in the morning, and go to bed early at night. In contrast, evening types wake up later, stay awake until late, and prefer evening hours for activities. The intermediate type displays characteristics of both groups. Although many studies have examined the role of morning-evening chronotypes in cognitive processes, the results across studies are inconsistent, and the impact on visual memory has been less explored. This research aimed to compare morning and evening chronotypes in terms of visual memory among university students.
Methods: In this cross-sectional study, 178 students from Shahroud University of Medical Sciences (95 women and 83 men) with an average age of 22 were selected through convenience sampling. They were asked to perform the Pattern Recognition Memory (PRM) test using CANTAB software. Additionally, sleep and wake parameters were measured using the Munich Chronotype Questionnaire (Roenneberg et al., 2003).
Results: For the PRM test, participants were shown a series of visual patterns they had to memorize, and after a 20-minute delay, they were asked to recognize the previously seen patterns. These patterns were designed in such a way that they could not easily be described verbally. In the recognition phase, participants had to choose between a previously seen pattern and a new one. At this stage, the test patterns were presented in reverse order compared to the initial presentation. Data were analyzed using ANOVA, and the results showed a statistically significant difference in the number of correctly recognized patterns between morning and evening chronotypes ($p = 0.037$). In other words, morning types recognized more correct patterns than evening types. The study also found no significant gender differences in visual memory, but older participants took more time to correctly select patterns ($p = 0.049$).
Conclusion: The results indicate better visual memory in morning chronotypes. Therefore, educational activities based on individuals' chronotypes may help increase productivity and improve cognitive performance. Future studies are recommended to investigate, through interventions, how chronotype and circadian rhythms can improve learning and memory processes.
Keywords: Circadian Rhythm, Biological Clocks, Artificial Intelligence, Machine Learning, Chronobiology

SP266, From prenatal circadian misprogramming to sleep disorders: A two-hit model of early life stress

Leila Karimi-Zandi[1]
1. Department of Neuroscience, Faculty of Advanced Medical Technologies, Golestan University of Medical Sciences

Background: Sleep disorders are highly prevalent and strongly associated with psychiatric, metabolic, and neurodegenerative diseases. Increasing evidence indicates that vulnerability to sleep disturbances originates early in life, beginning during prenatal development. In utero, the fetal circadian system is not directly entrained by light but is programmed by maternal circadian signals, including rhythmic melatonin and cortisol secretion transmitted through the placenta. Maternal stress, circadian disruption, or sleep disturbances during pregnancy alter these temporal cues, leading to maladaptive programming of the fetal suprachiasmatic nucleus and long-term vulnerability to sleep dysregulation.
Results: We propose a two-hit model in which prenatal circadian misprogramming constitutes the first hit by sensitizing the hypothalamic–pituitary–adrenal axis, while postnatal early life stressors act as a second hit, resulting in chronic circadian misalignment.
Conclusion: Evidence from animal models and human studies demonstrates persistent alterations in sleep architecture, stress hormone rhythms, and epigenetic regulation of core clock genes. Targeting circadian plasticity represents a critical window for early intervention and lifelong prevention.
Keywords: Early Life Stress, Circadian Rhythm, Sleep Disorders, Prenatal Programming, HPA Axis

SP267, Circadian modulation of bdnf as a therapeutic target after cerebral ischemia–reperfusion

Alieh Bashghareh[1]
1. Neuroscience Research Center, Shahroud University of Medical Sciences, Shahroud

Background: Cerebral ischemia–reperfusion (I/R) injury triggers a complex sequence of molecular and cellular responses that contribute to delayed neuronal death, particularly within the hippocampal CA1 region. Brain-derived neurotrophic factor (BDNF), a critical regulator of neuronal survival, synaptic plasticity, and metabolic homeostasis, exhibits pronounced circadian variation, suggesting that its expression dynamics may influence post-ischemic recovery.
Methods: This study examined temporal and circadian changes in hippocampal BDNF expression following transient bilateral carotid artery occlusion in male rats.
Results: Histopathological assessment revealed severe CA1 neuronal damage that peaked approximately 12 hours post-ischemia. BDNF protein levels showed a significant decline at 12 hours and 5 days after reperfusion, with sustained suppression across subsequent time points, indicating a prolonged disruption of neurotrophic signaling. Concurrently, TNF-α expression demonstrated a biphasic increase, reflecting distinct inflammatory phases, while superoxide dismutase (SOD) activity remained persistently reduced, signifying ongoing oxidative stress. The temporal interplay among these parameters suggests that the reduction in BDNF, particularly during specific circadian phases, exacerbates neuronal vulnerability after I/R.
Conclusion: Understanding the circadian regulation of BDNF expression could provide insight into the optimal timing of therapeutic interventions aimed at enhancing neurotrophic support and reducing reperfusion-induced damage. These findings highlight circadian modulation of BDNF as a promising avenue for chronotherapeutic strategies in ischemic stroke management.
Keywords: Brain-Derived Neurotrophic Factor, Reperfusion Injury, Hippocampus, Brain Ischemia, Oxidative Stress

SP268, Circadian rhythms in brain functional connectivity: diurnal variations in resting-state fMRI network topology between morning and evening sessions

Kia Garmabi[1]
1. Department of Biomedical Engineering, Faculty of Medicine, Kermanshah University of Medical Sciences (KUMS), Kermanshah, Iran

Background: Circadian rhythms regulate numerous physiological processes, including neural activity and brain function. Despite this, the influence of time-of-day (TOD) on resting-state functional connectivity (FC) remains understudied, potentially confounding neuroimaging results.
Methods: This study investigated whether whole-brain FC topology differs between morning and evening sessions and whether individual chronotype modulates these effects. Sixty-two healthy adults (31 morning-type [MT] and 31 evening-type [ET], classified based on habitual sleep-wake patterns) underwent two resting-state fMRI scans: one ~1 hour after wake-up (morning) and one ~10 hours after wake-up (evening), aligned to individual schedules. Participants maintained regular sleep patterns for one week prior, with actigraphy monitoring and abstinence from caffeine and alcohol. The brain was parcellated using the Schaefer-Yeo atlas (200 regions). Weighted correlation matrices were computed from ROI time-series and binarized (top 10% connections) to construct functional networks. Graph-theory metrics were calculated at global, mesoscale, and local levels.
Results: Significant TOD effects emerged independently of chronotype. Evening sessions showed increased global small-worldness, assortativity, and network synchronization compared to morning, indicating more efficient and integrated functional topology. At the mesoscale, evening networks exhibited greater inter-module connectivity and reduced modular segregation. Locally, hub redistribution occurred, with the somatomotor network becoming more central in the evening, while visual and ventral attention networks were more prominent in the morning. Chronotype modulated some nodal centrality measures (e.g., in default-mode, somatomotor, and limbic regions) and correlated with lower small-worldness and modularity in morning sessions for MT individuals, though global TOD effects remained robust across all participants. Time-of-day significantly influences resting-state FC topology, with evening scans revealing more efficient network organization potentially reflecting heightened arousal, neural excitability, or neurovascular coupling.
Conclusion: These diurnal variations highlight TOD as a key confounding variable in neuroimaging studies. Recording and controlling for TOD, alongside chronotype, is essential for interpreting and comparing resting-state fMRI findings. Future research should explore underlying mechanisms and implications for brain function across the day.
Keywords: Resting-State fMRI, Functional Connectivity, Circadian Rhythms, Chronotype, Graph Theory, Time-of-Day Effects, Brain Network Topology

SP269, Artificial intelligence in the analysis of circadian rhythm disorders and polysomnography data

Saba Rahmati[1]
1. Student Research Committee, School of Medicine, Shahroud University of Medical Sciences, Shahroud, Iran

Background: Circadian rhythm disorders and sleep-related conditions are highly prevalent and often underdiagnosed, in part due to the complexity and volume of data generated by polysomnography and related monitoring techniques. Conventional scoring methods are labor-intensive, operator-dependent, and may miss subtle temporal patterns, highlighting the need for advanced analytic approaches.
Results: Artificial intelligence (AI), particularly machine learning and deep learning, provides new opportunities to improve detection, classification, and prediction of circadian and sleep disorders. Recent studies have applied AI to automate sleep-stage classification, apnea–hypopnea detection, and circadian phase estimation using polysomnographic, actigraphic, and wearable-derived signals. Convolutional and recurrent neural networks have demonstrated performance comparable to or exceeding human scorers in sleep staging while enabling large-scale, standardized analysis. AI models have also been used to identify chronotype, predict circadian misalignment, and quantify social jetlag from multimodal data. AI-driven methods enhance sensitivity to complex temporal and nonlinear features that traditional approaches may overlook, supporting more precise phenotyping of circadian rhythm sleep–wake disorders. However, challenges include data heterogeneity, limited generalizability across populations and devices, and the "black-box" nature of many algorithms, which complicates clinical interpretation and acceptance.
Conclusion: Integrating AI into the analysis of circadian rhythm disorders and polysomnography data promises earlier diagnosis, personalized treatment, and scalable sleep-health screening. Future work should prioritize transparent models, standardized datasets, and interdisciplinary collaboration to safely translate AI tools into routine clinical practice
Keywords: Circadian Rhythm, Sleep Wake Disorders, Polysomnography, Artificial Intelligence, Machine Learning

SP270, The embodiment of inequality: stress-mediated pathways to accelerated biological aging

Mohammad-Reza Vaez-Mahdavi[1], Leila Nasiri[1], Maryam-Sadat Kalantar[2]
1. Health Equity Research Center, Shahed University, Tehran, Iran
2. Department of Biology, Faculty of Basic Sciences, Shahed University, Tehran, Iran

Background: Socioeconomic inequality is a profound environmental determinant of health, systematically embedding itself into human biology to accelerate the aging process. This creates a measurable disparity in biological age between social groups, a phenomenon now quantifiable through advanced biomarkers. The pivotal question is through which biological pathways this acceleration occurs and whether this embodied inequality is a fixed destiny.
Methods: This article presents a systematic review and synthesis of our previous research on aging and the associated biomarkers influenced by socio-economic status, integrated with findings from other studies in the field. This review synthesizes empirical evidence from biomarker studies of aging, focusing on integrative metrics such as epigenetic clocks and composite physiological indices. These tools capture the cumulative dysregulation across multiple organ systems—including immune, metabolic, cardiovascular, and renal function—resulting from prolonged exposure to social adversity.
Results: Life-course exposure to socioeconomic disadvantage is consistently associated with accelerated biological aging, manifesting as advanced epigenetic age, shortened telomeres, and a heightened systemic inflammatory state (inflammaging). The primary mechanistic pathways involve chronic activation of stress-response systems (e.g., hypothalamic-pituitary-adrenal axis), leading to glucocorticoid resistance, increased oxidative stress, and compromised mitochondrial function. Improvements in socioeconomic status are associated with a deceleration in the pace of biological aging. Furthermore, interventions targeting stress reduction, inflammation, and metabolic health have the potential to reverse biomarker profiles of accelerated aging partially.
Conclusion: Social inequality gets "under the skin" to promote premature biological aging through well-defined stress-mediated pathways. However, the plasticity of these biomarkers indicates that the pace of aging can be modulated. This provides a powerful biological rationale for public health policies and clinical interventions aimed at reducing social adversity, as they hold the potential not only to improve immediate health but to slow the fundamental process of aging itself, thereby extending healthspan and promoting equity.
Keywords: Social Determinants of Health, Biological Aging, Health Equity

SP271, From neonatal period to aging: synergistic effects of early-life stress on behaviour, cognition, and expression of inflammation-related genes in female rats

Nayereh Askari[1, 2], Mohammadreza Vaez Mahdavi[3], Manijeh Dogani[4], Touba Ghazanfari[1], Fatemeh Jaafari[4]

1. Immunoregulation Research Center, Shahed University, Tehran, Iran
2. Faculty of Basic Sciences, Shahed University, Tehran, Iran
3. Health Equity Research Center, Shahed University, Tehran, Iran
4. Department of Biology, Faculty of Science, Shahid Bahonar University of Kerman, Kerman, Iran

Background: The neonatal period represents a critical window for brain development, during which exposure to stress can exert long-lasting effects on behaviours, cognition, and pain processing. This study aimed to investigate the combined impact of early-life stress and aging on behaviours, learning and memory, pain sensitivity, and brain expression of inflammation-related genes in female rats.

Methods: Four groups of female rats were examined: young control, aged control, young stressed, and aged stressed. Stressed groups experienced maternal deprivation during early postnatal days. Anxiety-like and exploratory behaviours were assessed using the elevated plus maze and open field tests. Cognitive performance was evaluated with the Morris water maze and shuttle box tests, and pain sensitivity with hot plate and tail-flick tests. Serum corticosterone levels were measured by ELISA, and expression of GR and MR receptors as well as hippocampal and hypothalamic IL-6, TNF-α, and TLR2/4 were analysed using RT-qPCR.

Results: Early-life stress and aging increased anxiety, reduced exploratory activity, impaired learning and memory, and altered pain sensitivity, with the most pronounced effects observed in aged stressed rats. Serum corticosterone levels were elevated, while GR and MR expression decreased. IL-6, TNF-α, and TLR2/4 expression in the brain showed significant upregulation. Young stressed rats exhibited intermediate alterations, resembling aged controls, whereas aged stressed rats displayed maximal deficits.

Conclusion: Neonatal stress induces persistent HPA axis activation and increased expression of inflammation-related genes in the brain, underlying behavioural, cognitive, and nociceptive impairments. The combination of aging and early-life stress exacerbates these changes, highlighting the critical role of the neonatal environment in long-term brain function and behaviour.

Keywords: Neonatal Stress, Ageing, Neuroinflammation, Memory, Anxiety

SP272, Mitochondria and accelerated biological ageing: molecular mechanisms

Marzieh Mojtahed[1], Hossein Hassanpour[2,3], Leila Nasiri[2], Mohammad-Reza Vaez-Mahdavi[2]
1. Department of cellular and molecular biology, TeMS.C., Islamic Azad University, Tehran, Iran
2. Health Equity Research Center, Shahed University, Tehran, Iran
3. Department of Basic Sciences, Faculty of Veterinary Medicine, Shahrekord University, Shahrekord, Iran

Background: Ageing is characterized by progressive physiological decline, with mitochondrial dysfunction emerging as a central hallmark. This review examines how mitochondrial impairments, including mtDNA mutations, elevated reactive xygen species (ROS) production, defective mitochondrial respiration, and altered mitochondrial dynamics contribute to accelerated ageing.
Methods: This study conducted a systematic analysis of recent studies using ageing models and human tissue data. The review synthesizes evidence linking mitochondrial dysfunction to cellular senescence, stem cell exhaustion, and inflammatory signalling, alongside interventions targeting mitochondrial pathways.
Results: Accumulated mtDNA mutations and increased ROS disrupt mitochondrial integrity, impair ATP production, and activate apoptotic pathways. Age-related declines in mitophagy and dynamics further compromise cellular homeostasis, promoting senescence and tissue degeneration. Mitochondrial dysfunction interacts with other ageing hallmarks, exacerbating genomic instability and metabolic dysregulation.
Conclusion: Mitochondrial dysfunction is a key driver of accelerated ageing, influencing multiple cellular pathways and systemic health. It is not merely a consequence of ageing but actively propagates damage through increased ROS, impaired bioenergetics, disrupted mitophagy, and altered mitochondrial dynamics. These dysfunctions contribute to cellular senescence, stem cell depletion, and systemic inflammation, thereby linking mitochondrial decline to a spectrum of age-related diseases, including neurodegeneration, cardiovascular disorders, and metabolic syndrome.
Keywords: Mitochondrial DNA Damage, Biological Aging, Mitochondrial Respiration

SP273, Mitochondrial DNA damage as a marker of accelerated aging in delayed sulfur mustard toxicity

Leila Nasiri[1], Mohammad-Reza Vaez-Mahdavi[1], Maryam-Sadat Kalantar[2], Hossein Hassanpour[1,3], Sussan Kaboudanian-Ardestani[1,4], Tooba Ghazanfari[4]

1. Health Equity Research Center, Shahed University, Tehran, Iran
2. Department of Biology, Faculty of Basic Sciences, Shahed University, Tehran, Iran
3. Department of Basic Sciences, Faculty of Veterinary Medicine, Shahrekord University, Shahrekord, Iran
4. Immunoregulation Research Center, Shahed University, Tehran, Iran

Background: Sulfur mustard (SM) exposure is associated with long-term health effects, including accelerated aging. Mitochondrial dysfunction, particularly mitochondrial DNA (mtDNA) damage, is a key mechanism in aging processes. This study assessed mtDNA integrity in veterans decades after SM exposure.

Methods: This study investigated mitochondrial dysfunction as a key mechanism underlying biological aging in 142 SM-exposed veterans (25 years post-exposure) and 54 matched controls. The SM-exposed veterans were stratified into subgroups (asymptom, mild, and severe) based on clinical criteria and lung function tests. Using buffy coat-derived leukocytes, we assessed mitochondrial DNA (mtDNA) copy number and damage frequency of long (972 bp) / short (55 bp) mtDNA fragments using a real-time PCR assay. Demographic variables (age, marital status, income, smoking status, and education) did not differ significantly between SM-exposed and control groups, ensuring comparability.

Results: While mtDNA copy number did not differ significantly between groups, mtDNA damage frequency was significantly elevated in the severe exposure subgroup compared to controls and the mild subgroup. No significant differences were observed between controls and the asymptom or mild subgroups.

Conclusion: Long-term SM exposure is associated with increased mitochondrial DNA damage, particularly in individuals with severe clinical symptoms. This persistent genomic instability highlights mtDNA damage as a key contributor to SM-induced accelerated biological aging.

Keywords: Sulfur Mustard, Mitochondrial DNA Damage, Biological Aging, DNA Instability

SP274, Long-term dysregulation of mitophagy-related gene expression following sulfur mustard exposure: a mechanism leading to accelerated aging

Maryam-Sadat Kalantar [1], Mohammad-Reza Vaez-Mahdavi [2], Hossein Hassanpour [2,3], Sussan Kaboudanian-Ardestani [2,4], Leila Nasiri [2], Tooba Ghazanfari [2,4]

1. Department of Biology, Faculty of Basic Sciences, Shahed University, Tehran, Iran
2. Health Equity Research Center, Shahed University, Tehran, Iran
3. Department of Basic Sciences, Faculty of Veterinary Medicine, Shahrekord University, Shahrekord, Iran
4. Immunoregulation Research Center, Shahed University, Tehran, Iran

Background: Delayed toxicity from sulfur mustard (SM) exposure is associated with accelerated biological aging. Impaired mitochondrial quality control, particularly dysregulated mitophagy, is hypothesized as a central mechanism. Therefore, we systematically investigated whether persistent alterations in the expression of these key genes occur long after exposure and correlate with the spectrum of clinical severity.

Methods: A case-control study was conducted on 142 SM-exposed veterans (stratified into asymptomatic, mild, and severe subgroups) and 54 matched controls. Gene expression levels of key mitophagy regulators—PINK1, PRKN, DRP1, and FIS1—were quantified in buffy coat leukocytes using real-time PCR. Key demographic covariates showed no significant intergroup differences.

Results: SM-exposed veterans exhibited significantly increased mRNA expression of PINK1, PRKN, DRP1, and FIS1 compared to controls. Expression of fission-related genes DRP1 and FIS1 showed a severity-dependent increase, with the highest levels in the severe clinical subgroup.

Conclusion: Long-term SM exposure leads to persistent dysregulation of the mitochondrial quality control gene network. The severity-associated increase in fission genes, without efficient removal of damaged mitochondria, may result in the accumulation of dysfunctional mitochondria, elevated reactive oxygen species (ROS) production, and ultimately accelerated cellular senescence and tissue dysfunction. These findings highlight the mitophagy pathway as a promising therapeutic target for modulating the delayed complications of sulfur mustard injury.

Keywords: Sulfur Mustard, Mitophagy, Aging, Oxidative Stress, Mitochondria

SP275, Mitochondrial membrane permeability and oxidative stress in age-related decline

Tahereh Jamali[1]
1. Immunoregulation Research Center, Shahed University, Tehran, Iran

Background: Mitochondrial dysfunction is a core hallmark of biological aging, and one of the earliest detectable changes is the gradual decline in mitochondrial membrane potential (MMP). Reduced MMP destabilizes energy production, increases mitochondrial reactive oxygen species (mtROS), and facilitates cytochrome-c release, ultimately leading to apoptosis, tissue degeneration, and aging-associated inflammation (inflammaging).
Methods: In this study, existing mechanistic evidence on age-related changes in mitochondrial permeability was reviewed and integrated. This evidence includes disruptions in the electron transport chain, accumulation of oxidative damage, impaired mitophagy, and increased susceptibility to mitochondrial permeability transition. Published data on MMP instability and mtROS elevation were analyzed to construct a unified model of mitochondrial contributions to aging.
Results: Analysis revealed that gradual MMP decline disrupts electron flow and increases leakage from complexes I and III, leading to elevated mtROS production. High mtROS levels damage mitochondrial lipids, proteins, and DNA, creating a self-amplifying cycle of mitochondrial dysfunction. Loss of MMP also increases cellular susceptibility to permeability transition, enabling cytochrome-c release and activation of caspase-dependent apoptosis. Collectively, these processes contribute to tissue atrophy, stem cell depletion, immunosenescence, and heightened inflammatory signaling in aging tissues.
Conclusion: The combined decline in MMP, rise in mtROS, and enhanced cytochrome-c–mediated apoptosis positions mitochondria as central regulators and amplifiers of aging-related cellular stress. Understanding these interactions may facilitate the development of early mitochondrial biomarkers and therapeutic strategies—such as MMP stabilization, enhanced mitophagy, redox balance modulation, and inhibition of unnecessary cytochrome-c release—to preserve mitochondrial health and slow age-related functional decline.
Keywords: Mitochondrial Membrane Potential (MMP), ROS, Cytochrome-c, Inflammaging, Senescence

SP276, DNA repair gene changes in chemical veterans: evidance of accelerated biological ageing

Marzieh Mojtahed[1], Tooba Ghazanfari[2], Soyar Sari[1], Mehrdad Hashemi[3,4]
1. Department of cellular and molecular biology, TeMS.C., Islamic Azad University, Tehran, Iran
2. Immunoregulation Research Center, Shahed University, Tehran, Iran
3. Farhikhtegan Medical Convergent Sciences Research Center, TeMs.C., Islamic Azad University, Tehran, Iran
4. Basic and Molecular Epidemiology of Gastrointestinal Disorders Research Center, Research Institute for Gastroenterology and Liver Diseases, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: Sulfur mustard (SM) is a chemical warfare agent that induces persistent DNA damage and oxidative stress. It is a potent alkylating chemical warfare agent known to cause severe and persistent damage at the molecular level, primarily through DNA alkylation and the induction of chronic oxidative stress. These insults compromise genomic integrity and overwhelm cellular repair mechanisms, contributing to long-term degenerative health effects often observed in exposed individuals. The dysregulation of DNA repair pathways is a hallmark of accelerated biological ageing, characterized by the accumulation of unrepaired DNA lesions and increased cellular senescence. This study investigated the expression of key DNA repair genes, XRCC1 and XPC, in veterans with delayed SM toxicity to explore molecular evidence of accelerated biological ageing.
Methods: Gene expression of XRCC1 and XPC was assessed using quantitative real-time PCR in 545 SM-exposed veterans, categorized by clinical severity (asymptomatic, mild, moderate-severe), and compared to 156 non-exposed controls.
Results: XPC expression was significantly downregulated in the SM-exposed group compared to controls, with the most pronounced reduction in the moderate-severe subgroup. In contrast, XRCC1 expression was significantly upregulated in exposed individuals, particularly in the mild and moderate-severe subgroups.
Conclusion: SM exposure leads to a sustained imbalance in DNA repair gene expression, characterized by suppressed XPC and elevated XRCC1. This dysregulation reflects compromised genomic maintenance and provides molecular evidence of accelerated biological ageing in chemical warfare veterans.
Keywords: DNA Damage, Biological Aging, DNA repair

SP277, Telomere dysregulation and oxidative DNA damage in long-term survivors of sulfur mustard exposure

Sara Ghaffarpour[1], Leila Nasiri[1,2], MohammadReza Vaez Mahdavi[2,3], Tooba Ghazanfari[1], Tahereh Jamali[1], Sussan Kaboudanian Ardestani[4]

1. Immunoregulation Research Center, Shahed University, Tehran, Iran
2. Department of Health Equity, Immunoregulation Research Center, Shahed University, Tehran, Iran
3. Department of Physiology, Medical Faculty, Shahed University, Tehran, Iran
4. Institute of Biochemistry and Biophysics, University of Tehran, Tehran, Iran

Background: Exposure to sulfur mustard (SM) can lead to long-term and delayed health effects resembling premature biological aging. Persistent mitochondrial dysfunction and oxidative stress are central mechanisms, contributing to DNA damage, telomere dysregulation, and alterations in cellular senescence pathways. This study evaluated mitochondrial and nuclear aging markers—including 8-oxo-dG, telomere length (T/S ratio), and telomere-associated transcripts ANRIL and TERRA—in individuals with remote SM exposure.

Methods: Peripheral blood samples were collected from SM-exposed individuals and matched controls. Expression of ANRIL and TERRA was measured using real-time PCR. Telomere length was determined by monochrome multiplex quantitative PCR (MMqPCR), and oxidative DNA damage was assessed by ELISA for 8-oxo-dG.

Results: 8-oxo-dG levels were higher in the exposed group, though not statistically significant, while the T/S telomere ratio was lower in exposed individuals, indicating telomere shortening and impaired chromosomal maintenance. At the transcriptional level, ANRIL expression decreased, and TERRA expression increased, reflecting dysregulation of telomere-maintenance pathways and a molecular aging profile.

Conclusion: The combined alterations in 8-oxo-dG, telomere length, ANRIL, and TERRA indicate that long-term survivors of sulfur mustard exposure exhibit a consistent pattern of premature mitochondrial and cellular aging. These findings emphasize the persistent impact of oxidative stress and telomere dysfunction in delayed SM toxicity and accelerated biological aging.

Keywords: Sulfur Mustard, Oxidative Stress, Telomer, ANRIL, TERRA, 8-oxo-dG

SP278, Life dietary exposure to perfluorooctanoic acid (PFOA) and bisphenol compounds through milk consumption

Ramin Rezaee[1], Hamid Ahmadpourmir[1], Seyedeh Faezeh Taghizadeh[1], Mahmoud Hashemzaei[2]
1. Applied Biomedical Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Pharmacodynamics and Toxicology, School of Pharmacy, Zabol University of Medical Sciences, Zabol, Iran

Background: Perfluorooctanoic acid (PFOA) and Bisphenol compounds (BPs), particularly bisphenol A (BPA), have raised public concern due to their widespread presence/use and toxic health effects. Dietary intake is a major route of PFOA and BPs exposure, and milk is a primary source of nutrition in early life.
Methods: A systematic search was done in PubMed and Scopus to retrieve original papers written in English and reporting the occurrence of the noted compounds in samples of breast milk and infant formula, published until July 2024.
Results: Among the 69 studies reporting PFOA levels, the highest concentration of PFOA in infant formula and commercial milk was reported from Spain (2490 ng/kg) and the highest level of PFOA in breast milk from Belgium (3.5 ng/mL). The most commonly used approaches for extraction and analysis of PFOA were solid-phase extraction and LC-MS/MS, respectively. Among 43 reports on BPs, 27 and 13 respectively analyzed breast milk and infant formula samples, and 4 studies reported BPs levels in both matrices. BPA is the most frequently detected BP with concentrations in breast milk reaching up to 112.44 ng/g in samples from Taiwan and as high as 262 ng/g in formula samples from Canada. Liquid Chromatography coupled with Tandem Mass Spectrometry (HPLC-MS/MS) and Gas Chromatography Mass Spectrometry (GC–MS) were the most frequently employed methods of detection.
Conclusion: The available evidence highlights the necessity for regular assessment of these chemicals occurrence along with updated regulatory limits to minimize early-life exposure.
Keywords: Breast milk, Bisphenol, Infant Formula, Endocrine-Disrupting Chemicals, Perfluorooctanoic Acid

SP279, Legal aspects of pharmacy giving pregabalin to patients without a prescription

Alireza Ghassemi Toussi[1,2]
1. Medical Toxicology Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
2. School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: A 23-year-old man with a history of bipolar disorder and chronic neuropathic pain who according to his treating physician, had been taking 100 mg of pregabalin tablets daily. The patient has been Meeting a psychiatrist regularly and according to the last visit, he needed to be hospitalized in a psychiatric center due to a psychotic attack. In addition, the doctor does not prescribe pregabalin. The patient does not follow the psychiatrist's advice. The patient goes to the pharmacy and asks for 100 pregabalin tablet. At first, the pharmacy does not accept it and asks for a prescription. Finally, the pharmacy accepts the patient's request. A few hours later, the patient loses consciousness in home and transferred to the hospital. The patient died after 2 days.
Methods: The cause of death is pregabalin poisoning. The patient's family Complained about the medical staff.
Results: The pharmacy's technical manager was convicted of negligence and a disciplinary offense for failing to comply with government regulations by prescribing medication without a doctor's prescription.
Conclusion: Compliance with scientific and technical standards is mandatory for all medical staff. Delivery of medications to patients without a doctor's prescription is prohibited.
Keywords: Pregabalin, Negligence, Pharmacy

SP280, *Curcuma longa* attenuates paraquat-induced behavioral changes in rats exposed to inhaled paraquat through modulating oxidative stress and systemic inflammation

Mohammad Hossein Boskabady[1], Seyed Mahmood Hosseini[1], Mohammad Bazmara[1], Sima Beigoli[1], Amin Mokhtari Zaer[2]

1. Applied biomedical Research Center, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran, Post code: 9177948564
2. Torbat Jam Faculty of Medical Sciences, Torbat Jam, Iran

Background: *Curcuma longa* (Cl) shows potential effects on oxidative stress, and inflammation in various organs. This research sought to explore how Cl affects learning and memory deficits caused by inhaled paraquat (PQ), brain oxidative stress, and systemic inflammation in rats.
Methods: Rats inhaled either saline (Ctrl) or PQ aerosols during the experiment. The PQ groups were administered saline (PQ group), 0.03 mg/kg/day dexamethasone (Dexa), 150 and 600 mg/kg/day Cl (Cl-L and Cl-H), 5 mg/kg/day pioglitazone (Pio), and Cl-L + Pio for 16 days during the PQ exposure period. The evaluation of learning and memory abilities was conducted using Morris water maze (MWM) and passive avoidance tests.
Results: Total and differential WBC numbers, along with malondialdehyde (MDA) levels in the serum and brain were increased in the PQ group but the levels of thiol, catalase (CAT), and superoxide dismutase (SOD) were lower compared to the control group ($p<0.001$). The escape latency and distance traveled were increased in the PQ group. However, the time spent in the target quadrant in the MWM test and duration of time latency in the dark room were reduced after receiving an electrical shock ($p<0.05$ to $p<0.001$). In all treated groups, measured values were improved compared to the PQ group ($p<0.05$ to $p<0.001$). The combination of Cl-L + Pio showed more pronounced effects compared to either treatment alone ($p<0.05$ to $p<0.001$).
Conclusion: Cl, Pio and their combination improved PQ-induced memory dysfunction, brain oxidative stress and systemic inflammation in rats and PPARγ receptor contribution to the effects of Cl was suggested.
Keywords: *Curcuma Longa*, Pioglitazone, Paraquat, Memory, Oxidative Stress, Inflammation

SP281, Kynurenic acid as a potential protective agent in experimental eczematous dermatitis

Sevda Shayesteh[1], Mahsa Rashtchipour[2], Amir Baghaei[3]
1. Department of Pharmacology and Toxicology, Faculty of Pharmacy, Alborz University of Medical Sciences, Karaj, Iran
2. Student Research Committee, Alborz University of Medical Sciences, Karaj, Iran
3. Department of Pharmacology and Toxicology, Faculty of Pharmacy, Alborz University of Medical Sciences, Karaj, Iran

Background: Eczematous dermatitis is a chronic inflammatory skin disorder involving immune dysregulation and activation of NF-κB, the NLRP3 inflammasome, and the Th17/IL-23 axis. Although corticosteroids are commonly used, their long-term application is limited by side effects such as skin atrophy, delayed wound healing, and immune suppression. Kynurenic acid (KYNA), an endogenous tryptophan metabolite, has anti-inflammatory and antioxidant actions and modulates NF-κB, NLRP3, GPR35, and AhR pathways. This study evaluated the therapeutic potential of KYNA and compared its efficacy with dexamethasone in an experimental model of eczematous dermatitis.
Methods: Thirty mice were divided into five groups (n = 6): healthy control, OVA-induced dermatitis, dermatitis treated with KYNA (10 mg/kg, i.p.), dermatitis treated with dexamethasone (1 mg/kg, i.p.), and healthy mice treated with KYNA. Serum levels of NF-κB, NLRP3, IgE, IL-17, and IL-23 were measured by ELISA. Skin lesions were scored macroscopically, and histopathological analysis (H&E staining) assessed epidermal thickness, edema, and inflammatory infiltration.
Results: OVA-induced dermatitis significantly increased NF-κB, NLRP3, IL-17, IL-23, and IgE. KYNA markedly reduced NF-κB, NLRP3, IL-17, and IL-23, while dexamethasone did not decrease IL-17 substantially. KYNA produced superior macroscopic healing and better histological recovery, showing normalized epidermal architecture, reduced inflammatory cells, and improved collagen organization. Healthy mice receiving KYNA exhibited no adverse effects.
Conclusion: KYNA effectively attenuates eczematous dermatitis through multi-pathway immunomodulation, resulting in meaningful macroscopic and microscopic improvements. Its efficacy is comparable or superior to dexamethasone, and its favorable safety profile suggests KYNA as a promising non-steroidal therapeutic option for chronic inflammatory skin disease.
Keywords: Eczematous Dermatitis, Kynurenic Acid, NF-κB, NLRP3 Inflammasome, Th17

SP282, Exploring the neuroprotective potential of aprepitant against nicotine-induced withdrawal syndrome and neurotoxicity: behavioral and molecular evidences

Majid Motaghinejad[1], Hadi Asoudeh[1], Mahnaz Ghomi[2]
1. Chronic Respiratory Disease Research Center (CRDRC), National Research Institute of Tuberculosis and Lung Diseases (NRITLD), Shahid Beheshti University of Medical Sciences, Tehran, Iran
2. Faculty of Pharmacy, Tehran Medical Sciences, Islamic Azad University, Tehran, Iran

Background: This study examined the neuroprotective effects of Aprepitant (APRE), a selective NK1R antagonist, against nicotine (NICO)-induced withdrawal syndrome and neurotoxicity in adult male Wistar rats.
Methods: Forty-eight male Wistar rats were randomly assigned to groups of 8 rats treated ip daily for three weeks as follows: group 1 (0.5 mL/rat of normal saline), group 2 (10 mg/kg of NICO), groups 3, 4, and 5 (10 mg NICO/kg concurrently with APRE at 20, 40, or 80 mg/kg) and group 6 (APRE, 80 mg/kg). OFT, EPM, and FST were evaluated for mood and motor activity-related behaviors. Mitochondrial function, oxidative stress, and inflammation, as well as the JNK/Beclin-1-Bax and Bcl-2/Beclin-1-Bax autophagy and apoptosis pathways, were assessed in the hippocampus.
Results: APRE treatment significantly inhibited NICO-induced mood and motor activity disturbances and significantly increased SOD, GPx, GR activity and TAC, ATP, MMP, GSH, and the un-phosphorylated Form of Bcl-2. APRE in NICO-addicted rats significantly increased ROS, MDA, H2O2, GSSG, TNF-α, IL1-β, both forms of JAK, Bax, Beclin-1, and phosphorylated form of Bcl-2 levels.
Conclusion: The findings indicated that APRE alleviates various detrimental effects of NICO exposure, including behavioral alterations and oxidative stress.
Keywords: Nicotine, Aprepitant, Withdrawal Syndrome, Autophagy, Apoptosis, Inflammation, Oxidative Stress, Mitochondrial Function

SP283, Evaluation the multi-organs toxicity of methamphetamine (meth) in rats

Iraj Ahmadi[1], Hossein Foruozandeh[2]
1. Department of physiology, Faculty of Medicine, Ilam University of Medical Sciences, Ilam, Iran
2. Cellular and Molecular Research Center, Gerash University of Medical Sciences, Gerash, Iran

Background: Methamphetamine (METH) is a high stimulant for the nervous system, which is widely abused. Clinical reports indicated that METH has damaging effects on many organs. This study was done to assess the hepatotoxicity, nephrotoxicity and hematotoxicity of METH in rat model.
Methods: Different doses of METH were used to assess its toxic effects on the liver, kidney and blood in rat model. To evaluate toxicity, serum biochemical markers such as ALT, AST, ALP, Cr, BUN, antioxidant parameters, histopathological examination as well as blood parameters were measured.
Results: Administration of METH significantly increased the liver enzymes and induced oxidative damage in the liver, which confirmed by histopathology. Also, in the kidney, minor increases in BUN and Cr and slight oxidative damage were observed. In the blood, METH-induced reduced WBC level and slightly increased RBC and platelet concentrations and RBC indexes. Also, the total antioxidant capacity of the blood dropped.
Conclusion: Our finding showed severe liver damage and relatively less kidney damage as well as changes in blood parameters due to methamphetamine administration. Also, this study confirmed that oxidative stress plays key roles in the METH-induced damage.
Keywords: Methamphetamine, Toxic, Rat

SP284, Assessment of *Pseudocerastes persicus* venom-induced hind paw edema and antivenom neutralization in mice

Ramin Seyedian[1], Aeen Afrasiaby[1], Hossein Fatemikia[2]
1. Department of Pharmacology, Bushehr University of Medical Sciences, Bushehr, Iran
2. Department of Physiology, Medical School, Shiraz University of Medical Sciences, Shiraz, Iran

Background: Snake envenomation is a critical health concern in the Middle East, particularly in Iran, where the Persian horned viper (*Pseudocerastes persicus*) is endemic to the Zagros Mountains. Despite its prevalence, the biochemical and clinical effects of its venom remain poorly characterized. This study investigates the edematogenic activity of P. persicus crude venom through intraplantar injection in mice and evaluates the efficacy of two antivenoms (Razi Institute antivenom and SnaFab 6) in neutralizing edema.
Methods: Paw edema was induced in anesthetized mice (n=6) by intraplantar injection of venom (10, 50, and 100 µg in 50 µL saline). Paw thickness increase (%) was measured using a digital caliper. Pathological changes were assessed via hematoxylin and eosin staining. Antivenoms were tested by pre-incubation with venom or intraperitoneal administration pre- or post-exposure. Dexamethasone pretreatment was also evaluated.
Results: Venom (50 µg) caused significant edema, characterized by erythrocyte extravasation, leukocyte infiltration, and tissue damage. Pre-incubating venom with either antivenom (50 µL, 30 minutes) fully neutralized edema. However, intraperitoneal antivenom administration (pre- or post-exposure) failed to counteract pathological changes. Dexamethasone pretreatment did not mitigate venom effects, suggesting a limited inflammatory role.
Conclusion: *P. persicus* venom exhibits potent edematogenic, hemorrhagic, and myonecrotic effects. Antivenom efficacy depends critically on administration route and timing, emphasizing the need for optimized therapeutic protocols. These findings underscore the urgency of further research to refine envenomation treatments in endemic regions.
Keywords: *Pseudocerastes persicus*, Paw Edema, Venom, Antivenom

SP285, Beyond endocrine disruption: emerging multi-omics insights into bisphenol A (BPA) toxicity and personalized risk assessment

Sadegh Mohades[1], Shirin Imanpour[1], Jamshid Tabeshpour[1]
1. Department of Pharmacology and Toxicology, Da.C., Islamic Azad University, Damghan, Iran

Background: Bisphenol A (BPA) is a widely used industrial chemical found in plastics, food packaging, and thermal paper. As a known endocrine disruptor, BPA is linked to reproductive, metabolic, and neurodevelopmental disorders. However, recent research highlights its multi-omics effects, revealing complex interactions at genomic, proteomic, and metabolomic levels. Furthermore, individual susceptibility to BPA toxicity varies due to genetic polymorphisms, gut microbiota composition, and environmental co-exposures. This review explores emerging multi-omics insights, the role of non-monotonic dose responses, interactions with microplastics and per- and polyfluoroalkyl substances (PFAS), and next-generation remediation strategies. The aim of this study was to integrate multi-omics data to understand BPA's molecular toxicity and to assess genetic variability and microbiome influence on BPA metabolism. In addition, to examine low-dose and non-monotonic effects of BPA exposure and analyze BPA's interactions with environmental contaminants (microplastics, PFAS). Finally, to evaluate innovative BPA remediation strategies, including nanotechnology and microbial degradation.
Methods: A systematic review of peer-reviewed studies (2014–2024) was conducted using PubMed, Web of Science, and Scopus with keywords: "Bisphenol A," "multi-omics toxicity," "non-monotonic effects," "BPA metabolism," and "remediation strategies."
Results: BPA disrupts hormonal signaling, gene expression, and metabolic pathways. Emerging data suggest that low-dose exposure induces greater effects than high doses through epigenetic modifications. BPA also accumulates in microplastic particles and PFAS-contaminated environments, enhancing toxicity. Advanced remediation methods, including nanotechnology-based adsorbents and engineered bacteria, show promise in BPA removal.
Conclusion: A multi-omics and precision toxicology approach is essential to fully understand BPA's health risks. Future research should focus on personalized exposure assessments, environmental interactions, and sustainable remediation solutions.
Keywords: Bisphenol A, Multi-omics, Non-monotonic toxicity, Microplastics, Remediation strategies

SP286, Cardioprotective effects of hesperidin on carbon monoxide poisoned in rats

Mahmoud Hashemzaei[1], Ramin Rezaee[2], Alireza Sheidary, Saeedeh Jangjoo, Sarvenaz Ekhtiary, Somayeh Bagheri, Zahra Kohkan, Madjid Dadres

1. Department of Pharmacodynamics and Toxicology, School of Pharmacy, Zabol University of Medical Sciences, Zabol, Iran
2. Applied Biomedical Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Carbon monoxide (CO) poisoning induces cardiotoxicity, and no definitive pharmacological intervention is currently available to prevent CO-related cardiac injury. Hesperidin, a citrus-derived flavonoid, has been showed to have cardioprotective effects in experimental models of animals. This study investigated the potential protective effects of hesperidin against CO cardiac poisoning in rats.

Methods: CO poisoning was induced by exposing rats to 3000 ppm CO for 60 minutes. Hesperidin was administered intraperitoneally at doses of 25, 50, or 100 mg/kg/day on the day of CO exposure and for four consecutive days thereafter. Control animals received normal saline. Electrocardiographic (ECG) parameters, including S–T segment changes, T-wave abnormalities, atrioventricular block, and ventricular and supraventricular arrhythmias, were evaluated. On day 6, animals were anesthetized using ketamine/xylazine, recorded ECG and cardiac tissues were collected for histopathological assessment of necrosis and for analysis of Akt protein expression and the BAX/BCL2 ratio by western blotting.

Results: Hesperidin treatment significantly reduced cardiac necrosis in a dose-dependent manner. Administration of hesperidin at 100 mg/kg increased Akt expression and significantly decreased the BAX/BCL2 ratio. ECG abnormalities resolved within 2 hours after CO exposure in all groups, irrespective of treatment.

Conclusion: In conclusion, hesperidin attenuates CO-induced cardiac injury, possibly through activation of cell survival signaling pathways and inhibition of apoptosis, suggesting its potential as a cardioprotective agent in CO poisoning.

SP287, Physiology education in mbbs students: challenges and innovative teaching approaches

Majid Khazaei[1], Azam Norouzi[2]
1. Department of Medical Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Medical Sciences Education Research Center, Department of Medical Education, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Physiology is one of the fundamental subjects in the MBBS curriculum, serving as a bridge between basic sciences and clinical practice. Despite its importance, evidence suggests that many MBBS students face difficulties in learning physiology. The aim of this study is to study the challenges of physiology education in MBBS students, focusing on both common learning challenges and the effectiveness of modern teaching approaches.
Methods: This study was conducted as a narrative review. Literature searches were performed in Google Scholar, PubMed, and Scopus using keywords such as *MBBS students*, *physiology education*, *learning challenges*, *cognitive load*, *motivation*, *clinical integration*, and *active learning strategies*. Articles were included if they addressed difficulties in physiology learning among MBBS students or evaluated innovative teaching methods designed to improve learning outcomes.
Results: There are several challenges in physiology education for MBBS students including: high cognitive load and extensive content which lead to fatigue and reduced concentration, low motivation because of traditional lecture-based methods, poor clinical integration, and surface learning. In response to these challenges, multiple innovative teaching approaches have been suggested including: mMicro-learning (dividing content into short, focused segments reduces cognitive load and improves retention), case-based learning, blended Learning (combining traditional lectures with interactive group activities) and flipped classroom.
Conclusion: Traditional methods for physiology education in MBBS students are insufficient to address all challenges and innovative approaches such as micro-learning, case-based learning, blended learning, and flipped classrooms can significantly improve learning outcomes by fostering active engagement, reducing cognitive burden, and strengthening clinical relevance.
Keywords: MBBS students; Physiology education; Learning challenges.

SP288, Comparison of two methods: online webinar and podcast presentation in teaching physiology topics to medical students

Seyed-Masoud Hosseini[1], Ali Emadzadeh[1], Khadijeh Farrokhfall[2], Abbas Kadkhoda[2], Seyed Mohammadreza Hosseini[3]

1. Department of Medical Education, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Phsiology, School of Medicine, Birjand University of Medical Sciences, Birjand, Iran
3. School of Veterinary Medicine, Islamic Azad University (Garmsar Branch), Garmsar, Iran

Background: In recent years, distance education via electronic systems has been proposed as a new approach in medical sciences education. The aim of this study was to comparison the effect of two methods; online webinar and offline podcasts on the learning of two physiology courses among medical students at Birjand University of Medical Sciences.

Methods: In this study, 52 medical students were selected based on the inclusion criteria and randomly allocated to two groups, with consent. For group one, the topic of acid-base equilibrium was presented as an online webinar while the topic of potassium homeostasis presented as an offline podcast, and for group two, vice versa. The pre-tests and post-tests were administered for both groups and the data were analyzed using SPSS software.

Results: After the intervention, the mean of post-test score for podcast method on acid-base equilibrium course was significantly higher than the webinar method (P=0.004), while the mean of post-test score for the potassium homeostasis course using the webinar method was higher than the podcast method (P=0.039).

Conclusion: It seems that the nature of the content being taught is related to teaching method. For example, in the case of acid-base equilibrium (Taught by offline podcasts), students performed better because they could reflect and review the presented contents, repeatedly. On the other hand, in the case of potassium homeostasis (Taught by online webinar) students had a chance for direct questions and feedback on the topics presented by the teacher.

Keywords: Physiology, Distance Education, Acid-Base Equilibrium

SP289, The Impact of AI-Powered Adaptive Learning Systems on Personalized Instruction and Assessment in Pharmacology Education

Saeideh Naeimi[1], Melika Fayazi[2], Kimia Satari[2]
1. Department of Basic Sciences, Faculty of Veterinary Medicine, Semnan University, Semnan, Iran
2. School of veterinary medicine, Semnan University, Semnan, Iran

Background: Pharmacology education faces the challenge of delivering complex, rapidly evolving information to a diverse student body, each with unique learning paces and styles. Traditional one-size-fits-all approaches often lead to varied learning outcomes and can fail to address individual knowledge gaps effectively. This study aims to investigate the impact of Artificial Intelligence (AI)-powered Adaptive Learning Systems (ALS) on personalizing instruction and assessment within pharmacology curricula. We hypothesize that ALS can significantly enhance student engagement, comprehension, and mastery of pharmacological concepts by dynamically adjusting content and difficulty based on individual student performance and preferences.

Methods: This quasi-experimental study compares pharmacology students who used an AI-driven adaptive learning system to students receiving traditional lectures. The ALS created personalized learning pathways, provided focused feedback, and adjusted assessments in real time. Students in the intervention group demonstrated superior knowledge retention, complex problem-solving performance, and satisfaction. Immediate, individualized remediation proved particularly effective in reinforcing difficult concepts and correcting misunderstandings.

Conclusion: The implementation of AI-powered Adaptive Learning Systems offers a transformative approach to pharmacology education. By enabling true personalization of both instruction and assessment, ALS can optimize the learning journey for each student, fostering deeper understanding and improving overall academic performance. This approach not only addresses the inherent diversity in student learning but also prepares future healthcare professionals with a more robust and adaptable foundation in pharmacology, ultimately contributing to better patient care.

Keywords: Adaptive Learning Systems, Pharmacology Education, Personalized Learning, Artificial Intelligence

SP290, Comparison of the impact of traditional and ai-based formative assessment on knowledge and satisfaction of medical students in at mashhad university of medical sciences

Azam Norouzi[1], Zahra Shokri[1], Somayeh Akbari Farmad[1], Majid Khazaei[2]
1. Medical Sciences Education Research Center, Department of Medical Education, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Medical Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Formative assessment is a cornerstone of medical education, providing continuous feedback to enhance learning and motivation. Traditional methods often lack personalization, while artificial intelligence (AI) offers adaptive, personalized, and immediate feedback. This study aimed to compare the impact of AI-based formative assessment with traditional methods on knowledge and satisfaction among undergraduate medical students in endocrine physiology.
Methods: A quasi-experimental cross-over study was conducted on 129 undergraduate medical students at Mashhad University of Medical Sciences. Students were divided into AI-based and traditional assessment groups. The AI-based system provided automated feedback and adaptive evaluation aligned with students' performance levels. After half a semester, groups were switched to validate outcomes. Data were collected using knowledge tests and satisfaction questionnaires with established validity and reliability.
Results: Pre-intervention analysis showed no significant difference in baseline knowledge ($p>0.05$). During the first phase, AI-based assessment significantly improved knowledge (mean=15.32 vs. 14.05, $p<0.001$) and satisfaction (mean=4.12 vs. 3.45, $p<0.001$). After cross-over, the superiority of AI remained consistent: knowledge (15.60 vs. 14.25, $p<0.001$) and satisfaction (4.28 vs. 3.52, $p<0.001$). ANCOVA results demonstrated that approximately 41% of the variance in student satisfaction was attributable to the AI-based intervention.
Conclusion: This study revealed that AI-based formative assessment is more effective than traditional methods in enhancing both knowledge and student satisfaction. The cross-over design strengthens the internal validity of the results; however, further multi-center studies are recommended to confirm generalizability. Integrating AI-driven formative assessment into medical curricula may enrich learning experiences and better prepare students for evolving healthcare challenges.
Keywords: Artificial Intelligence; Formative Assessment; Medical Education; Endocrine Physiology; Active Learning

SP291, Game-based learning to enhance engagement in basic medical sciences education: an interprofessional "educational battlefield" case study

Zeinab Tabatabaee[1], Mahboubeh Khabbaz Mafinejad[2]
1. Department of E-Learning in Medical Sciences, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
2. Department of Medical Education, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran

Background: Active learning and student engagement remain persistent challenges in basic medical sciences, particularly in physiology education, where abstract concepts and dense theoretical content often limit student motivation. The growing demand for innovative approaches that support deeper understanding of physiological mechanisms and promote interprofessional problem-solving has highlighted the need for alternative pedagogical tools. This study reports on the design and implementation of a structured, game-based learning intervention ("Educational Battlefield Game") intended to model an approach that can be adapted to physiology and other foundational medical science domains to foster collaboration, engagement, and applied reasoning.
Methods: This educational case study involved 32 volunteer students from various medical disciplines at Tehran University of Medical Sciences. The game was an interprofessional, competitive intervention based on role-playing, educational questions, and practical challenges. The educational content focused on fostering problem-solving skills in complex scenarios and enhancing interaction between different healthcare roles. The intervention was executed in two 45-minute rounds. Data collection relied on field observations and descriptive feedback via a post-session questionnaire.
Results: Qualitative analysis of field observations and participant feedback demonstrated a highly engaging and interactive learning environment. All participants showed high active participation and competition throughout the game. Participant satisfaction ratings and open-ended comments indicated the success of the methodology in promoting interaction and motivation, with the role-playing section being rated as the most attractive component.
Conclusion: Game-Based Learning (GBL) proved to be a practical and engaging instructional strategy for promoting active participation and interprofessional collaboration. Given the adaptable structure of the game framework, this model holds strong potential for integration into physiology and other basic medical sciences education—particularly in topics requiring conceptual reasoning, applied decision-making, or interprofessional teamwork. The intervention can serve as a reproducible template for developing localized, curriculum-aligned educational games in foundational medical courses.
Keywords: Game-Based Learning, Physiology Education, Basic Medical Sciences, Interprofessional Education, Active Learning

SP292, effectiveness of student-generated podcasts as a supplementary tool in pharmacology education: A cross-sectional study

Kobra Naseri[1,2], Amirkhosro Eskandari Asl[3]
1. Medical Toxicology and Drug Abuse Research Center, Birjand University of Medical Sciences, Birjand, Iran
2. Department of Toxicology and Pharmacology, School of Pharmacy, Birjand University of Medical Sciences, Birjand, Iran
3. Student Research Committee, Birjand University of Medical Sciences, Birjand, Iran

Background: The growing interest in innovative digital tools, including podcasts, has created new opportunities for enhancing student engagement in medical education. Podcasts, as accessible digital audio or video materials, allow flexible and self-directed learning. Here we evaluate the impact of student-generated podcasts on pharmacology learning outcomes and assessment medical students' perceptions regarding podcast-based learning as a supplementary educational tool.
Methods: This descriptive cross-sectional study was conducted among medical students. Learners were divided into several groups, each responsible for designing podcasts related to pharmacology of neuropsychiatric drugs. Podcasts were required to include creative learning keys, important indications and contraindications, mechanism of action, and major adverse effects. Students voted for the best podcasts based on content attractiveness, usefulness and creativity. Learning outcomes were assessed using pre-test and post-test evaluations, and students' attitudes were measured using a Likert-scale questionnaire.
Results: Students' knowledge significantly improved following podcast-based learning. The mean pre-test score (0.86 ± 1.05) increased to (5.00 ± 1.26) in the post-test ($P < 0.03$). Additionally, 86% of students reported enhanced understanding of pharmacology concepts, 81% felt podcasts improved their exam performance, and 93% agreed that podcasts served as an effective supplementary tool alongside traditional instruction. Students consistently expressed a preference for diverse teaching methods and noted that well-designed podcasts are valuable self-study resources, particularly for newly enrolled students.
Conclusion: Student-generated podcasts proved to be an effective and engaging complementary approach for pharmacology education. They improved conceptual understanding, boosted communication confidence, and increased learner motivation. Expanding this strategy to other theoretical courses in medical sciences is recommended.
Keywords: Podcast; Pharmacology education; Supplementary tools; Student-generated content; Learning methods.

SP293, Evaluation of artificial intelligence algorithms in enhancing nurses' clinical skills for managing drug therapy–related complications

Alireza Keshavarz[1], Amir Hossein Shadfar[2], Vida Roustazadeh[3], Mohammad Amin Alizadeh[4], Kazem Najafi[5]

1. Student Research Committee, Faculty of Nursing and Midwifery, Bam University of Medical Sciences, Bam, Iran
2. Student Research Commitee, deparment of emergency nursing, school of Nursing and Midwifery, Bam University of Medical Sciences, Bam, Iran
3. Student Research Commitee, deparment of medical surgical nursing, school of Nursing and Midwifery, Bam University of Medical Sciences, Bam, Iran
4. School of nursing and midwifery, Jundishapur University, University of Medical Sciences, Ahvaz, Iran
5. Assistant Professor, Department of Nursing, school of Nursing and Midwifery, Bam University of Medical Sciences, Bam, Iran

Background: Drug therapy – related complications pose significant challenges in nursing care, leading to prolonged hospitalization, increased costs, and threats to patient safety. Recent advances in artificial intelligence (AI) offer opportunities to enhance clinical decision-making, predict adverse drug events, and strengthen nurses' competencies in medication management. This systematic review evaluates AI algorithms designed to improve nurses' clinical skills in managing drug therapy–related complications.

Methods: A systematic literature search was performed in PubMed, Web of Science, SID, and Magiran for studies published from 2020 to 2025. Search terms included artificial intelligence, nursing, clinical skills, medication safety, and adverse drug events. Of 170 records retrieved, 14 interventional studies in English or Persian met inclusion criteria. Review articles and gray literature were excluded. Study selection, data extraction, and bias assessment followed PRISMA guidelines, ensuring rigorous ethical standards.

Results: Machine-learning models forecasted adverse drug events from patient data, enabling early preventive actions. AI-powered alert systems detected dosing errors, drug – drug interactions, and protocol deviations in real time. Virtual Reality simulations reinforced safe medication administration techniques. Together, these interventions improved dose-verification accuracy by 20 – 35% , reduced adverse drug events by up to 40%, and significantly boosted nurses' confidence and adherence to safety protocols.

Conclusion: AI algorithms demonstrate promise for enhancing nurses' medication-management skills, particularly in risk prediction, rapid decision-making, and experiential learning. However, heterogeneity in study designs, limited sample sizes, and lack of long-term follow-up underscore the need for large-scale, multicenter randomized trials. Future research should focus on user-friendly AI interfaces, integration with electronic health records, and evaluation of patient-level outcomes.

Keywords: Artificial intelligence , Nursing education , Medication safety , Adverse drug events , Systematic review

SP294, Simulation Improves Practical Blood Physiology Skills in Pharmacy Students

Fereshteh Asgharzadeh[1], Mahmoud Hosseini[1], Zahra Gholamnezhad[1], Maryam Mahmoudabady[1], Maryam Afiyat[1], Mehdi Rabiei[2]

1. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Non-Communicable Diseases Research Center, Sabzevar University of Medical Sciences, Sabzevar, Iran

Background: Enhancing medical education quality requires innovative teaching methods. Simulation-based learning provides a safe, interactive environment, promoting deeper understanding of complex physiological concepts and improving student engagement and knowledge retention.

Methods: A quasi-experimental study was conducted with pharmacy students enrolled in a blood physiology course. Participants were assigned to either traditional instruction (lectures and PowerPoint) or PhysioEx9.1 simulation-based learning. Knowledge acquisition was measured using pre- and post-tests, while engagement, satisfaction, and perceived effectiveness were assessed via a Likert-scale questionnaire. Data were analyzed using paired t-tests in SPSS.

Results: Students using simulation demonstrated significantly higher knowledge retention, engagement, and satisfaction compared to the traditional group ($p < 0.05$). The simulation approach also enhanced conceptual understanding and problem-solving skills, providing a more immersive and interactive learning experience.

Conclusion: Integrating simulation-based learning with traditional instruction improves educational outcomes in medical sciences. This method reduces reliance on animal-based experiments, fosters active learning, and enhances student interaction. Broader implementation across disciplines and further comparative studies are recommended.

Keywords: Simulation-Based Learning; Blood Physiology; Pharmacy Education; Student Engagement; Knowledge Retention

SP295, The role of adipokines and inflammatory markers in respiratory diseases, studies based on clinical findings in patients with COPD

Mohammad Reza Aslani[1]
1. Lung Diseases Research Center, Ardabil University of Medical Sciences, Ardabil, Iran

Background: Chronic obstructive pulmonary disease (COPD) is characterized by irreversible airflow limitation with pulmonary and extrapulmonary complications. It has recently been shown that adipokines as well as inflammatory biomarkers play a key role in inflammatory diseases such as COPD. The aim of the current study was to investigate the levels of adipokines and inflammatory markers such as adipolin, H-FABP, visfatin, FABP-4, Sirtuin-1, DcR3, BNP, and VAP-1 in patients with COPD.
Methods: In a case-control study, patients diagnosed with COPD were compared with healthy subjects. The levels of inflammatory markers and adipokines were examined using ELISA kits. The relationship between inflammatory markers and adipokines and disease severity in COPD patients was also determined based on the GOLD grade.
Results: The results of the studies revealed that the levels of H-FABP, visfatin, FABP-4, DcR3, BNP, and VAP-1 were significantly higher in patients with COPD compared to healthy individuals, which was directly correlated with the severity of the disease according to GOLD. On the other hand, the levels of adiponectin and Sirtuin-1 were significantly lower in patients with COPD than in healthy individuals, which was also negatively correlated with the severity of the disease according to GOLD.
Conclusion: Changes in the levels of inflammatory markers and adipokines were significantly evident in patients with COPD compared to healthy individuals, which can be considered in the pathophysiology of the disease and possibly as therapeutic targets.
Keywords: Visfatin, adipoline, DcR3, COPD, VAP-1, FABP4

SP296, Protective effect of *Melissa officinalis* L. (lemon balm) and rosmarinic acid on ovalbumin induced lung injury in rats

Mohammad Reza Khazdair[1], Vahideh Abbasnia[2], Mohsen Foadoddini[1]
1. Cardiovascular Diseases Research Center, Birjand University of Medical Sciences, Birjand, Iran
2. Department of Biology, Payame Noor University, Tehran, Iran

Background: Asthma is an inflammatory chronic disease which has become prevalent internationally. The effect of *Melissa officinalis* L. (lemon balm) extract and rosmarinic acid (Ros A) on lung inflammation and pathological changes as well as oxidative stress factors in ovalbumin (OVA) induced asthma model rat was examined.
Methods: Lung injury (bronchial asthma) was induced by injection and inhalation of ovalbumin (OVA). Lung inflammation, pathological changes and oxidative stress factors were assessed in the control, sensitized rats, three sensitized groups treatment with lemon balm extract (50, 100, 200 mg/kg), three sensitized groups treatment with Ros A (0.5, 1, 2 mg/kg) and sensitized group treatment with dexamethasone (1mg/kg) as positive control group.
Results: Total WBCs counts, the levels of malondialdehyde (MDA) and nitrite (No2) were significantly increased while, the level of thiol and activity of superoxide dismutase (SOD) and catalase (CAT) were decreased in sensitized group ($p<0.001$). All treatment groups with lemon balm extract, Ros A and dexamethasone demonstrated significantly improved all changes compared to the asthma group ($p<0.001$). The level of thiol and activity of CAT and SOD were significantly higher in all treated groups with Ros A and high doses of extracts ($p<0.001$). Lung pathological changes in the treated groups with dexamethasone, plant extract and Ros A were significantly less than those observed in the asthma group ($p<0.05$ to $p<0.001$).
Conclusion: The study demonstrated the antioxidant and anti-inflammatory effects of lemon balm extract and Ros A in an animal asthma model, indicating the plant's potential therapeutic effects in reducing asthma symptoms.
Keywords: Lemon Balm, Antioxidant, Anti-Inflammatory, Asthmatic Model, Rats

SP297, A novel mouse model of ventilated lung ischemia-reperfusion injury: Minimizing confounders and enhancing clinical relevance

Farzaneh Kianian[1, 2], Wen-I Liao[1], Daisuke Maruyama[1], Christine Tat[1], Xiaoli Tian[1], Judith Hellman[1], Jeffrey M Dodd-o[3], Arun Prakash[1]

1. Department of Anesthesia and Perioperative Care, University of California San Francisco and San Francisco General Hospital, San Francisco, United States
2. Department of Physiology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
3. Department of Anesthesiology and Critical Care Medicine, Johns Hopkins University School of Medicine, Baltimore, United States

Background: Ischemia-reperfusion (IR) injury refers to tissue damage caused by the restoration of blood flow following a period of cessation of circulation. IR injury frequently occurs in various clinical settings, including trauma resuscitation, pulmonary embolism, and lung transplantation, highlighting the importance of focused research to understand underlying mechanisms and mitigate clinical complications. Current experimental models of lung IR injury (LIRI), such as lung hilum occlusion and ex vivo lung perfusion, often include confounding factors like significant atelectasis, hypoxia, and excessive mechanical ventilation.

Methods: Here, we present a detailed, reproducible in vivo mouse model of ventilated LIRI, generating sterile pulmonary damage. The surgical technique uniquely involves reversible oral-tracheal intubation, enabling spontaneous ventilation and significantly minimizing hypoxia and atelectasis. Left pulmonary ischemia is induced via a reversible slip-knot occlusion of the left pulmonary artery through left thoracotomy, isolating unilateral ischemia while maintaining cyclic ventilation and preserving immune responses.

Results: Advantages of this method include precise evaluation of isolated ischemic injuries, extended recovery monitoring, compatibility with secondary injury models (e.g., experimental pneumonia), and enhanced physiological relevance compared to alternative techniques. Findings demonstrated significant neutrophil-driven inflammation, peak cytokine responses at 1 hr post-reperfusion, and substantial inflammation resolution within 24 hr. Mild inflammation observed in the contralateral lung provided additional insights into hyperperfusion-related injury mechanisms.

Conclusion: Although technically challenging, proficiency can be achieved within 1–3 months, yielding an 80–90% success rate. This physiologically relevant mouse ventilated LIRI model facilitates precise exploration of molecular pathways, therapeutic interventions, and complex, multi-hit pulmonary injury mechanisms.

Keywords: Ischemia-Reperfusion Injury, Lung Injury, Pulmonary Artery, Animal Models, Ventilation

SP298, Navigating respiratory distress and dyspnea in sulfur mustard survivors and its mechanisms

Mahboobeh Ghasemzadeh Rahbardar[1], Shakeeb H Moosavi[2], Mohammad Hossein Boskabady[3,4]
1. Clinical Research Development Unit, Shahid Hasheminejad Hospital, Mashhad University of Medical Sciences, Mashhad, Islamic Republic of Iran
2. Department of Biological and Medical Sciences, Faculty of Health and Life Sciences, Oxford Brookes University, Oxford, England
3. Applied Biomedical Research Center, Mashhad University of Medical Sciences, Mashhad, Islamic Republic of Iran
4. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Islamic Republic of Iran

Background: Sulfur mustard exposure during warfare remains a significant cause of long-term pulmonary morbidity. Among the debilitating complications experienced by survivors, dyspnea stands out as a frequent and complex symptom. This narrative review aims to synthesize the current understanding of the physiological pathways driving respiratory distress and the corresponding pharmacological strategies utilized for management in this vulnerable population.
Methods: A literature search was conducted using databases including PubMed, Scopus, and Google Scholar. Keywords such as “sulfur mustard”, “dyspnea”, “respiratory distress”, “veterans”, and “chemical war victims” were utilized without time restrictions to identify relevant studies for this review.
Results: Evidence consistently highlights that sulfur mustard-induced dyspnea arises from a cascade of pathological changes, including chronic airway inflammation, fibrotic remodeling, and oxidative stress. Clinically, the management of these patients often involves a multifaceted pharmacological approach. Interventions such as long-acting bronchodilators, inhaled corticosteroids, and supplemental oxygen therapy are instrumental in mitigating symptoms. These therapeutic modalities have demonstrated efficacy in enhancing exercise tolerance and improving the overall health-related quality of life for survivors suffering from chronic respiratory impairment.
Conclusion: Managing dyspnea in sulfur mustard-exposed survivors requires a comprehensive, multidisciplinary clinical approach. By integrating a deeper understanding of the underlying pathophysiology with evidence-based pharmacological interventions, clinicians can optimize respiratory outcomes. Further research and global collaborative efforts remain essential to advancing care standards for individuals enduring the long-term respiratory sequelae of sulfur mustard exposure.
Keywords: Chemical Warfare, Mustard Gas, Respiratory Distress Syndrome, Inflammation, Pulmonary Edema

SP299, Camel milk attenuates airway inflammation, oxidative stress, and Th1/Th2 imbalance in an ovalbumin-induced asthma rat model

Sepide Behrouz[1], Hadi Sarir[1], Nema Mohammadia Roshan[2], Mohammad Hossein Boskabady[3,4]
1. Department of Animal Science, Faculty of Agriculture, University of Birjand, Birjand, Iran
2. Department of Pathology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Applied Biomedical Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
4. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Asthma is characterized by lung inflammation, lung pathological changes and airway hyper responsiveness. Several pharmacological and therapeutic effects were shown for camel milk.
Methods: The effect of camel milk was evaluated in control, asthmatic (ovalbumin -sensitized), asthmatic group treated (by gavage during animal sensitization period) with 4 and 8 ml/kg camel milk and 1 mg/Kg dexamethasone rats (in camel milk treated groups, n=7 and in the other groups n=6).
Results: In asthmatic group total and differential WBC count in the BALF, malondialdehyde level in the BALF and lung tissue, lung pathological changes, IL-4 level in the lung tissue and tracheal responsiveness were significantly increased, but the levels of superoxide dismutase, catalase and thiol in the BALF and lung tissue and IFN-γ and IFN-γ/IL-4 ratio were significantly decreased compared to the control group ($P<0.01$-$P<0.001$). Dexamethasone and camel milk significantly improved almost all measured variables ($P<0.05$-$P<0.001$).
Conclusion: In conclusion, this study demonstrates that camel milk exerts significant protective effects in an experimental model of asthma by reducing airway inflammation, oxidative stress, and histopathological damage, while improving Th1/Th2 immune balance and airway responsiveness. The findings suggest that camel milk may represent a promising natural adjunctive therapy for asthma management.
Keywords: Airway responsiveness, Asthmatic rat, Camel milk, Lung inflammation, Oxidative stress

SP300, Protective effects of leucomethylene blue against acetaminophen-induced lung toxicity in rats

Sahar Ghoflchi[1], Majid efati[1], Hossein Hosseini[1]
1. Department of Clinical Biochemistry, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Acetaminophen (APAP) overdose can lead to pulmonary complications, including acute lung injury, primarily through oxidative stress and disruption of cellular pathways (1). Leucomethylene blue (LMB), known for its antioxidant effects and inhibition of nitric oxide synthase (2), may mitigate oxidative damage and improve hemodynamic stability (3). This study aimed to evaluate the effects of LMB on acetaminophen-induced pulmonary injury in a rat model.
Methods: This study was conducted on 30 male Wistar rats, randomly assigned to five experimental groups. These included an acetaminophen-treated group, a group receiving N-acetylcysteine (NAC), the LMB group, and a combined NAC+LMB treatment group. Lung tissues were collected, frozen, and stored for subsequent gene expression analysis. Total antioxidant capacity (TAC) and tumor necrosis factor-alpha (TNF-α) levels were also measured. Statistical significance was set at $p < 0.05$.
Results: APAP toxicity significantly increased inflammation and oxidative stress in lung tissue, as shown by elevated TNF-α levels compared to controls (6.65 ± 1.4 ng/mg vs. 3.58 ± 0.48 ng/mg), and reduced TAC (27.80 ± 3.7 µmol/mg vs. 40.95 ± 6.8 µmol/mg). Treatment with LMB markedly reduced TNF-α levels and restored TAC (36.31 ± 4.08 µmol/mg protein), indicating its anti-inflammatory and antioxidant effects.
Conclusion: This study shows that APAP toxicity causes lung inflammation and oxidative stress. LMB reduced these effects by lowering TNF-α levels and increasing antioxidant capacity. These results suggest LMB may be a promising therapeutic option for APAP-induced lung injury.
Keywords: Leucomethylene blue, Pulmonary, Acetaminophen

SP301, Lung injury induced by PQ aerosol was improved by safranal in rats

Mahdieh Farhanji[1], Arghavan Memarzia[1, 3], Seyedeh Zahra Ghasemi[2], Sepideh Behrouz[5], Nema Mohammadian Roshan[4], Zahra Gholamnezhad[1], Mohammad Hossein Boskabady[1, 3]

1. Applied Biomedical Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
2. Cutaneous Leishmaniasis Research Center, Imam Reza Hospital, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
4. Department of Pathology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
5. Saffron institute, University of Torbat Heydariyeh, Torbat Heydariyeh, Iran

Background: Paraquat (PQ) is an herbicide which induces lung and multi-organ injuries. Safranal, the main constituent of Curcus sativus, showed a wide range of pharmacological effects, such as anti-inflammatory, anti-oxidant and immunoregulatory. The effects of safranal and pioglitazone compared to dexamethasone on lung injury induced by PQ aerosol in rats were examined.
Methods: Control (Ctrl) group of rats were exposed to saline and six groups to PQ aerosol 8 times on alternate days (n = 6). PQ groups were treated with saline (PQ), two doses of safranal (Saf-L and Saf -H), pioglitazone (Pio), the combination of Saf-L + Pio and dexamethasone (Dexa, as positive control) for 16 days after the end of PQ exposure.
Results: In PQ group. the bronchoalveolar lavage fluid (BALF) levels of superoxide dismutase (SOD), catalase (CAT) and thiol were reduced, but MDA level, total and differential WBC, and lung tissue levels of interferon gamma (INF-γ) and Interleukin 10 (IL-10), tracheal responsiveness to methacholine and lung pathological changes were increased. Measured variables in all treated groups were significantly improved except some variables in Saf-L. The effects of Saf-H and combination group Saf-L + Pio on measured variables were equal or even higher than dexamethasone. The effects of the combinations of Saf-L + Pio on most variables were significantly higher than those of Saf-L and Pio alone.
Conclusion: Safranal alleviated lung injury induced by inhaled PQ similar to the effects of dexamethasone. The synergic effects of safranal and pioglitazone suggest the possible influence of PPARγ receptor-on safranal mediated impacts.
Keywords: Safranal, Pioglitazone, Dexamethasone, Paraquat, Lung injury

SP302, Natural products in COPD: Insights from experimental and clinical evidence

Vahideh Ghorani[1], Saeideh Saadat[2], Farzaneh Shakeri[3], Mohammad Hossein Boskabady[1,4]
1. Applied biomedical Research Center, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Physiology, School of Medicine, Zahedan University of Medical Sciences, Zahedan, Iran
3. Natural Products and Medicinal Plants Research Center, North Khorasan University of Medical Sciences, Bojnurd, Iran
4. Department of Physiology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Chronic obstructive pulmonary disease (COPD) is a progressive respiratory disorder characterized by irreversible airflow limitation and persistent inflammation. Despite the availability of pharmacological therapies, current drugs only aim to relieve symptoms and reduce exacerbations rather than halt the progressive decline in pulmonary function. Consequently, there is growing interest in complementary and alternative medicine. Traditional medicine has a rich history of using plant-based extracts and natural products in the treatment of respiratory disease. A wide range of botanicals—including *Crocus sativus*, *Echinacea purpurea*, *Panax ginseng*, *Nigella sativa*, *Zataria multiflora* and etc. —have been reported to play roles in COPD management. These plants exhibit various effects, such as bronchodilation, vasodilation, and modulation of pulmonary inflammation. This review synthesizes experimental and clinical evidence regarding the effects of medicinal plants and their components on COPD.
Methods: Scientific papers in regard to COPD and natural products were collected from PubMed, Google Scholar, and Scopus up to the end of 2024.
Results: The findings showed that natural products may exert preventive and therapeutic effects through anti-inflammatory, antioxidant, and immunomodulatory mechanisms, particularly by regulating inflammatory cytokines and mitigating oxidative stress. While these results are promising, the clinical efficacy of plant-derived therapies remains to be firmly established. High-quality, well-designed clinical trials are needed to validate their therapeutic potential.
Conclusion: This review provides a consolidated overview of the role of plant-derived natural products in COPD management, highlighting both preventive and therapeutic strategies. Further research is essential to fully elucidate pharmacological and clinical significance of these plants in the context of chronic respiratory disease.
Keywords: Chronic obstructive pulmonary diseases, Herbal medicine, Natural product

SP303, Protein quality control during physiologic and pharmacologic stress

Gholamreza Karimi[1]
1. Department of Pharmacodynamics and Toxicology, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran

Background: The cellular protein quality control machinery with its central constituents of chaperones and proteases is vital to maintain protein homeostasis under physiological and pharmacologic conditions and to protect against acute stress conditions.
Methods: It plays an important role in maintaining normal cell metabolism and avoiding protein dysfunction. Various evidence shows that when abnormal protein accumulates, as an adaptive response of the ERS, the unfolded protein response (UPR) is provoked to produce normal proteins by up regulating the expression of molecular chaperones, while reducing the accumulation of misfolded proteins via decelerating the synthesis of total proteins.
Results: The adaptive and protective interactions between the ERS and UPS can help cells to clear toxic protein aggregation, reduce the imbalance in the endoplasmic reticulum lumen, and restore cell homeostasis. However, the continuous imbalance of endoplasmic reticulum homeostasis, as well as autophagy dysfunctions could mediate the gradual transformation from the ERS to autophagy, that is, from an adaptive and protective state to a persistent and destructive condition
Conclusion: Therefore, it is of great importance to explore the interrelationship between the protein quality control system and the pathogenesis of diseases, which will help us to further understand the mechanisms and consequences of proteostasis dysregulation in detail, and even provide a potential novel therapeutic strategy in pharmacotherapy.
Keywords: Protein, Oxidative stress, Endoplasmic reticulum

SP304, Raha herbal syrup and the behavioral-neuroendocrine disorders induced by opioid use disorder: A review article

Hajar Yazdani[1,2], Mitra As'habi[1,2], Freshteh Haerifar[1,2], Monireh Shokravian[3], Mahdi Zahedi-Khorasani[1,2], and Hossein Miladi-Gorji[1,2]

1. Research Center of Physiology, Semnan University of Medical Sciences, Semnan, Iran
2. Department of Physiology, Faculty of Medicine, Semnan University of Medical Sciences, Semnan, Iran
3. Department of Biology, Damghan Branch, Islamic Azad University, Damghan, Iran

Background: This study examined the effectiveness of Raha syrup on the behavioral and neuroendocrine disorders in rat models and patients with opioid use disorder.
Methods: In an animal model, morphine dependent rats gavaged the opium tincture (OT) and Raha syrup, and were tested for the severity of physical and psychological morphine dependence, and the cerebrospinal fluid (CSF) serotonin levels. Also, in other study, Raha syrup tested on the rewarding effects of morphine in conditioned place preference (CPP). In a clinical study, two groups of opioid-dependent mens were treated with OT and OT/Raha. Both groups completed the study questionnaire before and after treatment, and measured serum serotonin-cortisol levels.
Results: We found Raha syrup attenuated physical dependence, increased the CSF serotonin, sucrose preference, the percentage of time spent and exhibited a lower morphine preference in rats. Also, Raha syrup attenuated the acquisition of morphine CPP, and increased serotonin level, while did not affect the extinction and reinstatement of CPP. Also, we found significant differences in the pretest-posttest difference scores of the severity of dependence, depression, stress, anxiety, the craving scale and serum levels of serotonin between the two groups of patients receiving OT and OT/Raha, and without changing serum cortisol levels.
Conclusion: We conclude that the use of OT for maintenance treatment along with Raha herbal syrup may be beneficial for the management of opioid abstinence. Also, Raha herbal syrup may exert a protective effect against opiate-related rewards.
Keywords: Opioid use disorder; Opium tincture; Raha syrup; Physical dependence; Psychological dependence.

SP306, Aging and new strategies: *In vivo* and *in vitro* studies

Mojtaba Malekinejad[1], Mahfar Heibatollahi[2], Nasim Rezaie[3], Hassan Malekinejad[2, 3]
1. Department of Neurology, Faculty of Medicine, Urmia University of Medical Sciences, Urmia, Iran
2. Experimental & Applied Pharmaceutical Sciences Research Center, Urmia University of Medical Sciences, Urmia, Iran
3. Department of Pharmacology and Toxicology, School of Pharmacy, Urmia University of Medical Sciences, Urmia, Iran

Background: Aging processes are occurred in relatively all organs and tissues. There are inevitable factors, which hinder the natural life in advance ages. Those factors could be genetic or epigenetic-related and/or other detrimental metabolites such as reactive oxygen species (ROS) that are produced by human body. In addition, exposure against environmental chemicals and pollutants could even have negative impact on life quality and life span, too.
Methods: During the last 5 years, we tried to investigate the possible effects of some natural products including royal Jelly (RJ) and pharmaceutical agents such as Edaravone (EDN) on experimentally-induced cell senescence (CS) and hepatic aging in *in vitro* and *in vivo* studies.
Results: The experimentally induced CS resulted in a significant ($p<0.05$) decrease in cell proliferation, elevation of lipid peroxidation and protein carbonylation rates, increase of TNF-α release, elevation of apoptotic cells and fragmented DNA, along with 3.4 to 13-fold up-regulation of p53, p21 and p16 genes. At the same time, concurrently exposure to DG and various concentrations of EDN remarkably protected from all mentioned injuries. The most practical and effective concentration of EDN to protect from the DG-induced injuries was found to be 1 μMol. On the other hand RJ both in HepG2 cells and also in rat's hepatic tissue reduced remarkably the D-galactose-induced oxidative stress and inflammation.
Conclusion: Therefore, these findings suggest that EDN and RJ with antioxidant, anti-inflammatory characters could be effective anti-aging compounds to protect from various type of DNA damaging signals in neuronal and hepatic cells.
Keywords: Aging; Inflammation; DNA damage; Oncogenes; Oxidative stress.

SP307, Synergistic effect of green-synthesized ZnO-Ag@LAE nanoparticles and blue light in promoting wound healing

Zahra Kiani[1], Pouria Mohammadparast-Tabas[2], Hamed Aramjoo[3], Homa Sadat Esfahani[4], Khatereh Khorsandi[4]

1. Department of Pharmacology, Birjand University of Medical Sciences, Birjand, Iran
2. Department of Medical Biotechnology, Faculty of Medicine, Birjand University of Medical Sciences, Birjand, Iran
3. Cellular and Molecular Research Center, Department of Molecular Medicine, Birjand University of Medical Sciences, Birjand, Iran
4. Department of Photodynamic, Medical Laser Research Center, Yara Institute, ACECR, Tehran, Iran

Background: Wound healing is a coordinated biological process involving inflammation, proliferation, and tissue remodeling. Metal-based nanoparticles, including zinc oxide (ZnO) and silver (Ag), exhibit antimicrobial, anti-inflammatory, and pro-regenerative properties. photobiomodulation has also been shown to positively influence cellular behavior. In this study, the combined effects of green-synthesized ZnO-Ag nanoparticles and blue light on fibroblast-driven wound healing have been investigated.

Methods: ZnO-Ag nanoparticles were synthesized using *Launaea acanthodes* extract through a green method (ZnO-Ag@LAE) and characterized by XRD, FT-IR, FESEM, TEM, and EDS. Human dermal fibroblasts (HDFs) were exposed to increasing nanoparticle concentrations (1–200 µg/mL) under dark conditions or blue light irradiation (465 nm, 34 mW/cm², 5 min). Cell viability was measured using MTT assay, migration assessed through scratch assay, and intracellular reactive oxygen species (ROS) quantified by DCFH-DA flow cytometry.

Results: ZnO-Ag@LAE nanoparticles in concentrations less than 25 µg/mL showed minimal cytotoxicity, whereas higher doses reduced cell viability. Blue light irradiation improved fibroblast viability and mitigated nanoparticle-induced cytotoxicity. ROS analysis demonstrated that blue light significantly decreased oxidative stress in nanoparticle-treated cells. Scratch assay results revealed enhanced fibroblast migration and accelerated wound closure in the ZnO-Ag@LAE + blue light group compared with nanoparticles alone or light alone.

Conclusion: Co-treatment with ZnO-Ag@LAE nanoparticles and blue light synergistically improved fibroblast viability, reduced ROS generation, and accelerated in vitro wound healing. These findings support a promising non-invasive nano–photobiomodulation strategy that merits further evaluation in in vivo wound models.

Keywords: Zinc oxide, silver, nanoparticle, *Launaea acanthodes*, Blue Light, Phototherapy, Wound healing

SP308, Comparison of dexmedetomidine and midazolam in sedation of children under mechanical ventilation: A randomized controlled trial

Atiyeh Kaveh[1], Hosein Akhavan[2], Gholamreza Khademi[3], Maryam Naseri[4], Tahereh Sadeghi[5], Majid Sezavar[6]

1. Department of Pediatrics, School of Medicine, Akbar Hospital, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Pediatrics, School of Medicine, Sheikh Hospital, Mashhad University of Medical Sciences, Mashhad, Iran
3. Professor of Pediatrics, Department of Pediatrics, School of Medicine, Neonatal Research Center, Akbar Hospital, Mashhad University of Medical Sciences, Mashhad, Iran
4. Assistant Professor of Pediatrics, Department of Pediatrics, School of Medicine, Akbar Hospital, Mashhad University of Medical Sciences, Mashhad, Iran
5.Associate Professor of Nursing, Department of Pediatrics, School of Nursing and Midwifery, Nursing and Midwifery Care Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
6. Assistant Professor of Pediatrics, Department of Pediatrics, School of Medicine, Akbar Hospital, Mashhad University of Medical Sciences, Mashhad, Iran

Background: The advantages of Dexmedetomidine in the sedation of children receiving mechanical ventilation continue to present challenges.
Methods: this study was executed in 3 affiliated hospitals from March 2023 to March 2024 in Mashhad. Patients receiving mechanical ventilation aged between one month and 18 years were randomly selected to prescribe sedative medications, Dexmedetomidine (0.25-1µg/kg/h) or Midazolam (1-4-µg/kg/min), in addition to Fentanyl as an analgesic. The Ramsey Sedation Scale administered to evaluate sedation with target scores of 5 and 6. The main outcome was the proportion of patients successfully achieved the target level of sedation at the onset of mechanical ventilation .Successful cases were followed up for 6 hours.
Results: Statistical analysis was conducted on 120 participants, with 60 people in each group. There was no difference in the demographic features of the groups. The main finding showed that Dexmedetomidine was not effective compared to Midazolam in achieving goal levels of sedation in all ages (p=0.000). But in infants aged below 1 year, the efficacy of drugs was the same(P=0.157). In the follow-up, most patients receiving dexmedetomidine needed an increased dose to maintain sedation, whereas midazolam group required fewer adjustments (P=0.001). In terms of hemodynamic side effects, the dexmedetomidine group was associated with a significantly lower risk (3.3% vs. 23.3% for hypotension). The mortality rate, duration of PICU admission and duration of mechanical ventilation was the similar in the two groups (P= 0.853; P=0.082; P=0.076).
Conclusion: Although Dexmedetomidine is not suitable for providing profound sedation in mechanically ventilated children under 18 years old, it may be effective in infants with greater safety and less hemodynamic complications compared to Midazolam.
Keywords: Dexmedetomidine, Midazolam, mechanical ventilation, sedation

SP309, The potential role of adrenergic antagonists (propranolol and prazosin) in treating glioblastoma multiforme (GBM): in vitro and in vivo experiments

Nooshin Ahmadirad[1], Samaneh Dehghan[2]
1. Cellular and Molecular Research Center, Iran University of Medical Sciences, Tehran, Iran
2. Eye Research Center, The Five Senses Institute, Rassoul Akram Hospital, Iran University of Medical

Background: Glioblastoma multiforme (GBM) is a highly aggressive brain tumor with limited treatment options and poor prognosis. Despite progress in cancer research, the survival rate for GBM has remained largely unchanged. The adrenergic system, which plays a role in the stress response, has been linked to cancer progression by promoting tumor growth and suppressing the immune response. Adrenergic antagonists, such as the beta-blocker propranolol and the alpha-blocker prazosin, have shown potential anti-cancer effects, but more research is needed.
Methods: This study aimed to investigate the therapeutic effects of propranolol and prazosin on GBM induced by C6 and U87 glioma cells, using in vivo models. The main outcomes assessed were tumor growth, necrosis, and cell viability.
Results: In this study, we evaluated the effects of propranolol and prazosin on glioblastoma multiforme (GBM) in male Wistar rats. Seventy rats were divided into untreated controls and treatment groups receiving propranolol (5, 10, or 20 mg/kg) or prazosin (1, 2, or 4 mg/kg).
Tumor Growth: MRI assessments at days 11 and 18 revealed significant tumor volume reductions: propranolol 20 mg/kg led to a 45% decrease ($p < 0.01$), while prazosin 4 mg/kg showed a 40% decrease ($p < 0.01$).
Necrosis: Histological analysis indicated that high-dose treatments significantly reduced necrotic areas. Propranolol 20 mg/kg resulted in a 35% reduction ($p < 0.05$), and prazosin 4 mg/kg showed a 30% reduction ($p < 0.05$).
Cell Viability: Ki-67 staining revealed a 50% decrease in proliferation with propranolol ($p < 0.01$) and a 45% decrease with prazosin ($p < 0.01$).
Conclusion: The findings of this study suggest that both high-dose propranolol (20 mg/kg) and high-dose prazosin (4 mg/kg) effectively inhibit tumor growth and reduce necrosis in GBM models. These results support the potential use of adrenergic antagonists as therapeutic agents in the management of glioblastoma multiforme. Further investigations are warranted to elucidate the underlying mechanisms and to evaluate the clinical applicability of these findings.
Keywords: GBM, adrenergic receptors, Propranolol, Prazosin

SP311, Saffron and its bioactive compounds: From color and aroma to therapeutic applications

Hossein Hosseinzadeh[1]
1. Department of Pharmacodynamics and Toxicology, School of Pharmacy, Mashhad University of Medical Sciences

Background: Saffron (*Crocus sativus* L.) is one of the most important medicinal plants in the world, which has gained a special status in pharmaceutical and modern medical research due to its unique bioactive compounds. The most important active ingredients of saffron include crocin as a water-soluble carotenoid and the main coloring agent, crocetin as the active metabolite of crocin, safranal as a volatile compound responsible for its aroma, and picrocrocin as the agent responsible for saffron's bitter taste. Furthermore, flavonoids, phenolic compounds, and vitamins also play a role in the biological activities of saffron.
Results: Saffron exerts numerous effects on various systems of the body. In the central nervous system, experimental and clinical studies have shown that saffron possesses antidepressant, anti-anxiety, memory-enhancing, and neuroprotective properties and can be beneficial in disorders such as depression, Alzheimer's, and Parkinson's. In the cardiovascular system, saffron plays a protective role by lowering blood pressure, improving lipid profiles, inhibiting LDL oxidation, and improving endothelial function. In the metabolic system, this plant has been reported to be effective in controlling diabetes and metabolic syndrome by improving insulin sensitivity, lowering blood sugar and blood lipids, and modulating appetite. Additionally, anti-inflammatory and mucosal protective effects have been observed in the digestive system, immunomodulatory effects in the immune system, and improvement of sexual function and fertility in the reproductive system.The major mechanisms of saffron's action include strong antioxidant activity and inhibition of free radicals, reduction of inflammation via the inhibition of inflammatory cytokines, regulation of neurotransmitters such as serotonin and dopamine, inhibition of apoptosis and oxidative stress, and improvement of mitochondrial function. These mechanisms form the basis of saffron's multi-systemic effects.
Conclusion: Saffron is a multi-target medicinal plant with growing scientific evidence that can be considered as a safe and effective complementary option for the prevention and management of chronic diseases.

SP312, Saffron as red gold in cardiovascular protection: from molecular mechanisms to clinical implications

Marjan Razavi[1]
1. Department of Pharmacodynamics and Toxicology, School of Pharmacy, Mashhad University of Medical Sciences

Background: Cardiovascular diseases remain leading causes of mortality worldwide, and the search for safe and effective natural agents for their prevention and adjuvant treatment has gained increasing importance. Saffron, as one of the valuable medicinal plants, contains numerous bioactive compounds including crocin, crocetin, safranal, and picrocrocin, with growing evidence reporting their beneficial effects on the cardiovascular system.
Results: Laboratory, animal, and clinical studies indicate that saffron and its active ingredients can play a significant protective role in the heart and blood vessels by reducing blood pressure, improving lipid profiles, inhibiting atherosclerosis progression, and enhancing endothelial function. Crocin and crocetin are effective in regulating lipid metabolism by lowering total cholesterol, LDL, and triglycerides, and in some cases, increasing HDL.
The cardiovascular mechanisms of action of saffron primarily include potent antioxidant activity, inhibition of lipid peroxidation and reduction of reactive oxygen species, anti-inflammatory effects, reduction of inflammatory cytokines like TNF-α and IL-6, improving endothelial function by increasing nitric oxide (NO) bioavailability, and inhibiting platelet aggregation. Furthermore, safranal and crocetin can contribute to blood pressure reduction and myocardial protection against ischemia-reperfusion injury by inhibiting calcium channels and modulating the renin-angiotensin system.
Conclusion: The totality of scientific evidence suggests that saffron and its active compounds hold high potential as a supplementary natural agent in the prevention and management of cardiovascular diseases. However, larger clinical trials and standardization of dosage and pharmaceutical forms are necessary to translate these findings into definitive clinical recommendations.

SP313, Saffron in ophthalmology

Seyed Ahmad Mohajeri[1]
1. Pharmaceutical Research Center, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Saffron and its active ingredients such as crocin and safranal exhibit significant antioxidant, anti-inflammatory, neuroprotective, and anti-apoptotic properties which can be applied in ophthalmological research.
Methods: Numerous in vitro, in vivo, and clinical studies have evaluated the pharmacological effects of saffron and its active compounds in eye disorders.
Results: saffron play an important role in protecting photoreceptor cells and retinal ganglion cells by inhibiting free radical production, increasing antioxidant enzyme activity, and reducing lipid peroxidation. In addition, its compounds can prevent tissue damage in inflammatory eye disorders by modulating inflammatory pathways such as NF-κB and reducing the expression of inflammatory cytokines. Crocin prevents vascular leakage and abnormal retinal neovascularization by inhibiting NF-κB pathways and reducing VEGF expression. It also helps maintain the structure and function of the retina by improving mitochondrial function and increasing antioxidant capacity (such as increasing SOD and GPx). Clinical trials indicated that administration of crocin significantly reduced central macular thickness (CMT), improved best corrected visual acuity (BCVA), and reduced HbA1c. Also, oral consumption of saffron improved contrast sensitivity, retinal electrophysiological function, and visual quality in patients with non-advanced Age-related Macular Degeneration (AMD). Also, other works showed that saffron and crocin can reduce intraocular pressure and damage caused by increased pressure on the retina and optic nerve.
Conclusion: saffron and its active ingredients have significant potential in preventing and treating eye disorders. However, larger clinical trials are necessary for its definitive clinical application in ophthalmology.
Keywords: Saffron, crocin, retina, retinopathy, glaucoma

SP314, Anticancer effects of silymarin-loaded ACA-HA/sulfonamide IR-MOF nanoplatform in CT-26 xenograft model

Rasool Haddadi[1], Sedigheh Alavinia[2], Ramin Ghorbani-Vaghei[2]
1. Department of Pharmacology & Toxicology, Faculty of Pharmacy, Hamadan University of Medical Sciences, Hamadan, Iran
2. Department of Organic Chemistry, Faculty of Chemistry and Petroleum Sciences, Bu-Ali Sina University, Hamadan, Iran

Background: Silymarin, a herbal compound with antioxidant and anti-inflmmatory properties, has shown potential in inhibiting colon cancer cell growth. However, its clinical application is hindered by poor bioavailability. This study introduces a novel metal-organic framework, Sul-IRMOF, modifid with 6-aminocaproic acid (ACA) and hyaluronic acid (HA) to create Sul-IRMOF-ACA-HA, which enables targeted drug delivery via HA receptors.
Results: Histological staining, biochemical analyses, and flw cytometry revealed that Sul-IRMOF-ACA-HA@Sily significantly enhances cytotoxicity against CT-26 cells compared to pure silymarin. According to oxidative stress markers, Sul-IRMOF-ACA-HA@Sily signifiantly reduced total thiol and glutathione (GSH) content compared to the control ($p < 0.001$) and silymarin ($p < 0.001$). Catalase (CAT) and superoxide dismutase (SOD) activities were signifiantly reduced in all treatment groups ($p < 0.001$), with Sul-IRMOF-ACA-HA@Sily showing the most pronounced effects ($p < 0.001$ vs. silymarin). Additionally, malondialdehyde (MDA) and nitric oxide (NO) levels were signifiantly elevated in the silymarin and Sul-IRMOF-ACA-HA@Sily groups compared to the control ($p <0.001$), with Sul-IRMOF-ACA-HA@Sily further increasing both markers compared to silymarin ($p < 0.001$).
Conclusion: The synergistic design of ACA, HA, and Sul-IRMOF offers a promising strategy to overcome silymarin's bioavailability limitations, positioning Sul-IRMOF-ACA-HA@Sily as a novel therapeutic candidate for colorectal cancer.
Keywords: Silymarin, Colorectal cancer, Sulfonamide-based MOF, Targeted drug delivery, Hyaluronic acid, Total thiol, Glutathione, Malondialdehyde, Nitric oxide, Superoxide dismutase

SP315, Effect of α- bisabolol on SREBP1C, Caveolin-1, MCAD and apoB100 gene expression in HepG2 cell line steatosis signaling pathway

Mohammad Raman Moloudi[1], Mohsen Sohrabi[2], Farhad manoochehri[2], Alina Abdollahi[2], Masuod Allasvand[1]

1. Liver and Digestive Research Center, Research Institute for Health Development, Kurdistan University of Medical Sciences, Sanandaj, Iran
2. Student Research Committee, School of medicine, Kurdistan University of Medical Sciences, Sanandaj, Iran

Background: Nonalcoholic fatty liver is one of the most common causes of liver failure. Oxidative stress, cytokines and other inflammatory mediators help develop this disease and increase its risk. α-bisabolol is one of the main components of many herbal plants with anti-inflammatory effect. The goal of this study is to evaluate the Protective effect of α-bisabolol on NAFLD in HepG2 cell line.

Methods: In this experimental science study, HepG2 cell line was used. Household cells were synthesized in culture medium containing collagen skeleton before 24 hours with oleate and palmitate fatty acids in a ratio of 2 to 1 in the final concentration of 1.2 mM and then for 24 hours to control power 0, 1, 2.5 and 5 μm decreased the team and glutathione peroxidase activity and expression of SREBP-1, caveolin-1, ApoB-100 and MCAD genes were evaluated. Finally, using one-way analysis of variance (one-way ANOVA) and if there is a significant difference from other statistics ($P < 0.05$), using experimental tests (Post-Hoc test) experimental groups performed has been.

Results: The obtained data showed that α-bisabolol at concentrations of 1 and 2.5 significantly increased glutathione peroxidase activity ($p < 0.01$ and $p < 0.001$). It also significantly reduces the expression of Caveolin-1 at concentrations of 1, 2.5 and 5 ($p < 0.001$), has no significant effect on the expression of SREBP-1 gene and reduces the expression of MCAD and ApoB-100. The face becomes significant ($p < 0.001$).

Conclusion: The results of this study showed that a α-bisabolol in concentrations of 1, 2.5, and 5 through anti-inflammatory and antioxidant properties, and reduced expression of Caveolin-1 gene has a protective effect against liver damage caused by non-alcoholic fatty liver.

Keywords: α-Bisabolol, NAFLD, Antioxidant, gene expression

SP316, Preventive effects of quercetin and liraglutide on isoproterenol-induced myocardial ischemia in hyperglycemic and hyperlipidemic Wistar rats

Zahra Roshani[1], Zohreh Abdolmaleki[2], Seyedeh Parastoo Yasini[3]
1. Department of Pharmacology, Faculty of Veterinary Medicine, University of Tehran, Iran
2. Department of Pharmacology, Ka.C., Islamic Azad University, Karaj, Iran
3. Department of Clinical Science, Ka.C., Islamic Azad University, Karaj, Iran

Background: Ischemic heart disease, a global cause of mortality, is increasing under the conditions of hyperglycemia and hyperlipidemia. Existing treatments do not utterly prevent myocardial injury, creating interest in antioxidant and cardioprotective agents such as quercetin and the glucagon-like peptide 1 receptor agonist, liraglutide.
Methods: Hyperglycemia and hyperlipidemia were induced in Wistar rats through an eight-week high-fat diet and a single dose of streptozotocin. Then animals received quercetin (20 mg/kg), liraglutide (0.02 mg/kg), or their combination for four weeks. Isoproterenol was used to induce myocardial ischemia. Following Biochemical markers and antioxidant enzymes were evaluated: Troponin I, creatine kinase MB, lactate dehydrogenase, glucose, lipid profile, superoxide dismutase, malondialdehyde, catalase. Hematoxylin & eosin and Masson's trichrome staining were implemented.
Results: Both quercetin and liraglutide significantly increased superoxide dismutase and catalase activity and reduced creatine kinase MB, lactate dehydrogenase, triglycerides, cholesterol, glucose, and malondialdehyde ($P < 0.01$). The combination treatment produced greater improvements in all biochemical and oxidative stress indices ($P < 0.01$), showing efficient synergistic effects. The most favorable metabolic and cardiac profile was displayed by the combination group, whereas the ischemia and control groups showed the highest levels of injury markers. Logistic regression and rank correlation confirmed significant associations between treatment groups and myocardial injury ($P < 0.05$) and fibrosis severity ($P < 0.01$).
Conclusion: Simultaneous quercetin and liraglutide therapy results in superior protection against oxidative stress, biochemical damage, and cardiac fibrosis compared with either treatment alone, supporting the potency of their combination as a preventive strategy for ischemic myocardial injury in metabolic risk conditions.
Keywords: Hyperglycemia, Hyperlipidemia, Ischemic heart disease, Glucagon-like peptide 1 receptor, Quercetin.

SP317, Green synthesis of zinc nanoparticles from ginger contributes to the treatment of diabetic nephropathy

Abolfazl Akbari[1]
1. Department of Physiology, School of Veterinary Medicine, Shiraz University, Shiraz, Iran

Background: This study aimed to investigate the effect of the nanoparticles of zinc ginger and GSZNPG on DN by evaluating the metabolic and hemodynamic pathways in the kidney tissue of male rats.
Methods: Adult male Wistar rats were assigned into controlled and treated groups. The activity of angiotensin II/aldosterone/renin/Nr3c2/SGLT2 as the hemodynamic pathway, and the activity of RAGE/PKC/NF-κB/Nrf2 as metabolic pathway were measured along with oxidative markers and the serum levels of insulin, glucose, creatinine, and urea.
Results: HFD-induced T2DM could increase the activity of the hemodynamic pathway and metabolic pathway in the diabetic group compared to the control group ($P<0.05$). However, treatment with different doses of ginger, zinc, nanoparticles, and GSZNPG could inhibit these pathways and reduce the serum creatinine and urea levels in diabetic rats compared to the diabetic group without intervention ($P<0.05$). Moreover, inflammation, apoptosis, and oxidative damage could be inhibited compared to the untreated diabetic group($P<0.05$).
Conclusion: It can be concluded that the nanoparticles of ginger and zinc, and GSZNPG as novel agents to deliver zinc-ginger could improve kidney function in diabetic patients and have a potential anti-diabetic activity. They can be used as an adjunct combination along with antihypertensive drugs and in the manufacture of supplements or anti-diabetic drugs.
Keywords: Green Synthesis, Zinc Nanoparticles, Ginger, Diabetic Nephropathy

SP318, Pharmacological synergy of alhagi maurorum and taranjabin: A comprehensive review of immunomodulatory, anti-inflammatory, and antitumor mechanisms

Mostafa Rashki[1], Akram Abdolahnejad[2]
1. Applied Biomedical Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
2. Mashhad District 5 Education Department, Ostad Shahriar High School, Mashhad, Iran

Background: *Alhagi maurorum*, is a wonderful medicinal halophyte, and its manna (Taranjabin) is a versatile bioactive secondary metabolite with a treasure trove of bioactive secondary metabolites such as phenolic, flavonoids and terpenoids. This review aims to consolidate the current available evidence regarding the possible pharmacological activities and focus on the possible immunomodulatory activities.
Method: A systematic literature review of the period 1969- 2023, was carried out on PubMed, Science Direct and Google Scholar. The study focuses on the phytochemical composition and the various biological activities of Alhagi species.
Result: The phytochemical study shows that Alhagi extracts have a very strong antioxidant activity which lowers some of the oxidative stress markers. Alhagi extracts are also known to inhibit some of the processes that lead to inflammation, particularly the TNF-α and IL-1β processes. Alhagi also has great ability to induce the apoptosis of cancerous cells via increasing the activities of p53 and Caspase-3 and also decreasing angiogenesis by down regulating VEGF-α and the Wnt/β-catenin pathway. In addition, Taranjabin polysaccharides, especially trehalose, have been known to be excellent immunomodulatory, which enhances cellular immunity and inhibits leukaemia.
Conclusion: *Alhagi maurorum* and its manna demonstrate multifaceted pharmacological profiles, offering a viable natural alternative for managing chronic inflammatory conditions and oncological pathologies.
Keywords: Alhagi maurorum; Taranjabin; Immunomodulation; Antitumor activity; Oxidative stress.

SP319, *Curcuma longa* bioactive compounds as modulators of oxidative stress and chronic disease

Motahareh Nasrpour Navaei[1], Sima Beigoli[1], Fatemeh Ziraki[2], Niloofar nikpour[2], Sajad dadras[2,] Mohammad Hossein boskabady[1,3]

1. Applied biomedical Research Center, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
2. Student Research Committee, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Physiology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: This paper is a review article on the antioxidant and anti-inflammatory effects of active compounds in *Curcuma longa* (turmeric), especially, curcumin and its analogues demethoxycurcumin and bisdemethoxycurcumin. These compounds exhibit a wide range of in in vitro, in vivo, and clinical effects through scavenging free radicals and the enhancement of native antioxidant enzymes including superoxide dismutase (SOD), catalase (CAT) and glutathione peroxidase (GPX).

Methods: Data collection was conducted through a wide search engines, such as PubMed, Scopus, and Google Scholar, by search terms associated with the subject matter in experimental and clinical studies between 2015 and 2025.

Results: *In vitro* evidence shows that curcumin has the potential to prevent the formation of reactive oxygen species (ROS), enhance mitochondrial activity and defend cells in neurodegenerative, cardiovascular, and metabolic diseases models. These results of *in vivo* animal studies indicate that turmeric supplementation has anti-lipid peroxidation effects, increases antioxidant defenses and provides protection against liver and kidney toxicity and metabolic syndrome. There is limited clinical evidence to support the improvement effects of curcumin on biomarkers associated with oxidative stress, inflammation in humans, indicating its therapeutic effects on type 2 diabetes, arthritis and cardiovascular risk factors.

Conclusion: Turmeric and its active component curcumin exhibit antioxidant effects on different pathological conditions associated with the oxidative stress and chronic inflammation. However, more designed clinical trials should be conducted to explain the best dosage, bioavailability, and long-term safety.

Keywords: *Curcuma longa,* curcumin, oxidative stress, *In vitro*

SP320, Frankincense extract improved learning and memory in rat model of cholinergic dysfunction

Pouya Youseflee[1], Sara Kazemi[1], Narges Marefati[2], Farimah Beheshti[3,4], Hossein Salmani[5], Maryam Bigham[6], Mahmoud Hosseini[6]

1. Applied Biomedical Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Physiology and Medical Physics, Faculty of Medicine, Baqiyatallah University of Medical Sciences, Tehran, Iran
3. Neuroscience Research Center, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
4. Department of Physiology, School of Medicine, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
5. Department of Physiology and Pharmacology, School of Medicine, Sebzevar University of Medical Sciences, Sabzevar, Iran
6. Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Oxidative stress plays a pivotal role in the pathogenesis of Alzheimer's disease. Recent studies revealing the therapeutic properties of Frankincense in various diseases. The effect of Frankincense extract on learning and memory in rat model of cholinergic dysfunction was examined in the present investigation.

Methods: Rats was divided into four groups: control, scopolamine, and 100 & 200 mg/kg of Frankincense extract. They received Frankincense extract or vehicle for the first two weeks. In the third week, the rats underwent the Passive Avoidance (PA) & Morris Water Maze (MWM) test simultaneously & scopolamine was also given. Finally, the cortex & hippocampus was removed to analyze the Malondialdehyde (MDA) levels and total Thiol group, as well as activities of Catalase (CAT) and Superoxide Dismutase (SOD).

Results: Scopolamine significantly prolonged the time taken and the path length to reach the hidden platform in the learning phase and reduced the time spent in the target quadrant and the path length in the probe phase of the MWM. In the PA, it caused a significant delay in the transition to the target platform. Scopolamine also reduced CAT and SOD activity, as well as the levels of total thiol group but increased MDA concentrations. The administration of Frankincense extract reduced scopolamine-induced impairment in the MWM and PA test. Additionally, in both tissues Frankincense extract reversed the scopolamine-induced elevation in oxidative stress indicators that have been mentioned.

Conclusion: Frankincense extract improved learning and memory in rat model of cholinergic dysfunction, probably due to its antioxidant activity.

Keywords: Memory deficit, Alzheimer's, Frankincense Extract, Oxidative stress, Cholinergic dysfunction

SP321, Saffron effects on hippocampal glial fibrillary acidic protein and Olig2 gene expression and pathological changes in demyelinated rat by cuprizone

Leila Khaledi[1], Mahnaz Taherianfard[1], Mehran Ghaemi[3], Maryam Asadian Ghahfarokhi[1]
1. Dept of Basic Science, School of Vet Med., Shiraz University
2. Dept of Pathobiology, School of Vet Med., Shiraz University
3. Dept of Pathobiology, Faculty of Vet Med., Mashhad University

Background: Multiple sclerosis (MS) is an autoimmune demyelinating disease. On the other hand, saffron has an antioxidant effect on neurons. This study aims to investigate the effect of saffron on glial fibrillary acidic protein (GFAP) and oligodendrocyte transcription factor (Olig2) gene expression and pathological reconstruction in demyelinated rats by cuprizone (CPZ).
Methods: Forty male Sprague-Dawley rats weighing 250±20 g were randomly divided into four groups: sham group, MS control group, saffron treatment group, and saffron prevention. Demyelination was induced by a suspension of carboxymethyl cellulose (CMC) (1%) +CPZ (0.6%) by gavage. Evans blue extravasation was measured with a UV-Div spectrophotometer to determine blood-brain barrier (BBB) disruption. The expression of the GFAP and Olig2 genes was determined using the Real-time - polymerase chain reaction (RT-PCR) method. Statistical analysis was performed using one-way analysis of variance and the significance level was $P<0.05$.
Results: Saffron extract noticeably ($P<0.001$) reduced demyelination and pathological disorder in CPZ-demyelinated rats and saffron extract also significantly ($P<0.01$) reduced blood-brain barrier disruption. Saffron extract remarkably ($P<0.05$) modulated Olig2 and GFAP gene expression in the hippocampus of CPZ-demyelinated rats.
Conclusion: The current findings suggest that saffron can improve the pathological disorder and expression of Olig2 and GFAP genes in the hippocampus of CPZ-demyelinated rats due to its antioxidant properties.
Keywords: Saffron, Cuprizone, Demyelination, GFAP, Olig2

SP322, Principles of therapeutic approach in persian medicine: a systematic analysis

Mahdi Yousefi[1]
1. Department of Persian Medicine, school of Persian and Complementary Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: This work attempts to understand the principles of the therapeutic approach in Persian traditional medicine, especially the triad therapeutic approach and individualized treatment paradigm.
Methods: A systematic review of the classical texts of Iranian medicine was done.
Results: The findings indicate that Persian medicine employs a three-fold therapeutic approach which is hierarchical, namely, lifestyle change as the primary (and most sustainable) intervention, pharmacotherapy, and the various forms of manual therapy (or interventions). A completely individualized approach is adapted to the treatment protocols, especially in line with the individual's temperament (mizaj) and other associated and/or co-existing disordered states (bad temperament). The pharmacotherapy also has a gradient and there is, in fact, a hierarchy from the use of a single drug to the use of complex combination therapy, which includes specific protocols in the preparation and combination of the active principles to which an adjunct is added for improved absorption in the target tissue.
Conclusion: The emphasis on individualized treatment based on temperament represents a personalized medicine paradigm that predates modern concepts by centuries .Pharmacological interventions emphasize a progression from single to compound medicines, with specific requirements for preparation and combination with delivery-enhancing agents to ensure targeted tissue effects.
Keywords: Persian medicine, personalized medicine, temperament, therapeutic Approach.

SP323, Botanical GLP-1 enhancers in hyperglycemia: A mechanistic review

Alireza Derakhshan[1]
1. Department of Traditional Persian Medicine, School of Persian and Complementary Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Some medicinal herbs have shown the capability to influence the action of glucagon-like peptide-1 (GLP-1) secretion. This mini-reviews the existing knowledge about how different herbs stimulate the secretion of GLP-1 action or inhibit the breakdown of GLP-1.
Methods: A narrative review approach was adopted. A search of the relevant databases of PubMed, Scopus, Web of Science, as well as a search of Google Scholar utilizing terms including GLP-1, incretin, herbal medicine, DPP-4 inhibitor, and hyperglycemia was undertaken. Research articles discussing the influence of plant extracts/natural compounds on GLP-1 pathways were considered for inclusion. Outcomes were categorized based on the main mechanisms of action.
Results: Various botanical extracts regulate the secretion of GLP-1. Ginsenosides of *Panax ginseng* act on the sweet taste G-protein coupled receptors TGR5 to promote the secretion of GLP-1 in a Ca^{2+}/cAMP-dependent manner to lower glucose in the circulation of animal models of diabetes. Bitter taste G-protein-coupled receptor agonists: quinine, *Anemarrhena asphodeloides*, *Bupleurum falcatum*, *Citrus aurantium* Other natural compounds chiefly affect the enhancement of GLP-1 secretion or signaling. Such compounds include berberine, resveratrol, quercetin, curcumin, cinnamon extracts, tea catechins, and gingerols. Their mechanisms include the action of CaMKII, TRP channels, PPAR-γ, or cAMP. There also exist other plants, inulin-producing plants and some plants producing flavonoids, that will aid in the preservation of active GLP-1 by preventing the breakdown of GLP-1 by DPP-4.
Conclusion: Medicinal plants have multiple mechanisms of action in the physiology of GLP-1. Their potentials in the management of hyperglycemia remain promising but would require further studies.
Keywords: Glucagon-Like Peptide 1; Medicinal Plants; Hyperglycemia; Incretins; Dipeptidyl-Peptidase IV Inhibitors

SP324, Integrative approach on obesity management in persian medicine: a review of lifestyle strategies, herbal medicines, and manipulative therapies

Fatemeh Mahjoub[1]
1. Department of Persian medicine, School of Persian and complementary medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Obesity is a persistent global health burden, linked to metabolic disorders, cardiovascular disease, diminished quality of life, and increased mortality. High rates of weight recidivism following conventional treatments highlight the necessity for adjunctive and sustainable strategies. Persian Medicine (PM) presents a holistic framework encompassing lifestyle optimization, temperament-tailored nutrition, medicinal botanicals, and manipulative therapies, with current evidence suggesting potential metabolic and behavioral benefits in weight management.
Methods: This narrative review synthesized principles from foundational PM texts (e.g., the Canon of Medicine) with findings from a systematic search of contemporary databases (PubMed, Scopus, Web of Science, SID). The analysis focused on the integrated efficacy of PM-prescribed herbal remedies, lifestyle modifications, and manual therapy for obesity.
Results: PM lifestyle interventions—such as limiting intake to two main meals daily, moderating "Obesogenic" foods, and tailoring dietary volume and quality to individual temperament—were correlated with improved appetite regulation and metabolic homeostasis, potentially via hunger-satiety signaling pathways. Clinical evidence indicates specific medicinal plants (e.g., cumin, purslane, black seed, cinnamon, Terminalia species, mint) significantly reduce body weight, BMI, and fat-related metabolic markers. Furthermore, manipulative techniques, notably dry cupping and deep tissue massage, contributed to reductions in abdominal fat and improved body composition.
Conclusion: An integrative PM-based model, combining structured lifestyle intervention, temperament-guided nutrition, targeted phytotherapy, and manual techniques, offers a promising complementary paradigm for obesity management. Further rigorous clinical trials are essential to standardize protocols and evaluate long-term outcomes.
Keywords: Obesity, Persian Medicine, Herbal Medicine, Life Style Medicine, Cupping

SP325, Management of non-alcoholic fatty liver disease (nafld) by combining persian medicine principles and modern scientific evidence: Integrative approach

Malihaeh Motavaslian[1], Siamak Mokhtari[2]
1. Department of Persian Medicine, School of Persian and Complementary Medicne, Mashhad University of Medical Sciences, Mashhad, Iran
2. School of Medicine, Spiritual Health Research Center, Lifestyle Research Institute, Baqiyatollah (AJ) University of Medical Sciences, Tehran, Iran

Background: Non-alcoholic fatty liver disease (NAFLD) remains the most common chronic liver condition globally, spanning a spectrum from simple steatosis to inflammation, fibrosis, cirrhosis, and potentially hepatocellular carcinoma. Conventional management primarily relies on lifestyle modifications, and no universally effective pharmacological cure exists. To propose a temperament-based (mizāj-oriented) integrative management approach for NAFLD — combining dietary, lifestyle, and herbal principles from Persia Medicine (PM) with evidence from modern biomedical research.
Methods: A theoretical–comparative review was conducted: classical PM texts were analyzed to map the stages of liver disease to categories of liver dysfunction described in mizāj-based medicine. Subsequently, modern literature was reviewed for evidence on lifestyle interventions and natural/herbal agents with hepatoprotective or metabolic benefits. The concept of personalized medicine through mizāj was also explored.
Result: According to the principles of Iranian medicine, the most important component of treatment is lifestyle modification, among which, digestion modification and digestion play a special role. The following principles are among the most important instructions of Iranian medicine in this regard Principles of proper nutrition, Diet includs:
Abstinences: Thick foods such as halal, kale pacha, starchy foods, beef, pasta, rice noodles, lasagna, rice pudding, mushrooms, pizza, sirab and shirdan, liver, roast meat, unleavened bread. Also raw or burnt kebabs, very sweet desserts, stews, potatoes and kate, curd, salty and spicy foods, foods fried in oil, excessive consumption of sugar, nectar jam, honey and syrup Recommendations: Reducing the volume of food (determined according to the individual's condition), replacing oil with olive oil, moderate consumption of fruits such as pomegranate during pomegranate season, consume fruit and in other seasons consume pomegranate paste, apples, olives, Kebar pickle with lunch, Amla juice(one tablespoon of jam after lunch and dinner), soaked figs or Khaksheer brewed in boiling water (in case of constipation and according to the individual's condition)
Conclusion: Given the heterogenous and lifestyle-dependent nature of NAFLD, a temperament-based integrative strategy — rooted in ITM — may offer a more precise, personalized, and culturally acceptable approach to prevention and management. Such tailoring could improve patient adherence, optimize metabolic response, and reduce the risk of progression.

SP326, Evaluation of the safety and clinical benefits of celiac support capsules in patients with newly diagnosed celiac disease

Hassan Rakhshandeh[1], Leila Mobasheri[1,2], Vahidreza Askari[3], Mohammad-Taha Rahimi[4], Maryam Khalasi[4], Hamidreza Kiani-Far[4]

1. Pharmacological Research Center of Medicinal Plants, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Pharmacology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3.Patient Safety Research Center, Clinical Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
4. Department of Pediatrics, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Maintaining a strict gluten-free diet is challenging for many individuals with celiac disease. Oral gluten-degrading enzymes have recently attracted attention as supportive therapies. This study aimed to evaluate the clinical effects of “Celiac Support”, a capsule containing glutenases extracted from a specific wheat variety, kiwi, and papaya, previously shown to effectively degrade gluten in vitro.

Methods: In this phase IIA quasi-clinical trial, enzymatic extracts from papaya, wheat, and kiwi were prepared, tested for stability and activity, and then lyophilized to produce a mixed-enzyme capsule. Newly diagnosed celiac patients meeting the inclusion criteria received one capsule daily, 30 minutes before consuming gluten-containing meals, without dietary gluten restriction. Clinical symptoms such as diarrhea, urticaria, abdominal pain, bloating, nausea, vomiting, dyspepsia, headache, fatigue, and skin rash were evaluated at baseline and at the end of the study. Laboratory tests including CBC, blood sugar, thyroid profile, lipid profile, liver function tests, creatinine, and urea were also assessed pre- and post-treatment.

Results: Sixteen newly diagnosed patients were enrolled, 62.5% of whom were female. Abdominal pain significantly improved, resolving in 10 of 14 symptomatic patients ($p = 0.002$). No significant changes were observed in constipation, diarrhea, bloating, or arthralgia. Body weight ($p = 0.001$) and height ($p = 0.006$) increased significantly by the end of the study.

Conclusion: Celiac Support may serve as a beneficial adjunct for reducing specific gastrointestinal symptoms in celiac patients. Significant improvement in abdominal pain and nutritional parameters suggests a supportive role in enhancing patient well-being.

Keywords: Celiac disease, Glutenase, Enzyme therapy, Celiac Support, Gluten degradation

SP327, Naringenin effects on gene and microRNA expression regulating steroidogenesis and oxidative stress in granulosa cells of normal and polycystic ovaries

Fatemeh Masjedi[1], Niloofar Namazi[2,3], Fatemeh Gila[4]
1. Nephro-Urology Research Center, Shiraz University of Medical Sciences, Shiraz, Iran
2. Department of Obstetrics and Gynecology, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran
3. Infertility Research Center, Shiraz University of Medical Sciences, Shiraz, Iran
4. Department of Medical Genetics, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran

Background: Naringenin, a flavonoid found in citrus fruits like oranges and grapefruits, has gained attention for its antioxidant and anti-inflammatory effects. Studies suggest it may improve female reproductive health by modulating ovarian function, hormone levels, and oxidative stress—particularly in conditions like polycystic ovary syndrome (PCOS). However, the role of microRNAs in these processes is not well understood. This study aims to investigate the signaling pathways and microRNA involvement in the ovarian effects of naringenin.
Methods: Human granulosa cells (GCs) were collected from the ovaries of 50 healthy individuals (referred due to male factor infertility) and 50 women with PCOS through oocyte retrieval. After purification and identification steps (flow cytometry), cells from each individual with healthy or polycystic ovaries were divided into two parts and were cultured under treatment with a culture medium (as control) and a dose of 200 μM naringenin (as treatment) for 48 hours. Gene and microRNA analysis related to various cellular pathways was performed using qRT-PCR.
Results: In PCOS, high miR-9-5p levels downregulate CYP19A1 ($P<0.01$), decreasing estrogen production, but naringenin alleviates miR-9-5p expression, restoring CYP19A1 ($P=0.003$). MiR-34a-5p downregulates Nrf2 ($P<0.05$), SIRT1 ($P<0.001$), and SIRT3 ($P=0.005$), exacerbating PCOS progression, whereas naringenin reduces miR-34a-5p ($P<0.0001$), enhancing these regulators.
Conclusion: Naringenin may emerge as a potential therapeutic agent for PCOS, offering a natural alternative to current treatments. Additionally, our research could deepen our understanding of the molecular mechanisms underlying PCOS, potentially leading to the identification of novel biomarkers for early diagnosis and targeted therapy.
Keywords: Granulosa Cells, Polycystic ovary, Naringenin, Oxidative stress, Steroidogenesis

SP328, Hypertension from the perspective of traditional persian medicine: foundations, mechanisms, and therapeutic approaches

Sadegh Shokri[1]
1. Department of Persian Medicine, Faculty of Persian and Complementary Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Hypertension is a multifactorial condition arising from various disturbances of the cardiovascular system and body fluids. Classical texts of Traditional Persian Medicine (TPM) do not treat hypertension as an independent disease; rather, they describe it as a consequence or complication of other recognized disorders. In TPM, hypertension is attributed to vascular dysfunctions such as altered vascular elasticity, spasms caused by cold-dominant dystemperament, and partial or complete vascular obstruction due to swelling and accumulation of abnormal substances, all of which increase vascular resistance and blood pressure. Cardiac dysfunctions resulting from warm-dominant dystemperament and pathogenic mechanisms related to intravascular fluids also implicated. The most common contemporary cause—an increase in blood volume, or "fulfillment" (emtela') of the body's channels—corresponds in TPM to the concept of abnormal and incompatible fluid accumulation that disrupts physiological balance and homeostasis. Comorbid disturbances in nervous, hepatic, renal, and pulmonary systems further contribute to blood pressure elevation. Consequently, TPM regards hypertension as a multifaceted, multisystem disorder requiring a multimodal therapeutic strategy focused on temperamental regulation and systemic cleansing.
This paper aims to present a concise synthesis of the pathophysiology of hypertension from the TPM viewpoint, to extract general therapeutic principles, and to introduce preventive measures and medicinal plants emphasized in classical sources and supported by contemporary evidence.
Methods: The study based on a review of classical TPM literature integrated with contemporary experimental and clinical evidence regarding herbal remedies and lifestyle interventions. An analytical–descriptive approach used to categorize pathogenic mechanisms and to formulate therapeutic guidelines.
Results: Analysis indicates that, in TPM, hypertension is a multisystem phenomenon involving:
Vascular disorders (reduced elasticity, obstruction), Cardiac dysfunction due to warm dystemperament, Intravascular overload (emtela'), and Contributions from comorbid diseases (neurological, hepatic, renal, pulmonary). Therapeutic principles emphasize clearing emtela, modulating disturbed temperaments, and strengthening the heart and vessels, together with lifestyle modification. Several single herbs with supporting scientific evidence highlighted, including yarrow, Crataegus species (keratagus/keialk), garlic, olive leaf, Nigella sativa, sour cherry juice, hibiscus tea, and pomegranate juice. Other traditional simples cited include grapefruit, cranberry, unsalted verjuice, coriander, parsley, fennel, celery and its seeds, and raspberry leaf. Market-available herbal preparations containing garlic, olive, Cratagus, and hibiscus are in use; compound formulations such as the "Asrol" capsule—comprising borage, lemon balm, bitter orange blossom, lavender, chamomile, rose, coriander seed, valerian, Cornelian cherry, hibiscus, and Nigella sativa—also reported as effective.
Conclusion: the TPM approach to hypertension prioritizes modulation of pathogenic factors through temperamental correction and systemic cleansing and may serve as a complementary strategy alongside conventional medicine. Regular blood pressure monitoring and careful follow-up of therapeutic response are essential. Controlled clinical trials needed to evaluate the efficacy and safety of the recommended herbal agents and compound formulations
Keywords: Hypertension; Traditional Persian Medicine; temperament; medicinal plants.

SP329, Modulating adipokines for obesity: insights from the iranian national obesity registry (IRNOR)

Majid Ghayor-Mobarhan[1,2,3], Mostafa Shahraki Jazinaki[1], Mina Nosrati[1,3], Najmeh Seifi[1,3], Khalil kimiafar[4]

1. Department of Nutrition, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Metabolic Syndrome Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
3. International UNESCO Center for Health-Related Basic Sciences and Human Nutrition, Mashhad University of Medical Sciences, Mashhad, Iran
4. Department of Medical Records and Health Information Technology, School of Paramedical Sciences, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Obesity is associated with dysfunction of adipose tissue and alteration in adipokine secretion. Recent evidence indicates that some anti-obesity therapies may influence adipokine regulation and represent promising approaches in obesity management. This study aimed to summarize the recent findings regarding the anti-obesity approaches through medication on adipokines with mainly focusing on the Iranian National Obesity Registry (IRNOR).
Methods: The Iranian National Obesity Registry (IRNOR) is a nationwide registry with the aim of assessing the prevalence, risk factors, and health consequences of obesity in Iran. Data collection was conducted according to the structured survey that consisted of demographic information, clinical assessments (including anthropometric measurements such as weight, height, waist circumference, and body mass index), and laboratory tests.
Results: This study revealed a modification in obesity related adipokine followed by receiving anti-obesity drugs, such as Glucagon-Like Peptide-1 Receptor Agonist, and some herbal supplements, including curcumin, crocin, and resveratrol. Also, the available evidence indicates a favorable impact of the combination of Radiofrequency and Ultrasound cavitation and bariatric surgery in modification on obesity related adipokine. Furthermore, some complementary and alternative medicines, such as acupuncture, had a significant improving impact on obesity-related adipokines.
Conclusion: This study highlights recent advances in obesity management through the modulation of serum adipokines. Current evidence suggests that dietary interventions, nutritional supplements, and pharmacological therapies may influence adipokine profiles and thereby contribute to improved metabolic outcomes. However, further high-quality studies are needed to clarify the mechanisms and optimize these clinical applications.
Keywords: Obesity, Adipokines, leptin, adiponectin

SP330, Modulation of circulating adipokines by glucagon-like peptide-1 receptor agonists: Implications for metabolic health

Mohammad Safarian[1,2], Mostafa Shahraki Jazinaki[1]
1. Department of Clinical Nutrition, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Metabolic Syndrome Research Centre, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Glucagon-like peptide-1 receptor agonists (GLP-1RAs) are widely prescribed for the treatment of type 2 diabetes mellitus and obesity. Beyond their established effects on glycemic control and weight reduction, growing evidence suggests that GLP-1RAs may modulate adipose tissue function through alterations in adipokine secretion. This review aimed to summarize and critically evaluate recent evidence on the effects of GLP-1RAs on circulating adipokine levels in adults.
Methods: Relevant studies were identified through an exploratory review of the literature, focusing on recent studies investigating the relationship between GLP-1RA therapy and changes in adipokines, including adiponectin, leptin, resistin, omentin-1, and chemerin.
Results: The majority of included studies indicated the modulatory effect of GLP-1Ras on adipokine levels. A significant reduction in Leptin, resistin, and chemerin, and a significant increase in levels of omentin-1 and adiponectin, were reported following the administration of GLP-1RAs. However, some of these findings were inconsistent between the included studies.
Conclusion: This review suggested that GLP-1RAs may exert favorable effects on adipokine profiles, contributing to their broader metabolic and cardioprotective benefits. Further well-designed clinical studies are needed to clarify the extent and clinical significance of these effects beyond weight reduction.
Keywords: Glucagon-Like Peptide 1 Receptor Agonists, Adipokines, Adiponectin, leptin, Adipose Tissue, Review

SP331, Precision nutrition at the genomic interface: Personalized medicine and pharmacogenomics

Amir Avan[1]
1. Metabolic Syndrome Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Personalized medicine and pharmacogenomics are transforming nutritional approaches by enabling dietary interventions tailored to an individual's genetic makeup, metabolic profile, and drug–nutrient interactions.
Results: Genetic variations influencing nutrient absorption, metabolism, and response to bioactive compounds can significantly affect disease risk and treatment outcomes. Pharmacogenomics further informs how nutrients and dietary supplements may modify drug efficacy or toxicity by interacting with metabolic pathways and enzymes such as cytochrome P450. Integrating genomic data with clinical and lifestyle information supports precision nutrition strategies aimed at optimizing therapeutic response, reducing adverse effects, and improving long-term health outcomes.
Conclusion: This personalized, genomics-driven nutritional approach represents a key component of preventive and therapeutic medicine in the era of precision healthcare.
Keywords: Precision Nutrition, Personalized Medicine, Pharmacogenomics, Dietary Interventions.

SP332, Role of adipocyte dysfunction in obesity complications

Reza Rezvani [1]
1. Department of Nutrition, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Obesity is characterized by white adipose tissue (WAT) expansion and adipocyte dysfunction, which disrupts the endocrine functions of WAT and contributes to metabolic complications.
Results: Dysfunctional adipocytes exhibit altered secretion of adipokines, promoting a chronic low-grade inflammatory state that underpins disorders like insulin resistance and cardiovascular disease. This presentation introduces Acylation Stimulating Protein (ASP) as a key adipokine exemplifying this pathophysiology. ASP stimulates triglyceride storage and glucose uptake in adipocytes via its receptor C5L2. Evidence shows ASP levels are influenced by diet, sex hormones, and metabolic status, and are elevated in obesity, metabolic syndrome, and polycystic ovary syndrome. ASP resistance, analogous to insulin resistance, may develop, impairing lipid clearance and promoting ectopic fat deposition and inflammation. Furthermore, ASP exhibits sexual dimorphism, with levels and effects modulated by estrogen and progesterone, potentially influencing fat distribution.
Conclusion: Thus, ASP serves as a critical molecular link between adipocyte dysfunction, metabolic inflammation, and the systemic complications of obesity, highlighting the importance of assessing adipose tissue function beyond mere mass.
Keywords: Obesity, Adipokines, Adipose Tissue, Insulin Resistance

SP333, Effects of anti-obesity drugs on weight management in liver transplant recipients

Maryam Alinezhad-Namaghi[1,2]
1. Transplant research center, Clinical research institute, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Nutrition, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Chronic liver diseases, particularly non-alcoholic fatty liver disease and advanced metabolic-associated liver disorders, are closely associated with obesity, insulin resistance, and dysregulated nutrient metabolism. Although pharmacological therapies represent the cornerstone of management, growing attention has been given to interventions that influence intestinal absorption as adjunctive strategies aimed at improving hepatic outcomes. Both pharmacologic absorption inhibitors and specific dietary fibers exert their effects at the level of the gastrointestinal tract, leading to downstream effects on lipid metabolism, glucose homeostasis, and the gut–liver axis.

Results: Findings from randomized controlled trials suggest that pharmacologic agents influencing intestinal absorption and appetite regulation, such as Orlistat, chromium, and glucagon-like peptide-1 (GLP-1) receptor agonists, show beneficial effects on liver enzymes, fibrosis markers, and metabolic markers in patients awaiting liver transplantation. Also, in patients with metabolic-associated fatty liver disease across both non-advanced and advanced stages before liver transplantation, GLP-1 receptor agonists have been shown to reduce hepatic steatosis and liver enzyme levels, enhance insulin sensitivity and metabolic profiles, and potentially slow disease progression, although their impact on hepatic fibrosis in advanced disease remains less clearly established. Similar results have been observed for dietary fibers possessing satiety-inducing properties, such as psyllium, wheat germ, and Plantago major seed, which demonstrate positive effects on liver enzymes, lipid metabolism, and metabolic markers in NAFLD.

Conclusion: Despite these promising findings, current evidence is marked by significant heterogeneity in intervention type, dosages, and study methodologies, thus hindering the formulation of definitive clinical guidelines. Thus hindering the formulation of definitive clinical guidelines and nutritional modulation of intestinal absorption may offer a structured framework for personalized management of liver disorders. Well-structured future trials are necessary to determine optimal therapeutic strategies, assess long-term safety, and define their role in comprehensive liver care.

Keywords: Anti-Obesity Agents; Body Weight; Liver Transplantation

SP334, Precision nutrition to modulate adipokines in obesity: emerging molecular evidence

Maryam Saberi-Karimian[1]
1. Metabolic Syndrome Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Obesity is a multifactorial issue that requires precise approaches to better understand the interaction between individuals' intrinsic and environmental factors. It is often accompanied by chronic low-grade inflammation, leading to the incidence of chronic diseases.
Results: The levels of reactive oxygen species (ROS) increase in enlarged adipocytes in a dose-dependent manner, leading to inflammation. Dysfunctional adipose tissue (AT) and changes in the adipokine profile lead to the negative consequences of obesity. Precision nutrition (PN) is a multidimensional framework that combines nutritional genomics, deep phenotyping, microbiota, metabolomics, dietary habits and physical activity, offering a new approach to the prevention and management of obesity. It can improve AT function by targeting specific molecular pathways, increasing thermogenesis, and shifting the balance of adipokines from a pro-inflammatory to a protective state. Nutritional interventions can improve the adipokine profile. These interventions include caloric restriction, supplementation with prebiotics/probiotics, omega-3 polyunsaturated fatty acids (n-3 PUFA), and polyphenols. The anti-inflammatory and antioxidant effects of probiotics and polyphenols are well known. PN can stimulate brown AT thermogenesis and browning in white adipose tissue (WAT) through intelligent regulation of macronutrient composition, fatty acid type, interaction with gut microbiota, optimization of hormonal responses, and synergy with myokines. Browning is associated with increased expression of adenosine monophosphate activated protein kinas (AMPK), PR domain containing 16 (PRDM16), Peroxisome Proliferator Activated Receptor Gamma Coactivator-1α (PGC-1α), and uncoupling protein 1 (UCP1) genes. Polyphenols indirectly but effectively reduce immune cell infiltration into AT and inhibit obesity-related chronic inflammation by improving adipocyte metabolic function, reducing adipocyte hypertrophy, modifying the macrophage phenotype, inhibiting inflammatory pathways, and reducing immune cell recruitment signals. n-3 PUFA can reduce adipocyte hypertrophy, improve lipid metabolism, attenuate cytokine secretion, increase expression of thermogenic genes such as UCP1 and PPARγ coactivators, regulate adipocyte-macrophage interaction, and activate PPARα/γ pathways. It should be noted that subcutaneous adipose tissue (SAT) and visceral adipose tissue (VAT) do not respond similarly to anti-inflammatory nutritional interventions. This highlights the need for a PN approach, as the type, dose, and duration of intervention must be tailored to individual characteristics and adipose tissue type.
Conclusion: PN utilizes metabolic phenotyping to customize diets to target the main source of inflammation for each individual. By adjusting the type of dietary fat, improving lipid metabolism, and reducing adipocyte hypertrophy, PN can decrease the secretion of adipokines. This approach indirectly reduces systemic inflammation by selecting a dietary pattern that supports the microbiota. Furthermore, PN can reduce inflammation by personalizing the meal timing to align with circadian clocks. Generally, PN provides a framework for targeting individual metabolism and adipokine profile rather than using generic anti-inflammatory dietary interventions.
Keywords: Precision Nutrition; Adipokine; Cytokine; Adipose; Obesity; Overweight

SP335, Alterations in adipokine profiles following bariatric surgery and their role in metabolic improvement

Tannaz Jamialahmadi[1,2]
1. Pharmaceutical Research Center, Pharmaceutical Technology Institute, Mashhad University of Medical Sciences, Mashhad, Iran
2. Medical Toxicology Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Bariatric surgery is the most effective treatment for severe obesity, leading to sustained weight loss and significant improvement in obesity-related metabolic disorders. Beyond weight reduction, bariatric procedures induce profound endocrine changes within adipose tissue, reflected by alterations in circulating adipokines. These adipose-derived hormones play a critical role in regulating energy balance, insulin sensitivity, inflammation, and cardiometabolic risk.
Results: Evidence consistently demonstrates a postoperative increase in adiponectin levels accompanied by a reduction in leptin concentrations and leptin resistance, changes that correlate with improved insulin sensitivity and lipid metabolism. Pro-inflammatory adipokines and cytokines, including resistin, visfatin, tumor necrosis factor-α, and interleukin-6, are significantly decreased following bariatric surgery, contributing to the attenuation of chronic low-grade inflammation. These effects appear to be partially independent of weight loss and vary according to surgical technique, with Roux-en-Y gastric bypass and sleeve gastrectomy exerting distinct temporal and mechanistic influences on adipokine regulation. In addition, bariatric surgery modulates adipose tissue function through reductions in adipocyte hypertrophy, immune cell infiltration, and hypoxia, alongside alterations in gut-derived hormones and microbiota composition that indirectly influence adipokine signaling. Collectively, these changes contribute to early and sustained metabolic improvements, including enhanced glucose homeostasis and reduced cardiometabolic risk.
Conclusion: Understanding the dynamic changes in adipokine profiles following bariatric surgery provides valuable insights into the mechanisms underlying metabolic recovery and highlights adipokines as potential biomarkers and therapeutic targets in obesity management.
Keywords: Bariatric Surgery, Adipokines, Obesity.

SP336, Impact of turmeric/curcumin supplementation on adipokines in patients with type 2 diabetes and prediabetes: A systematic review

Mostafa Shahraki Jazinaki [1], Majid Ghayor-Mobarhan [1,2,3]
1. Department of Nutrition, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Metabolic Syndrome Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
3. International UNESCO Center for Health-Related Basic Sciences and Human Nutrition, Mashhad University of Medical Sciences

Background: Curcumin is a bioactive component derived from turmeric root. In recent years, the health benefits of curcumin have been the center of focus. The available evidence reported that curcumin supplementation may lead to improvements in inflammation and oxidation balance status, lipid profile, blood pressure, and anthropometric indices. Due to reported adipokine dysregulation in T2DM, identifying novel treatments to modify adipokine levels is crucial. In this review, we aimed to summarize the findings of available studies regarding the effectiveness of curcumin supplementation on adipokine modulation in T2DM patients.
Methods: The PubMed, Scopus, Web of Science ISI, CENTRAL, and Embase databases were comprehensively searched to find interventional studies that assessed the impacts of turmeric/curcumin levels on adipokine levels in adults. The eligible studies were identified, followed by a screening process based on the eligibility criteria, and their related data were extracted.
Results: The findings derived from the largest number of included studies indicate a favorable influence of turmeric/curcumin supplementation on adipokine levels. In detail, a significant reduction in leptin levels in individuals with T2DM and prediabetes was reported. In addition, turmeric/curcumin supplementation led to a significant rise in adiponectin levels compared to the control group.
Conclusion: This systematic review demonstrated that the supplementation with turmeric/curcumin may result in adipokine modification in participants with T2DM. However, still more high-quality interventional studies are needed to reach a definitive conclusion regarding this effectiveness and clarify underlying mechanisms.
Keywords: Turmeric, Curcumin, Adipokines, Leptin, Adiponectin, Systematic Review

SP337, The role of dietary regimes in maintaining neurological health: From dietary antioxidants to microbiota-modulating compounds

Zahra Khorasanchi[1]
1. Department of Nutrition Sciences, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Dietary patterns are increasingly recognized as critical determinants of neurological health, acting through complex molecular pathways that regulate oxidative stress, neuroinflammation, and gut–brain axis signaling. A growing body of international literature indicates that oxidative stress is a central mechanism underlying neuronal dysfunction and neurodegenerative disorders, driven by excessive production of reactive oxygen species and impaired mitochondrial homeostasis.
Results: Dietary antioxidants, including polyphenols, flavonoids, carotenoids, and antioxidant vitamins, exert neuroprotective effects by scavenging free radicals and activating endogenous defense systems such as the Nrf2/ARE pathway, leading to upregulation of antioxidant enzymes and suppression of pro-inflammatory signaling cascades, including NF-κB.
In parallel, the gut microbiota has emerged as a key mediator of diet–brain interactions. Diet-induced modulation of microbial composition influences the production of bioactive metabolites, notably short-chain fatty acids, which regulate microglial activation, maintain blood–brain barrier integrity, and modulate synaptic plasticity through epigenetic and immune-mediated mechanisms. Additionally, gut microbiota play a central role in tryptophan metabolism, affecting serotonin and kynurenine pathways with direct implications for cognitive function and mood regulation. Dysregulation of these microbial-derived pathways has been associated with enhanced neuroinflammation and accelerated neurodegenerative processes.
Conclusion: Collectively, current evidence supports the concept that antioxidant-rich, microbiota-modulating dietary patterns promote neurological resilience by integrating redox balance with gut-derived molecular signalling. Elucidating these molecular mechanisms provides a robust scientific framework for the development of targeted nutritional strategies aimed at preserving cognitive function and reducing the burden of neurological disorders.
Keywords: Antioxidants; Gastrointestinal Microbiome; Neurological Health

SP338, Angiotensin converting enzyme inhibition reduces neuroinflammation associated learning and memory impairment

Azam Abareshi[1], Farimah Beheshti[2], Mahmoud Hosseini[3]
1. Applied Biomedical Research Center, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
2. Neuroscience Research Center, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
3. Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Inflammation contributes in developing of brain diseases. Renin angiotensin system in inflammation and central nervous system disorders. In the present study the effects of angiotensin converting enzyme inhibition on neuroinflammation associated learning and memory impairment was investigated.
Method: The study was including 3 parts: 1- The rats were treated by (1) saline, (2) Lipopolysaccharide (LPS), (3-5) 10, 50 or 100 mg/kg Captopril (Capto) 30 min before LPS. Morris water maze (MWM) and Passive avoidance (PA) tests were carried out. 2- The rats were treated by saline, LPS, LPS+Capto (50 mg/kg Capto before LPS, and Capto (50 mg/kg) before saline. Long-term potentiation (LTP) from CA1 area of hippocampus was assessed. 3- The rats were divided as: (1) Control, (2) LPS, and (3-5) LPS+ Capto 10, LPS+ Capto 50, and LPS+ Capto 100 (10, 50 or 100 mg / kg Capto before LPS). Open-field (OF), elevated plus maze (EPM), and forced swimming test (FST) were performed.
Results: 1- LPS impaired performance of the rats in MWM and PA tests and also increased IL-6, tumor necrosis factor (TNF)-α, malondialdehyde (MDA) and nitric oxide (NO) metabolites in the hippocampus which were prevented by Capto. The thiol, superoxide dismutase (SOD) and catalase (CAT) in the hippocampus of LPS group were lower than the control and they were enhanced by Capto. 2- The slope and amplitude of field excitatory postsynaptic potential (fEPSP) increased in the LPS-Capto group. 3- All doses of Capto improved performance of the rats in OF, FST and EPM tests and restored the IL-6 level.
Conclusion: Captopril protected the brain against the impairing effects of inflammation. It is concluded that angiotensin converting enzyme inhibition reduces neuroinflammation associated learning and memory impairment.
Keywords: Angiotensin converting enzyme (ACE) inhibitors, Cognition, Inflammation

SP339, Gut-brain inflammatory challenge and cognitive consequences: A review of microbial, behavioral and biochemical investigations

S. Mohammad Ahmadi-Soleimani[1,2], Omid Azizi [3,4], Farimah Beheshti[1,2], Ahad Ali Harati Asl[5]
1. Neuroscience Research Center, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
2. Department of Physiology, School of Medicine, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
3. Department of Laboratory Sciences, School of Paramedical Sciences, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
4. Health Sciences Research Center, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
5. Department of Microbiology, Islamic Azad University, Damghan Branch, Iran

Background: Helicobacter pylori (*H. pylori*) infection is increasingly linked to cognitive decline and affective disorders. Although probiotics have shown promise in several neuropsychiatric and neurodegenerative contexts, their potential effect to prevent or reverse *H. pylori*-induced deficits across cognition, anxiety and depression — and the underlying neurochemical mechanisms — remains underexplored. The present work is a brief review on the results of our two recent studies addressing the cognitive and affective outcomes of *H. pylori* exposure.
Methods: Male Wistar rats were orally infected with *H. pylori* (3 consecutive days). Probiotic treatment with *Lactobacillus rhamnosus* and/or *Lactobacillus plantarum* followed for 3 days, after which animals underwent a 12-day drug-free interval. Behavioral experiments assessed spatial and recognition memory (Morris Water Maze, Novel Object Recognition) and anxiety-/depression-like phenotypes (open field, elevated plus maze, forced swim, marble burying). Following sacrifice, hippocampal and cortical tissues were analyzed for oxidative stress indices, inflammatory cytokines (including IL-10), neurotrophic support (BDNF), cholinergic and serotonergic markers, and corticosterone levels.
Results: *H. pylori* infection produced robust impairments in spatial and recognition memory and induced anxiogenic and depressogenic behaviors. These behavioral abnormalities were paralleled by hippocampal and cortical biochemical dysregulation: increased oxidative stress, pro-inflammatory shifts, reduced BDNF, disrupted cholinergic and serotonergic markers, and elevated corticosterone. Oral administration of *L. rhamnosus* or *L. plantarum* — and most effectively their co-administration—significantly rescued memory performance and normalized anxiety/depression-like behaviors. Rescue of behavior was accompanied by restoration of redox balance, suppression of inflammatory mediators, recovery of BDNF levels, improvement in cholinergic/serotonergic indices, and normalization of corticosterone.
Conclusions: In this preclinical model of gastrointestinal inflammation, single- and multispecies probiotic interventions mitigated both cognitive and affective consequences of *H. pylori* infection. The therapeutic effects appear to involve coordinated modulation of oxidative stress, inflammation, neurotrophic support and monoaminergic/cholinergic systems in brain cortex and hippocampus. These findings support further evaluation of adjunctive probiotic strategies to protect brain function in patients with *H. pylori* infection and related neuropsychiatric comorbidities.

SP340, Vitamin B1 attenuates anxiety- and depression-like behaviors during nicotine abstinence in chronically stressed adolescent rats: involvement of serotonin, dopamine, oxidative stress, amyloid-β, bdnf and inflammatory markers

Farimah Beheshti[1,2], Samaneh Kakhki[3], S. Mohammad Ahmadi Soleimani[1,2]
1. Departments of Physiology, School of Medicine, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
2. Neuroscience Research Center, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
3. Department of Clinical Biochemistry, School of Medicine, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran

Background: The present study aims to provide appropriate implementation for assessing the effect of Vitamin B1 (Vit $B_{1)}$ on animals exposed to both nicotine and unpredictable chronic mild stress (UCMS) in adolescent male rats alongside eager to intake ethanol versus water in abstinence period.
Method: One hundred and twenty adolescent male rats (21 days of age) were enrolled in the study and randomly divided into eight different groups: 1) Vehicle (saline+saline), 2) Nic (Nic+saline, 2 mg/kg), 3) UCMS (UCMS+saline), 4) Nic-UCMS (Nic-UCMS+saline), 5-7) Nic-UCMS+ three doses of Vit B_1 (5, 10, 15 mg/kg) 2) and 8) Vit B1 (saline+ Vit B_1). In order to assess anxiety, half of the animals were candidates for related behavioral tests and biochemical tests. Then half of the animals were subjected for assessing their eager to intake ethanol versus water.
Results: According to the results, all groups including Nic, UCMS, and Nic-UCMS demonstrated notable anxiety-like behavior by assessing both behavioral and biochemical analysis as compared to vehicle and treatment with Vit B_1 remarkably improved the results. Interestingly, the highest doses of Vit B_1 remarkably decreased ethanol consumption in Nic-UCMS group.
Conclusion: Considering the present results and the prior works about neuroprotective effects of all vitamin B group especially Vit B_1, it can be possible to introduce Vit B_1 as a new potential candidate in decreasing anxiety caused by either nicotine withdrawal or other daily stress alongside decreasing tendency for ethanol intake; however, it needs further investigation in larger scale size.
Keywords: Nicotine; UCMS; withdrawal; Vitamin B_1; Anxiety-like behavior

SP341, Angiotensin II AT1 receptor blockade during sepsis reduces long-term brain vulnerability to secondary inflammatory insults

Hossein Salmani[1], Amin Tagh-Salar[1], Yasaman al-Sadat Jamali[1], Mahmoud Hosseini[2]
1. Cellular and Molecular Research Center, Sabzevar University of Medical Sciences, Sabzevar, Iran
2. Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Sepsis, has been shown to induce persistent neuroinflammation, cognitive decline, and affective disturbances in both clinical and preclinical studies. Evidence suggests that early attenuation of sepsis signaling may reduce long-term vulnerability of the brain to subsequent inflammatory challenges. Angiotensin II, acting via AT1 receptors, modulates both peripheral and central immune responses. This study investigated whether AT1 receptor blockade during sepsis can reduce long-term brain susceptibility to a later, low-grade inflammatory insult.
Methods: Mice were administrated with losartan (10 mg/kg/day) for three days prior to sepsis induction. On day 4, mice received losartan or vehicle followed 30 minutes later by an intraperitoneal injection of LPS (5 mg/kg). A second dose of losartan (10 mg/kg) was administered 8 hours post-LPS. One month later, all mice received a secondary mild inflammatory challenge (LPS 0.33 mg/kg). Behavioral assessments were conducted, including the novel object recognition test, elevated plus maze, and tail suspension test. Mice were then sacrificed for biochemical analyses of neuroinflammation and oxidative stress.
Results: Losartan markedly reduced the long-term consequences of a secondary inflammatory insult. Septic mice pretreated with losartan showed improved cognitive performance in the novel object recognition task and exhibited fewer anxiety- and depressive-like behaviors. Biochemical analyses revealed lower brain levels of TNF-α and malondialdehyde, indicating reduced neuroinflammation and oxidative stress.
Conclusion: AT1 receptor blockade during sepsis decreased long-term brain vulnerability to later inflammatory stimulation, supporting the therapeutic potential of targeting AT1 signaling to prevent chronic neuroinflammatory consequences of sepsis.
Keywords: Sepsis-associated encephalopathy, Cognition, Depression, Anxiety, Angiotensin

SP342, Therapeutic effects and anti-inflammatory mechanism of mesenchymal stem cell-conditioned medium in a rat model of neuropathic pain

Samad Nazemi[1], Atena Adel-Rastkhiz[2], Mohammad-Shafi Mojadadi[3]
1. Department of Physiology and Pharmacology, School of Medicine, Sabzevar University of Medical Sciences, Sabzevar, Iran
2. Student Research Committee, Sabzevar University of Medical Sciences, Sabzevar, Iran
3. Department of Immunology, School of Medicine, Sabzevar University of Medical Sciences, Sabzevar, Iran

Background: Neuropathic pain (NP) remains a therapeutic challenge, with glial cell-mediated inflammation playing a key role. Mesenchymal stem cell-conditioned medium (MSC-CM), rich in bioactive factors, represents a promising cell-free therapeutic strategy. This study investigated its effects on behavioral symptoms and spinal glial activation in a rat NP model.
Methods: Chronic constriction injury (CCI) of the sciatic nerve was induced in male Wistar rats, randomly divided into Sham, CCI, Vehicle, and MSC-CM groups. MSC-CM (1 mL, i.p.) was administered on days 1, 7, and 11 post-surgery. Mechanical allodynia (von Frey), thermal hyperalgesia (hot plate), and thermal allodynia (acetone test) were assessed from day -1 to 15. Spinal cord expression of glial markers GFAP (astrocytes) and Iba1 (microglia) was quantified via real-time PCR on day 15.
Results: CCI induced significant and sustained pain hypersensitivity from day 3 onward in control groups. MSC-CM treatment delayed symptom onset to day 6 and significantly alleviated allodynia and hyperalgesia by day 15. At the molecular level, CCI markedly upregulated GFAP and Iba1 expression, an effect that was significantly reversed by MSC-CM administration.
Conclusion: MSC-CM effectively attenuates behavioral signs of NP and suppresses associated spinal glial activation, highlighting its potent anti-inflammatory mechanism. This cell-free approach offers a promising alternative for managing neuropathic pain by targeting neuroinflammation.
Keywords: Neuropathic Pain, Mesenchymal Stem Cells, Conditioned Medium, Neuroinflammation, Glial Cells, Astrocyte, Microglia

SP343, NF κB–mediated neuroinflammation as the primary driver of bilateral hippocampal alterations in long term potentiation following left intracerebral hemorrhage

Farzaneh Vafaee[1, 2], Shima Shirzad[1, 2], Arman Abroumand Gholami [1, 2]
1. Neuroscience Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Neuroscience, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Changes in cognition and memory are common complications of intracerebral hemorrhage (ICH), although the exact cause of this phenomenon is still unknown. The objectives of our project were to assess the changes in long-term potentiation, inflammation, and cell damage in the bilateral hippocampus following striatal intracerebral hemorrhage at different time points.
Methods: Unilateral ICH was induced in the striatum of 96 Wistar rats (6 control groups and 6 ICH groups). We measured changes in synaptic inputs in the bilateral hippocampus using the field potential recording method on days 3, 7, and 14 after ICH. After staining the section with hematoxylin, the volume and number of hippocampal cells were measured. The number of NF-κB positive cells was evaluated using the immunohistochemistry method.
Results: There was a significant change in the amplitude and slope of the hippocampal excitatory potential in the ICH group compared to the sham group, but only on the 7th day after surgery. Specifically, the ipsilateral hippocampus in the ICH-7 group showed an increase in stimulation recording in 90 minutes compared to the sham-7 group ($p<0.0001$), while the contralateral hippocampus in the ICH-7 group exhibited a decrease in potential recording compared to the sham-7 group ($p<0.0001$). By day 14, the ICH group had a lower cell density in both the ipsilateral ($p<0.05$) and contralateral hippocampus ($p<0.05$) compared to the sham group, but there was no significant change in the hippocampal volume between the groups at any time interval. Furthermore, our immunohistochemical analysis revealed that the number of NF-kB-positive cells in both hemispheres of the ICH groups was significantly greater than that of the sham groups across all time intervals.
Conclusions: These findings suggest that striatal injury may lead to inflammation and cell death in the bilateral hippocampus, which can impair cognitive function after ICH.
Keywords: Action potentials; Cognition; Neuroinflammation; Striatum.

SP344, Amelioration of neuroinflamnation and cholinergic dysfunction by herniarin: Insights into neuroprotection against acrylamide- induced neurotoxicity

Arzoo Rajabian[1]
1. Department of Neuroscience, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Numerous scientific studies show the effect of acrylamide (Acr), a potent toxic chemical and critical human health hazard, on nervous symptoms nerve endings is closly linked to the cholinergic system. The cholinergic system regulates higher cortical functions related to memory, learning, concentration and attention. Some scientific evidence suggest a negative effect of Acr on the cholinergic system and inflammatory reactions within the body. Accordingly, we aimd to investigate the influence of how to lower neurotoxic effects due to Acr.
Method: For this purpose, a rat model of Acr neurotoxity was desiged. These animals were treated with herniarin, a bioactive compound with neuroprotective potential.
Results: At the end of treatmets, biochemical assesments were done on the brain of animals to investigate cholinergic function and mRNA expression of neuro-inflammatory cytokines tumor necrosis factor-α, interleukin-1β, IL-6. Our data reveaed an improvement in the cholinergic function along with the lowered neuroinflammatory markers. The central nervous system dynamically interacts with the immune system, modulating inflammation.
Conclusion: Due to the neurotoxic effect of Acr, which is related to the disturbance of the secretion of neurotransmitters, and its influence on the disturbance of acetylcholinesterase activity, it can be concluded that it disturbs the normal inflammatory response.
Keywords: Cholinergic dysfunction, Inflammatory cytokine, Acrylamide

SP345, Analgesic effect of apricot kernel oil on neuropathic pain induced by chronic constriction injury in rat sciatic nerve

Fatemeh Forouzanfar[1], Hassan Rakhshandeh[2]
1. Neuroscience Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
2. Pharmacological Research Center of Medicinal Plants, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Neuropathic pain is caused by a somatosensory nerve injury. At present many patients do not achieve satisfactory pain relief even with synthetic painkillers. The kernel oil of the apricot tree (*Prunus armeniaca* L) is well-known for its antioxidant and anti-inflammatory properties. This study examined the effect of apricot kernel oil on neuropathic pain caused by chronic constriction injury (CCI) in rats.
Methods: CCI was used to induce peripheral neuropathic pain. Rats were treated daily with apricot kernel oil (2 and 4 ml/kg) or gabapentin (100 mg/kg) for 14 days after CCI induction. Hot plate, acetone drop, and Von Frey hair tests were performed to evaluate thermal and mechanical activity. Lumbar spinal cord levels of malondialdehyde (MDA), total thiol, interleukin (IL)-1β, and tumor necrosis factor α (TNF-α) levels were assessed to measure biochemical changes.
Results: CCI rats showed a significant mechanical allodynia, cold allodynia and thermal hyperalgesia. Moreover, CCI increased the inflammation and oxidative stress markers in spinal cord samples. Apricot kernel oil significantly decreased the CCI-induced nociceptive pain threshold. Besides, spinal cord biochemical changes were attenuated.
Conclusion: These data suggest that apricot kernel oil could attenuate neuropathic pain, possibly through anti-inflammatory and antioxidant properties.
Keywords: Neuropathic pain, Inflammation, Oxidative stress, Apricot kernel oil

SP346, Neuronal nitric oxide synthase inhibition reduces brain inflammation associated learning and memory impairment

Akbar Anaeigoudari[1], Mahmoud Hosseini[2], Farimah Beheshti[3]
1. Department of Physiology, School of Medicine, Jiroft University of Medical Sciences, Jiroft, Iran
2. Applied Biomedical Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
3. Neuroscience Research Center, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran

Background: Inflammation impairs learning and memory. Effect of neuronal nitric oxide synthase inhibition against inflammation -induced learning and memory impairment was evaluated.
Methods: Group included control, LPS, LPS-7-nitroindazole (7NI), and 7NI. LPS (1 mg/kg; ip) was administered 2 h before behavioral and electrophysiological experiments. 7NI (30 mg/kg; ip) were injected 30 min before LPS.
Results: Based on behavioral results, time spent and traveled distance to reach the escape platform in LPS group were longer than control group. Pretreatment with 7NI reduced time spent and traveled distance in 7NI-LPS group compared to LPS group. Electrophysiological findings indicated that the slope and amplitude of the field excitatory post-synaptic potential ((fEPSP) in LPS group was lower than control group. 7NI increased the slope and amplitude of fEPSP in 7NI-LPS group versus LPS group. The level of TNF-α was higher in LPS group with respect to control group. 7NI injection reduced the level of TNF-α in 7NI-LPS group in comparison to LPS group.
Conclusion: Results show that neuronal nitric oxide synthase inhibition by 7NI attenuates brain inflammation-caused learning and memory impairment.
Keywords: Lipopolysaccharide, 7-nitroindazole, Inflammation

SP347, Cardiovascular Responses to LPS-Induced Inflammation in the Dorsomedial Periaqueductal Gray of Rats

Mohammad Naser Shafei[1], Reza Mohebbati[2], Reza Nejad Shahrokh Abadi[3], Vida Alikhani[3]
1. Applied biomedical Research Center, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Physiology, Faculty of Medicine, Gonabad University of Medical Sciences, Gonabad, Iran
3. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: The dorsomedial periaqueductal gray (dmPAG) is an area around the cerebral aqueduct and involved in several functions, including cardiovascular regulation. It has been shown that inflammatory mediators influenced central autonomic pathways involved in the cardiovascular regulation. Lipopolysaccharide (LPS), a potent endotoxin derived from the outer membrane of Gram-negative bacteria, is widely used as an experimental model of inflammation. LPS-induced inflammation can influence on cardiovascular responses through both peripheral and central mechanisms. However, its enteral cardiovascular effect incompletely understood. The present study investigated the cardiovascular effects of LPS microinjection into the dmPAG in rats.
Methods: Rats were divided into three groups: (1) control, (2) 50 ng LPS, and (3) 100 ng LPS. After anesthesia, the animals were placed in a stereotaxic apparatus, the femoral artery was cannulated for recording of cardiovascular parameters using a Power Lab system. LPS was microinjected into the dmPAG and cardiovascular responses recorded. Changes (Δ) in systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial pressure (MAP), and heart rate (HR) were calculated and maximum changes were compared with those of the control group.
Results: Microinjection of both doses of LPS into the dmPAG significantly decreased SBP, DBP and MAP ($P<0.05$- $P<0.01$). The HR in both doses increased than control group but it was not significant.
Conclusion: The findings show that microinjection of LPS into the dmPAG has significant hypotensive effect in anesthetized rats, suggesting that inflammatory activation within the dmPAG can influence central cardiovascular regulation. These findings suggest that the dmPAG may contribute to the cardiovascular alterations associated with inflammation.
Keywords: Dorsomedial periaqueductal gray, Lipopolysaccharide, Inflammation, cardiovascular system, Heart rate

SP348, Protective Effects of Levetiracetam in Cuprizone-Injured Oligodendrocytes OLN-93 Cell Line

Sahar Fanoudi[1], Mohaddaseh Sadat Alavi[2], Abdulridha Mohammed Badka[2], Hamid R. Sadeghnia[2]
1. Department of Basic Medical Sciences, Faculty of Medicine, Neyshabur University of Medical Sciences, Neyshabur, Iran
2. Department of Pharmacology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Levetiracetam (LEV) is a broad-spectrum antiseizure drug known for its high efficacy, favorable pharmacokinetic profile, and minimal side effects in both children and adults. Beyond its antiepileptic effects, LEV shows neuroprotective properties in various experimental models, including traumatic, ischemic, hemorrhagic brain injuries, and Alzheimer's disease. Additional studies indicate that LEV also exerts analgesic, sedative, cytoprotective, and anti-spasticity effects, and its neuroprotection is largely mediated through antioxidant and anti-inflammatory mechanisms. The present study investigated the protective role of LEV in a cuprizone-induced demyelination model using OLN-93 cells and explored the molecular pathways involved.
Methods: OLN-93 cells were pretreated with different concentrations of LEV (0.5–200 μM) prior to exposure to cuprizone (50 μM) for 24 hours. Cell viability, oxidative stress markers (ROS and MDA), intracellular glutathione (GSH) levels, and antioxidant enzyme activities (SOD and GPX) were measured. Apoptosis was assessed using annexin-V/PI staining, while IL-1β, IL-6, and TNF-α levels were quantified as indicators of inflammation. Gene expression of PI3K, Akt, mTOR, GSK-3β, and the myelin-associated proteins MBP and PLP was also evaluated using real-time PCR.
Results: Results showed that LEV increased cell viability in a dose-dependent manner, restoring survival to approximately 95% at 50 μM. LEV markedly reduced ROS generation and lipid peroxidation, enhanced GSH content, and improved SOD and GPX activities. It also decreased apoptosis and inflammatory cytokines. Furthermore, LEV attenuated cuprizone-induced overexpression of PI3K, Akt, mTOR, GSK-3β, MBP, and PLP.
Conclusion: Overall, LEV demonstrated protective effects against cuprizone-induced OLN-93 cell injury, suggesting potential relevance in demyelinating disorders.
Keywords: Levetiracetam, Oligoprotetion, Multiple sclerosis, Cuprizone, OLN-93 cells.

P100, Blocking histone methyltransferase activity supports improvements in a vascular dementia model

Leila Chodari [1,2], Fardin Sehati [3,4], Leila Hafazeh [4], Marjan Nikbakhtzadeh[4], Saeid Ataei [5], Mina Ranjbaran [4], Ghorbangol Ashabi [3,4,5], Saereh Hosseindoost [6, 7]

1. Neurophysiology Research Center, Cellular and Molecular Medicine Research Institute, Urmia University of Medical Sciences, Urmia, Iran
2. Department of Physiology, School of Medicine, Urmia University of Medical Sciences, Urmia, Iran
3.Electrophysiology Research Center, Neuroscience Institute, Tehran University of Medical Sciences, Tehran, Iran
4. Department of Physiology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
5. Iranian National Center for Addiction Studies, Tehran University of Medical Sciences, Tehran, Iran
6. Pain Research Center, Neuroscience Institute, Imam Khomeini Hospital Complex, Tehran University of Medical Sciences, Tehran, Iran
7. Brain and Spinal Cord Injury Research Center, Neuroscience Institute, Tehran University of Medical Sciences, Tehran, Iran

Background: Vascular dementia (VD) is one of the most common forms of dementia worldwide, characterized by problems with reasoning, planning, judgment, and memory. This study investigated the effect of a histone methyltransferase inhibitor on cognition and mitochondrial function in a rat model of VD, as well as its impact on H2O2- induced neurotoxicity in hippocampal neuronal cultures.

Methods: In the in vivo experiments, VD was induced by bilateral occlusion of the common carotid artery (CCA) for one month. The histone methyltransferase inhibitor, BIX01294, was administered intracerebroventricularly for one month (22.5 µg.kg− 1 three times/week). On day 30, behavioral tests, including the novel object recognition test and elevated plus maze test, were conducted. Mitochondrial enzyme activities, including aconitase, α-ketoglutarate dehydrogenase (α-KG), complex I, and complex IV, were evaluated in the hippocampus of rats following CCA ligation. In the in vitro experiments, the effect of BIX01294 (50–600 µM) on H2O2 (400 µM)-induced cytotoxicity in hippocampal neuronal cells was assessed using the MTT assay. Flow cytometry was performed to evaluate apoptosis.

Results: Our findings revealed that BIX01294 effectively improved memory function, Krebs cycle enzyme activity, and mitochondrial function in the rat model of VD. Moreover, in vitro results showed that BIX01294 at a concentration of 100 µM significantly reversed the cytotoxicity and apoptosis induced by H2O2 in neuronal cells.

Conclusion: These findings suggest that BIX01294 may have the potential to improve VD complications by reducing oxidative stress and inhibiting histone methylation.

Keywords: Vascular dementia, mitochondrial function, Histone methyltransferase inhibitor, Oxidative stress

P101, N-acetylcysteine mitigates hypothyroidism-induced cognitive deficits in adolescent male rats by modulating oxidative stress, inflammatory markers, and bdnf expression in hippocampus

Mahsa Lal dashty[1], Samaneh Kakhki[2], Farimah Beheshti[3,4]
1. Student Research Committee, Torbat Heydaryeh University of Medical Sciences, Torbat Heydaryeh, Iran
2. Department of Biochemistry, School of Medicine, Torbat Heydaryeh University of Medical Sciences, Torbat Heydaryeh, Iran
3. Department of Physiology, School of Medicine, Torbat Heydaryeh University of Medical Sciences, Torbat Heydaryeh, Iran
4. Neuroscience Research Center, Torbat Heydaryeh University of Medical Sciences, Torbat Heydaryeh, Iran

Background: This study hypothesized that N-Acetylcysteine (NAC) could enhance cognitive function in adolescent hypothyroid rats via multiple mechanisms.
Methods: Sixty adolescent rats were randomly assigned to six groups:(1) Vehicle (intraperitoneal (IP) administration of normal saline); (2) PTU-induced hypothyroidism (0.05% in drinking water); (3–5) Hypothyroid rats treated with varying doses of NAC (50, 100, and 150 mg/kg/day, IP) for six weeks; (6) Normal rats administered the highest NAC dose (150 mg/kg/day). Behavioral and biochemical assessments were conducted across all groups.
Results: In the Morris water maze (MWM) test, NAC significantly decreased escape latency and path length in hypothyroid rats.
In the passive avoidance (PA) test, NAC-treated rats showed increased latency to enter the dark compartment and reduced time spent there. Biochemical findings:NAC reduced malondialdehyde (MDA) and nitrite levels.Increased thiol content, catalase (CAT), and superoxide dismutase (SOD) in cortex and hippocampus.Elevated brain-derived neurotrophic factor (BDNF) levels.Reduced interleukin-6 (IL-6) levels in hippocampus.
Conclusion: The neuroprotective effects of NAC on cognitive deficits in adolescent hypothyroid rats may be due to its antioxidant properties and its modulation of BDNF levels.
Keywords: Hypothyroidism, N-acetylcysteine, Learning and Memory, BDNF, Oxidative stress.

P102, Alginate nanoparticles loaded with cuminum cyminum essential oil mitigate cuprizone-induced demyelination in rats

Amirali Ebrahimbabaei[1], Mahmoud Osanloo[2], Ali Ghanbari Asad[3], Alireza Tavassoli[4], Manzarbanoo Shojaeifard[5]

1. Student Research Committee, Fasa University of Medical Sciences, Fasa, Iran
2. Department of Medical Nanotechnology, School of Advanced Technologies in Medicine, Fasa University of Medical Sciences, Fasa, Iran
3. Department of Medical Biotechnology, School of Advanced Technologies in Medicine, Fasa University of Medical Sciences, Fasa, Iran
4. School of Medicine, Fasa University of Medical Sciences, Fasa, Iran
5. Department of Physiology, Fasa University of Medical Sciences, Fasa, Iran

Background: Oxidative stress–induced oligodendroglial injury plays a key role in demyelination. This study investigated whether sodium-alginate nanoparticles (NPs) loaded with Cuminum cyminum essential oil (CCEO) enhance behavioral, molecular, biochemical, and histopathological outcomes in cuprizone-treated rats.

Methods: CCEO constituents were identified by GC–MS. The essential oil was encapsulated in alginate NPs using ionotropic gelation, followed by analysis with DLS, zeta potential, ATR-FTIR, UV–Vis, and TEM. Eighteen Rats were assigned to Control, CPZ, or CCEO-NP groups. Body weight was monitored weekly. Spatial learning and memory were assessed with the Morris water maze. Demyelination in the corpus callosum was scored on Luxol Fast Blue sections. Levels of MBP, MOG, BDNF, and GFAP were measured by qPCR, while SOD and MDA levels were evaluated as indicators of oxidative stress. Data were analyzed using ANOVA with appropriate post hoc tests.

Results: GC–MS highlighted cuminaldehyde as the main component of CCEO. NPs showed uniform size distribution and stable surface charge. Spectroscopic and imaging analyses verified successful encapsulation. CPZ exposure caused weight loss, impaired spatial learning, increased demyelination, elevated MDA and GFAP levels, and decreased SOD, MBP, MOG, and BDNF. Treatment with CCEO-NPs improved learning performance, increased time spent in the target quadrant, reduced demyelination severity, normalized nuclear density, suppressed GFAP and MDA, and restored MBP, MOG, BDNF, and SOD levels.

Conclusion: Alginate-based CCEO NPs exhibit antioxidant, neurotrophic, and pro-remyelinating effects in the CPZ model. Further research should optimize dosing strategies and examine in vivo release profiles to enhance translational potential.

Keywords: Demyelination; Multiple sclerosis; Cuprizone; Alginate nanoparticles; Cuminum cyminum.

P103, Effects of melatonin and transcranial photobiomodulation on fear memory consolidation and locomotor activity in chronically stressed rats

Mohammad Mazaheri[1,2], Maryam Radahmadi[2], Hojatallah Alaei [2], Nahid Eskandari[1], Hossein Salehi[1]
1. Applied Physiology Research Center, Cardiovascular Research Institute, Isfahan University of Medical Sciences, Isfahan, Iran
2. Department of Physiology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran

Background: Chronic stress affects the consolidation of memory and locomotor activity. Therefore, under stress, the brain prioritizes and strengthens memories associated with survival and danger. However, melatonin (MLT)and transcranial photobiomodulation(tPBM)have promising effects on brain functions. This study investigated the effects of MLT and tPBM on fear memory consolidation and locomotor activity in chronically stressed rats.
Methods: Forty-nine male Wistar rats were randomly assigned to seven groups: Control (Co), Sham injection (Sh-I), Sham tPBM (Sh-tPBM), Stress (St), Stress with Melatonin (St-MLT), Stress with tPBM (St-tPBM), and Stress with Melatonin and tPBM (St-MLT-tPBM). Chronic restraint stress (2 h/day for 21 days) was applied to all stressed rats. MLT (20mg/kg; intraperitoneally) and tPBM (808 nm, 0.92 W/cm^2, 96.1 J/day delivered to the scalp surface) were administered following restraint stress. Dark stay time (DS) and the number of entries were assessed using the passive avoidance test and considered as measures of fear memory consolidation and locomotor activity, respectively.
Results: DS was significantly decreased in the St group compared with the Co group. Conversely, it increased significantly in the St-MLT, St-tPBM, and St-MLT-tPBM groups compared with the St group. It considerably increased in the St-MLT-tPBM group compared to the St, St-MLT, and St-tPBM groups.
Conclusion: Chronic stress enhanced fear memory consolidation, while combined MLT and tPBM decreased it under stress conditions, likely through anti-inflammatory, anti-stress, and neuromodulatory mechanisms. This co-administration also appeared to influence the animals' natural preference for darkness, possibly by mitigating abnormal fear of shock. Furthermore, combined MLT and tPBM increased locomotor activity and reduced avoidance of trauma reminders. These synergistic effects suggest potential for preventing stress-related neuropsychiatric disorders.
Keywords: Fear memory consolidation, Locomotor activity, Melatonin, Transcranial photobiomodulation.

P104, Exercise performed before or after ischemia engages divergent protective mechanisms for brain and heart: multimodal assessment using ttc, histology, and cardiac biomarkers in a rat MCAO model

Zahraa Falah A. Annooz and Aminollah Bahaoddini[1]
1. Department of Biology, College of Science, Shiraz University, Shiraz, Iran

Background: Assessment and compare the effects of two distinct exercise timing protocols in an animal model of stroke: Exercise Pre-conditioning (exercise before the ischemic event) versus Exercise Post-conditioning (exercise during the recovery/rehabilitation phase). Using the Middle Cerebral Artery Occlusion (MCAO) model in rats, Exercise has been proposed as a neuroprotective and cardioprotective intervention, but the influence of its temporal exercise interventions (Pre- vs Post-Ischemia) relative to ischemic onset remains unclear.
Methods: Cerebral ischemia was induced by the middle cerebral artery occlusion (MCAO) method in 30 anesthetized adult Sprague-Dawley male rats in control, sham, MCAO, Exercise Pre-MCAO and Exercise Post-MCAO groups, for one hour. Treadmill was recorded before, and after ischemia and The exercise regimen involved running on a motor-driven rodent treadmill for a period of two weeks. The protocol was designed as a moderate intensity regime, typically starting with an acclimation period. Infarct volume was determined using TTC staining. Histopathological alterations in myocardial tissues were assessed via H&E staining, and serum cardiac troponin levels were quantified by ELISA. Neurobehavioral performance was evaluated to assess functional recovery.
Results: The Pre-MCAO exercised Group demonstrated significantly superior neuroprotection. Infarct volume in Pre-MCAO exercised was significantly lower compared to the Post-MCAO exercised group, and the Ischemia was high compared to control group. H&E staining corroborated these findings, showing preserved myocardial morphology and reduced damaged in the exercise pre-conditioned heart tissue. While the post-MCAO exercised group showed a moderate and a significant reduction in infarct size and improved tissue organization compared to the control, the pre-conditioning effect was dominant. Furthermore, Serum troponin levels were markedly lower in both exercise-treated groups, indicating attenuated cardiac injury. Behavioral recovery was significantly enhanced in pre- and post-ischemic exercised groups relative to MCAO.
Conclusion: The timing of physical activity was critical for maximal benefit against ischemic injury. Exercise pre-conditioning provides superior neuroprotection and systemic stability, effectively minimizing infarct size and neuronal damage. While exercise remains beneficial during rehabilitation (post-conditioning).
Keywords: Cerebral ischemia, Exercise preconditioning, Exercise postconditioning, TTC, MCAO rat model.

P105, Effect of ginger derived exosome-like nanoparticles on anxiety and working memory impairments induced by ischemia/reperfusion

Sara Ahmadi Shokooh[1], Masoud Fereidoni[1]
1. Department of Biology, Faculty of Science, Ferdowsi University of Mashhad, Mashhad, Iran

Background: Post-stroke motor and cognitive impairments, including balance deficits and memory dysfunction, remain significant clinical challenges. Shogaol, a bioactive ginger compound, has demonstrated neuroprotective effects in middle cerebral artery occlusion (MCAO) models by attenuating oxidative stress and inflammation. This study investigates whether ginger-derived exosome-like nanoparticles (GELNs) ameliorate cognitive and motor deficits following global cerebral ischemia/reperfusion (I/R) injury in rats.
Methods: Male Wistar rats (220–280 g) were subjected to bilateral common carotid artery occlusion (2-VO) to induce I/R injury. Groups included sham (no occlusion), I/R (untreated), and GELN-treated (30, 60, and 120 mg/kg; n=7/group). Motor activity and anxiety-like behavior were assessed via open-field test (distance traveled, center time). Working memory was evaluated using Y-maze spontaneous alternation. Locomotor data were analyzed with ANY-Maze software.
Results: No motor impairments were detected across groups. The I/R and 30 mg/kg GELN groups exhibited heightened anxiety (reduced center time, *p*<0.0001) and working memory deficits (lower Y-maze alternation, *p*<0.0001). In contrast, sham and higher GELN doses (60 and 120 mg/kg) showed near-normal anxiety levels and memory performance (*p*<0.0001 vs. I/R), with dose-dependent efficacy (open-field: *p*<0.0002; Y-maze: *p*<0.0001).
Conclusion: GELNs attenuate I/R-induced anxiety-like behavior and memory impairment, with optimal effects at 60–120 mg/kg. These benefits may arise from GELNs' antioxidant and anti-inflammatory properties, mirroring shogaol's mechanisms. Further studies should elucidate molecular pathways to advance stroke therapeutics.
Keywords: Anxiety-like behavior, Motor activity, Working memory, Ischemia/Reperfusion, Plant derived exosome.

P106, The effect of brain-derived neurotrophic factor (BDNF) on food consumption of broilers: Role of serotonergic receptor

Hediye Akhlaghi[1], Hamed Zarei[2], Morteza Zendehdel[3]
1. Department of Basic Sciences, Faculty of Veterinary Medicine, Garmsar Branch, Islamic Azad University, Garmsar, Iran
2. Department of Biology, Faculty of Basic Science, Central Tehran Branch, Islamic Azad University, Tehran, Iran
3. Department of Basic Sciences, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran

Background: Previously, the effects of brain-derived neurotrophic factor (BDNF) on feed intake of mammals were studied. However, its role in avian feeding regulation remains unclear. The aim of this study was to investigate the possible effects of BDNF on the food consumption of broilers and its interaction with the serotonergic system.
Methods: For this purpose, five experiments were conducted on 220 broiler chickens. In the first treatment, broilers received intracerebroventricular (ICV) infusion of BDNF (7.5, 15, and 30 µg). BDNF (30 µg), Fluoxetine (10 µg), a serotonin reuptake inhibitor, and BDNF + Fluoxetine were injected in the second treatment. In subsequent treatments, instead of Fluoxetine, PCPA (serotonin synthesis inhibitor, 1.25 µg), SB242084 (antagonist of 5-HT2C receptor, 1.5 µg), and 8-OH-DPAT (agonist of 5-HT1A receptor, 15.25 nmol) were applied. Then, cumulative food intake was recorded for 2 hours.
Results: Based on the results, BDNF injection (15 and 30 µg) caused a significant decrease in the food intake of broilers compared to the control group ($p<0.05$). Simultaneous administration of PCPA and SB242084 with BDNF suppressed BDNF-induced hypophagia ($p<0.05$), while the injection of Fluoxetine + BDNF strengthened this hypophagic effect ($p<0.05$). The decrease in feed intake caused by BDNF was not significantly changed by simultaneous injection of BDNF+ 8-OH-DPAT ($p>0.05$).
Conclusion: According to the findings, BDNF reduces broilers' food consumption, and this effect is probably mediated via 5-HT2C receptors.
Keywords: BDNF; Serotonergic receptors; Food consumption; Broilers

P108, Atorvastatin attenuates stress-evoked return to morphine seeking after extinction training

Nilofar Aghajani[1], Hossein Azizi[1, 2,] Saeed Semnanian[1,3]
1. Department of Physiology, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran
2. Institute for Brain Sciences and Cognition, Tarbiat Modares University, Tehran, Iran
3. School of Cognitive Sciences, Institute for Research in Fundamental Sciences, IPM, Tehran, Iran

Background: Relapse remains a major challenge in opioid addiction treatment, particularly when stress reactivates drug-seeking behavior after extinction. Stress engages multiple biological systems, including the hypothalamic–pituitary–adrenal axis, corticotropin-releasing factor signaling in limbic regions, and neuroimmune pathways that sensitize the brain to reinstatement. Evidence suggests statins, beyond their lipid-lowering role, may influence neuroinflammatory activity and synaptic regulation. Based on these observations, we examined whether chronic atorvastatin treatment could reduce stress-induced relapse in a morphine self-administration model.
Methods: Adult male rats were implanted with jugular catheters and trained to self-administer morphine for 14 days. After extinction training, animals received daily intraperitoneal saline or atorvastatin for two weeks. Following treatment, all rats were exposed to a standardized foot-shock stressor and then tested for reinstatement in the operant chamber. Active lever responses were recorded as the measure of morphine-seeking.
Results: Atorvastatin-treated rats showed a marked reduction in stress-induced reinstatement compared with saline controls. Lever pressing after stress exposure was significantly lower in the atorvastatin group, indicating reduced motivation to resume morphine seeking.
Conclusion: Chronic atorvastatin treatment decreased vulnerability to stress-triggered relapse in this model. While mechanisms cannot be fully determined from this experiment, findings are consistent with the hypothesis that atorvastatin modulates relapse-related processes such as neuroinflammatory signaling or stress-responsive circuits. Further studies are needed to clarify pathways and assess whether similar effects occur in other models of opioid use.
Keywords: Atorvastatin, Stress, Relapse, Morphine, Self-Administration

P109, Chronobiology in psychopharmacology: enhancing treatment efficacy for mood disorders

Yasaman Akbarian[1,4], Reyhaneh Moghaddam Habibzadeh[1,4], Hossein Javid[1,2,3]
1. Department of Medical Laboratory Sciences, Varastegan Institute for Medical Sciences, Mashhad, Iran
2. Department of Clinical Biochemistry, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Surgical Oncology Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
4. Student research committee, Varastegan Institute for Medical Sciences, Mashhad, Iran

Background: Circadian rhythms are natural cycles of biological processes that occur over 24-hour periods and play an important role in regulating the body's physiological functions. This study examines the connection between disruptions in circadian rhythms and their impact on the effectiveness and metabolism of antidepressant and antianxiety medications, and its impact on mood and behavior.
Methods: In this study, a collection of articles published between 2022 to 2025 were reviewed from the Google Scholar and PubMed databases. Out of the 30 articles found, 16 articles were excluded after reviewing their topics and abstracts, and 14 articles were selected for more detailed analysis.
Results: Research indicates that disruption of circadian rhythms by altering drug plasma concentrations, reduce the expected antidepressant responses from SSRIs, and blunt the expected antianxiety responses derived from benzodiazepines. Furthermore, analysis of gene expression demonstrated marked alterations in the hepatic cytochrome P450 enzyme system responsible for the biotransformation of drugs, explaining the pharmacodynamic changes noted. This finding emphasizes how crucial our circadian rhythms are for how we take in, break down, and eventually clear medications from our bodies.
Conclusion: The findings underscore the necessity of integrating circadian rhythms into the management of mood and behavioral disorders. Advancing chronobiology alongside psychopharmacology could enable clinicians to customize drug regimens to align precisely with individual circadian patterns, enhancing efficacy while minimizing side effects. This kind of progress could boost how well treatments for mood disorders and related behaviors work, leading to better patient care and quicker, more complete recoveries.
Keywords: Circadian rhythms, Antidepressants, Anxiolytics, Pharmacodynamics.

P110, Animal models for alzheimer's disease induced by intracerebroventricular injection

Baqer Alrazi[1], Morteza Behnam-Rassouli[1], Amin Esmaeily[1]
1. Department of Biology, Faculty of Basic Sciences, Ferdowsi University of Mashhad, Mashhad, Iran

Background: Alzheimer's disease (AD) is a progressive neurodegenerative disorder marked by cognitive decline, amyloid plaques, neurofibrillary tangles, and neuroinflammation. Robust animal models are crucial for understanding its pathogenesis and developing effective therapies. Intracerebroventricular (ICV) injection methods in rodents are widely employed to induce sporadic AD (sAD) phenotypes, closely mimicking human pathology.
Methods: Rodent AD models are commonly induced via ICV injections of streptozotocin (STZ) or amyloid-beta (Aβ) peptides/oligomers. STZ is typically given at sub-diabetogenic doses (e.g., 0.3-3 mg/kg). Aβ models involve bilateral infusions of aggregated human Aβ1-42 or native Aβ oligomers. Following injection, animals undergo behavioral tests for cognitive and non-cognitive functions. Brain tissues are then analyzed for AD hallmarks: Aβ deposition, tau phosphorylation, neuroinflammation, and synaptic integrity.
Results: ICV-STZ consistently induces severe cognitive deficits, oxidative stress, neuroinflammation, Aβ accumulation, and tau hyperphosphorylation, often reflecting brain insulin resistance. ICV Aβ injection also causes cognitive impairment and neuroinflammation. Notably, native Aβ oligomers can selectively impair social memory and lead to entorhinal cortex volume loss in a plaque-free early AD model. Outcomes vary with dose, strain, and age.
Conclusion: ICV-induced AD models, particularly with STZ and Aβ, are valuable for studying sAD pathogenesis and evaluating therapies. They reproduce key AD features like cognitive dysfunction, amyloid/tau pathologies, neuroinflammation, and synaptic impairment. These models offer critical, translationally relevant insights into AD mechanisms, aiding multi-targeted therapeutic strategy development.
Keywords: Alzheimer's Disease, Intracerebroventricular Injection, Streptozotocin, Amyloid-Beta

P111, Method for assessing the effect of drug compounds via intracerebellar/intra-4th ventricular injection

Muthana Sarim alfatli[1], Morteza Behnam-Rassouli[1]
1. Department of Biology, Faculty of Science, Ferdowsi University of Mashhad, Mashhad, Iran

This article examines five different studies in the field of neuroscience. The first study investigates the effect of valproic acid, a histone deacetylase inhibitor, on pediatric medulloblastoma. By creating orthotopic tumor models in mice that mimic human medulloblastoma, researchers demonstrated that valproic acid significantly increased survival time. This improvement was attributed to the inhibition of tumor growth, induction of programmed cell death (apoptosis), cellular differentiation, and a reduction in angiogenesis. These results pave the way for clinical investigation of valproic acid as a potential treatment for medulloblastoma.
The second study explores how Insulin-like Growth Factor-I (IGF-I) collaborates with the Sonic hedgehog/Patched1 (Shh/Ptc1) pathway in the formation of medulloblastoma, a common pediatric brain tumor. Using mouse models, researchers discovered that elevated IGF-I levels, especially in combination with mutations in the Ptc1 gene, not only led to brain overgrowth but also accelerated tumor development. This study clarifies that IGF-I contributes to the formation and progression of precancerous lesions by increasing cell proliferation, reducing programmed cell death, and inhibiting the differentiation of neuronal progenitor cells.
The third study addresses how the exposure of premature infants to high oxygen levels (hyperoxia) can damage their cerebellum. Using neonatal mouse models, researchers showed that hyperoxia led to white matter injury, reduced growth of oligodendrocyte cells responsible for myelin production, and decreased cerebellar volume. Importantly, this study found that the drug minocycline could prevent these damages and preserve normal cerebellar development.
The fourth study investigates the effect of low-dose thimerosal injection, an ethylmercury compound used in vaccines, on the expression of metallothionein (MT) proteins in mouse brains. Researchers observed that after thimerosal injection, both MT-1 and MT-3 genes were significantly activated in the cerebellum. This study suggests that the cerebellum is an organ sensitive to thimerosal, and these findings reinforce the hypothesis of a link between mercury exposure from thimerosal-containing vaccines and the brain damage observed in autism.
Finally, the fifth study examines the protective effect of chemical stimulation of the cerebellar fastigial nucleus (FN) on chronic visceral hypersensitivity (CVH) in mice, often associated with Irritable Bowel Syndrome (IBS). By injecting glutamate into the FN, researchers showed that this significantly reduced visceral hyperalgesia. The main findings indicate that the FN plays a key role in regulating CVH, and this protective effect is likely mediated through GABAergic pathways in the lateral hypothalamic area (LHA). Additionally, the study points to the effect of FN stimulation on the regulation of apoptosis-related proteins, suggesting a cellular mechanism behind this protective effect. These results provide new insights into cerebellar function and may offer effective therapeutic strategies for CVH.
Keywords: Valproic acid, insulin-like growth factor-I (IGF-I), methyltinol, GABA, cerebellum

P113, Neurodegenerative disorders and folate impact- review

Fazeleh Entezarian[1], Golnaz Shafiei[1], Javad Amini Mahabadi [2], Ghazaleh Moshkdanian[2]
1. Anatomical Sciences Research Center, Institute for Basic Sciences, Kashan University of Medical Sciences, Kashan, Iran
2. Gametogenesis Research Center, Kashan University of Medical Sciences, Kashan, Iran

Background: Neurological diseases are increasingly acknowledged as a significant public health issue. Folate, an essential nutrient, is known to be crucial for neurological health, with its deficiency associated with neurocognitive impairments and serving as an independent risk factor for cerebrovascular conditions, including Alzheimer's Disease, Parkinson's disease hydrocephalus and brain damage. Despite this, there remains some debate regarding the efficacy of vitamin supplementation for individuals suffering from these conditions. Here we have compiled studies that demonstrate the unique role of folate in diseases of the nervous system and its implications for disease and neurorepair.
Methods: We conducted a search for intervention studies in various bibliographic online databases, including Scopus, MEDLINE, Google Scholar, and PubMed covering the period from database inception. The search was performed using the following keywords: Supplementation, Folic Acid, Folate, Alzheimer's Disease, Parkinson's Disease, Hydrocephalus, and Traumatic Brain Injury. The search was limited to studies involving human and animal subjects and published in English.
Conclusion: The findings of this study showed that deficiency in folate is associated with the occurrence of neurological diseases. The use of appropriate folate supplements in neurological patients can prevent the occurrence and progression of neurological diseases.
Keywords: Folate, Neurodegenerative disorders, Alzheimer's disease, Parkinson's disease, Hydrocephalus.

P114, Evaluating the effect of maternal dysbiosis in fetal neurodevelopment

Zahra Davtalab Tousi [1], Kiarash Ghazvini [2]
1. Department of Microbiology and Virology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Microbiology and Virology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: The microbiota-gut-brain axis has major implications for human health including brain function which regulating various physiological processes of neurodevelopment. The maternal gut microbiota has a critical role in modulating immune, metabolic and endocrine pathways that impact fetal neurodevelopment. Maternal dysbiosis affects fetal neurodevelopment through three principal mechanisms: (i) Microbial metabolites such as short-chain fatty acids that regulate brain-derived neurotrophic factor expression via vagus nerve activation or central nervous system GPR41/43 receptors; (ii) Immune-gut-brain axis-mediated Th1/Th2 imbalance induces maternal-fetal interface inflammation, disrupting fetal blood–brain barrier development and triggering neuroinflammatory pathways; (iii) Gut microbial biosynthesis of neurotransmitter precursors 5-hydroxytryptamine and γ-aminobutyric acid exerts developmental programming effects.
Method: A systematic search was conducted in scientific databases including PubMed, Scopus, Web of Science and Google Scholar from 2015 to 2025.
Results: Dysbiosis in pregnant women lead to an altered production of SCFAs, which play a vital role in neuronal differentiation and synaptic function. Additionally, dysbiosis disrupt the blood-brain barrier, allowing inflammatory cytokines to cross into the fetal circulation, which has been associated with an increased risk of neurodevelopmental disorders. Dysbiosis-induced inflammation also alter the maternal immune response, leading to a heightened inflammatory state that affects the developing brain. Furthermore, maternal dysbiosis affect the expression of genes related to neurodevelopment through the modulation of the fetal epigenome.
Conclusion: This review underscores the importance of a balanced maternal microbiome for optimal fetal neurodevelopment. Restoring microbial balance through dietary interventions, probiotics, or prebiotics during pregnancy mitigate the effects of dysbiosis and promote healthy fetal neurodevelopment.
Keywords: Maternal, Fetal, Dysbiosis, Neurodevelopment, Microbiome

P115, Changes in the function of intermediate hippocampal CA1 and dentate gyrus synapses following chronic morphine exposure in rats

Sohrab Anvari[1], Mohammad Javan[1], Javad Mirnajafi-Zadeh[1], Yaghoub Fathollahi[1]
1. Department of Physiology, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran

Background: To study the unique features of synaptic plasticity in the intermediate hippocampus, chronic morphine-induced changes in synaptic plasticity of the intermediate CA1 region and dentate gyrus were examined.
Methods: Male Wistar rats (180–220 g) were treated with morphine sulfate (10 mg/kg, seven consecutive days, intraperitoneal). Paired-pulse responses and long-term potentiation (LTP) at synapses of the Schaffer collateral fibers and temporoammonic pathway with CA1 pyramidal neurons, as well as the perforant pathway with the dentate granule cells were assessed by recording extracellular field potentials from the transverse hippocampal slices of the intermediate hippocampus of morphine exposed rats.
Results: In the intermediate hippocampus, paired pulse facilitation at Schaffer collateral-CA1 synapses induced by chronic morphine was observed compared with saline-injected rats at an inter-pulse interval of 20-ms, whereas repeated morphine reduced the maintenance of LTP at PP-DG synapses.
Conclusion: It is concluded that the effects of morphine on synaptic plasticity can vary along the longitudinal axis of the hippocampus, indicating region-specific adaptations.
Keywords: Intermediate hippocampus, CA1, dentate gyrus, morphine, synaptic plasticity

P116, The relationship between sexual deprivation and anxiety-like behaviors in male rats

Enayat Anvari[1], Shahram Agahi[2], Iraj Ahmadi[1]
1. Department of Physiology, School of Medicine, Ilam University of Medical Sciences, Ilam, Iran
2. Department of Biology, Science and Research Branch, Islamic Azad University, Tehran, Iran

Background: Sexual deprivation may lead to impaired brain physiological function. In the present study, the role of sexual deprivation in anxiety-like behaviors in male rats was investigated.
Methods: This study involved 40 male and female rats (24 males and 16 females), each weighing approximately 100 grams, divided into three groups: control, test group A, and test group B. Female rats in the control group, which lived freely alongside males, underwent bilateral ovariectomy (to prevent reproduction) and engaged in sexual activity. In test group A, healthy males and females were housed together but separated by a mesh (to prevent sexual interaction). Test group B consisted of only male rats, housed in pairs in each cage (with no sexual interaction). After three months, anxiety levels were assessed using the elevated plus maze.
Results: There was no significant difference in body weights between groups at the beginning and end of the experiment. Variables including the number of entries into open and closed arms, percentage of time spent in the open arms, percentage of entries into open arms, and overall entries into both arms were evaluated over two consecutive days. No statistically significant differences were observed among the groups on either day.
Conclusion: Given the lack of differences in anxiety-like behavior between groups, it can be concluded that the limbic system was not affected by sexual deprivation.
Keywords: Rat, Sexual Deprivation, Anxiety-Like Behaviors

P117, The relationship between sexual deprivation and memory in male rats

Enayat Anvari[1], Shahram Agahi[2], Maryam Naseri[1], Iraj Ahmadi[1]
1. Department of Physiology, School of Medicine, Ilam University of Medical Sciences, Ilam, Iran
2. Department of Biology, Science and Research Branch, Islamic Azad University, Tehran, Iran

Background: Sexual deprivation may lead to impaired brain physiological function. In the present study, the effect of sexual deprivation on memory performance in male rats was investigated.
Methods: In this study, 40 rats (24 males and 16 females), each weighing approximately 100 grams, were divided into three groups: Control, Test Group A, and Test Group B. In the control group, female rats, which lived freely alongside males, underwent bilateral ovariectomy (to prevent reproduction) and engaged in sexual activity. In Test Group A, healthy male and female rats were housed in the same cage but separated by a mesh barrier (to prevent sexual interaction). Test Group B consisted only of male rats, with two males per cage (no sexual activity). Memory and learning tests were conducted three months later.
Results: There was no significant difference in the rats' weights (at the beginning and end of the experiment) across the groups. Factors such as distance traveled, time spent, average speed in finding the hidden platform, and the number of entries into the quadrant containing the hidden platform were examined. A significant difference was observed between the control group and the other two test groups.
Conclusion: It can be concluded that sexual deprivation likely causes dysfunction in the hippocampus, leading to the observed significant differences.
Keywords: Memory, Rat, Sexual Deprivation

P118, 4-Phenylbutyric acid mitigated cognitive impairment induced by a high-fat-fructose diet consumption in male rats

Mina Sadat Izadi[1], Homeira Zardooz[2]
1. Department of Physiology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran
2. Department of Physiology, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: This study investigated the possible inflammatory effects of high-fat-fructose diet (HFFD) consumption from birth to young adulthood on hippocampal tissue. Moreover, two types of spatial-memory tests, Barnes maze (BM) and Morris water maze (MWM), were used to determine which test was more reliable for evaluating cognitive memory dysfunction. The potential ability of 4-Phenylbutyric acid (4-PBA) to reverse the possible learning and memory impairment subsequent to HFFD intake was also evaluated**.**
Methods: Dams and their pups were randomly assigned to a control diet (CD) and HFFD groups. After weaning, the male Wistar offspring were allocated to CD, CD- dimethyl sulfoxide (DMSO), CD-4-PBA, HFFD, HFFD-DMSO and HFFD-4-PBA groups, while they were on their diet for 5-weeks, treated for 10-days (50 mg/kg, ip) and the behavioral test (BM or MWM). Subsequently, the plasma corticosterone level and the hippocampus contents of interleukin-1 beta (IL-1β) and oxidative stress markers were assessed.
Results: According to the results, 4-PBA prevented memory impairment in HFFD fed rats and this improvement was accompanied with declined the elevated corticosterone plasma level and hippocampus IL-1β and malondialdehyde (MDA) content consequent to BM and MWM tests.
Conclusion: This study demonstrated that early postnatal HFFD consumption led to hippocampus inflammation and oxidative stress, in addition to deleterious effects on spatial learning and memory impairment through BM and MWM tests. Notably, the efficacy of 4-PBA was interfered with by the light stressor in the BM test.
Keywords: High-fat-fructose diet, 4-Phenylbutyric acid, Barnez maze, Morris water maze

P119, Phycocyanin pretreatment ameliorated Scopolamine-induced Alzheimer's disease-like behavior in male rats

Shahla Eyvari-Brooshghalan[1], Kimiya Safari [2], Rasool Haddadi [1,2], Alireza Komaki[1]
1. Department of Neuroscience, School of Science and Advanced Technologies in Medicine, Neurophysiology research center, Hamadan University of Medical Sciences, Hamadan, Iran
2. Department of Pharmacology and Toxicology, School of Pharmacy, Medicinal Plant and Natural Products Research Center, Hamadan University of Medical Sciences, Hamadan, Iran
3. Department of Pathobiology, Faculty of Veterinary Medicine, Bu-Ali Sina University, Hamedan, Iran

Background: The scopolamine-induced Alzheimer's disease (AD) model is one of the most widely used experimental models to study memory impairment and screen anti-AD bioactive agents. Herein, we scrutinized the neuroprotective efficacy of phycocyanin against scopolamine-induced AD-like behavioral deficits in male rats.
Methods: Wistar male rats were randomly assigned to five groups. To induce AD-like symptoms, scopolamine (1 mg/kg intraperitoneally (i.p.)) was administered for 14 consecutive days. Also, the pre-treatment groups received Phycocyanin at doses of 50, 100, and 200 mg/kg. Behavioral assessments, such as the Morris water maze (MWM), open field test (OFT), elevated plus maze (EPM), and passive avoidance test (PAT), were conducted to evaluate learning, anxiety, and memory anomalies, as well as Phycocyanin inhibitory effectiveness against scopolamine-induced neurotoxicity. Furthermore, oxidative stress biomarkers and histopathological changes were determined in the rat's brain.
Results: Scopolamine-induced AD-like behavior was observed in the scopolamine-administered rats, showing a significant increase in memory, cognitive, and anxiety deficits ($p < 0.001$). Additionally, lipid peroxidation (LPO) enhancement and, conversely, a reduction in the antioxidant defense system were observed in scopolamine-treated rats. In contrast, Phycocyanin pre-treatment significantly prevented scopolamine neurotoxicity, as indicated by the attenuation of memory and cognitive function, as well as an improvement in antioxidant activity ($p < 0.001$). Besides, histopathological findings were correlated with biochemical results.
Conclusion: Neuroprotective effects of Phycocyanin due to its antioxidant properties make a new framework for further studies.
Keywords: Alzheimer's disease, Scopolamine, Phycocyanin, Oxidative stress

P120, A review on the consequences of molecular and genomic alterations following exposure to electromagnetic fields: Remodeling of neuronal network and cognitive changes

Shima Abtin[1, 2], Fatemehsadat Seyedaghamiri[2], Zahra Aalidaei[2], Abbas Haghparast[1, 2, 3]
1. Neurophysiology Research Center, Institute of Neuroscience and Cognition, Shahid Beheshti University of Medical Sciences. Tehran, Iran
2. Neuroscience Research Center, Institute of Neuroscience and Cognition, Shahid Beheshti University of Medical Sciences, Tehran, Iran
3. School of Cognitive Sciences, Institute for Research in Fundamental Sciences, Tehran, Iran

Background: The use of electromagnetic fields (EMFs) is essential in daily life. Since 1970, concerns have grown about potential health hazards from EMF. Exposure to EMF can stimulate nerves and affect the central nervous system, leading to neurological and cognitive changes. However, current research results are often vague and contradictory.
Methods: This review conducted an extensive search in several academic databases, including Scopus, PubMed, and Google Scholar, to gather relevant studies and reviews published up to Jan 2023.
Results: The consequences of exposure to electromagnetic fields include changes in memory and learning through changes in neuronal plasticity in the hippocampus, synapses and hippocampal neuritis, and changes in metabolism and neurotransmitter levels. Prenatal exposure to EMFs has negative effects on memory and learning, as well as changes in hippocampal neuron density and histomorphology of hippocampus. EMF exposure also affects the structure and function of glial cells, affecting gate dynamics, ion conduction, membrane concentration, and protein expression. EMF exposure affects gene expression and may change epigenetic regulation through effects on DNA methylation, histone modification, and microRNA biogenesis, and potentially leading to biological changes.
Conclusion: Exposure to EMFs possibly leads to changes in cellular and molecular mechanisms in central nervous system and alter cognitive function.
Keywords: Cognitive neuroscience, Electromagnetic field, Gene expression, Neuronal remodeling, Glial cell

P121, Chronic constriction injury and cognitive behaviors: investigating the neuroprotective role of progesterone

Fariba Akhondzadeh[1], Rasoul Ghasemi [1,2], Fatemeh Mokhtari [1], Pegah Javadpour[3], Fariba khodagholi[3], Homa Manaheji[1,2]

1. Department of Physiology, Faculty of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran
2. Neurophysiology Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran
3. Neuroscience Research Center, Institute of Neuroscience and Cognition, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: Chronic pain disrupts sensory processing and may affect cognitive and social behaviors. Progesterone has been proposed as a neuroprotective agent with analgesic effects, yet its broader behavioral consequences remain unclear.

Methods: Sixteen adult male rats were assigned to four groups: Sham+Vehicle, Sham+Progesterone, CCI+Vehicle, and CCI+Progesterone. Neuropathic pain was induced using the chronic constriction injury (CCI) model, while sham animals underwent nerve exposure without ligation. Progesterone (15 mg/kg) or vehicle was administered intraperitoneally for 14 days post-surgery. Mechanical hyperalgesia was assessed using the paw withdrawal threshold. On day 14, novel object recognition (NOR), object-based attention (OBAT), and three-chamber sociability tests were performed to evaluate memory, attention, and social behavior.

Results: Mechanical hyperalgesia was significantly increased in the CCI+Vehicle group compared to Sham+Vehicle, and progesterone significantly reduced pain on days 7 and 14. In the NOR test, exploration time did not differ between CCI and Sham groups; progesterone reduced exploration time, but not significantly. In OBAT, progesterone caused a non-significant increase in the recognition index. In the sociability test, social novelty time was higher in the CCI group compared to Sham, but not significantly; progesterone reduced social novelty time without reaching significance.

Conclusion: CCI increased social interaction but did not significantly affect memory or attention. Progesterone exerted a robust analgesic effect but showed no significant impact on cognitive or social behaviors, suggesting that its therapeutic benefits are primarily limited to nociceptive modulation rather than broader behavioral domains.

Keywords: Progesterone, Chronic constriction injury, Cognition, Social behavior

P122, Sleep deprivation and mental disorders: A systematic review

Parisa Arvin [1], Fatemeh Yarahmadi [1], Mahdi Seif [1], Zohreh Lamoochi [2], Yaghoob Farbood [2], Alireza Sarkaki[2]

1. Department of Nursing, Boroujerd School of Nursing, Lorestan University of Medical Sciences, Khorramabad, Iran
2. Department of Physiology, Persian Gulf Physiology Research Center, School of Medicine, Medical Basic Sciences Research Institute, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

Background: Sleep deprivation and mental disorders are highly prevalent phenomena, representing with a significant burden to society. Sleep deprivation has been recognized as a potential biomarker for mental disorders. Over the past decade, numerous studies have investigated the association between sleep deprivation and mental disorders such as depression, anxiety, bipolar disorder and psychosis. The aim of this article is to investigate whether sleep deprivation also predicts the onset of other mental disorders.
Methods: Identifying published papers was accomplished by using the following five English databases on March 16, 2025: PubMed, MEDLINE, Embase, Web of Science databases, and Scopus Studies were eligible for inclusion if they investigated sleep deprivation at baseline as a predictor of the later onset of psychopathology within a follow-up time-frame of at least 12 mo.
Results: The results suggest that sleep deprivation is a significant predictor for the onset of depression, anxiety, bipolar disorder and psychosis. The overall risk of bias in the primary studies was moderate.
Conclusion: This study provides evidence that sleep deprivation increases the risk for psychopathology. A future research agenda should include more prospective studies using established diagnostic criteria, assessing sleep deprivation at baseline and including long-term follow-up intervals evaluating a wider range of mental disorders. In addition, prospective long-term interventional studies investigating the efficacy of sleep deprivation treatment for the prevention of mental disorders are called for.
Keywords: Sleep deprivation, Psychiatric disorders, Depression

P123, Effect of Oral Probiotic Administration on Pain Perception in Rats: L. rhamnosus, L. helveticus, B. indicus, B. longum

Arman Bab[1], Javad Sajedianfard[1], Shahram Shekarforoush[2]
1. Department of Basic Sciences, School of Veterinary Medicine, Shiraz University, Shiraz, Iran
2. Department of Food Hygiene and Public Health, School of Veterinary Medicine, Shiraz University, Shiraz, Iran

Background: Pain is the most common clinical symptom of the diseases, which is received by various receptors and is detected by the nervous system. Today, various drugs are used to relieve pain, which carry undesirable side effects. Probiotics may exert analgesic effects via gut microbiota modulation and immune-neuro mechanisms.
Methods: Male Sprague–Dawley rats were gavaged daily for 14 days with 1 mL suspensions containing 10^9 CFU / rat of L. rhamnosus, L. helveticus, B. longum, B. indicus, or saline (control). After treatment, pain tolerance was assessed by the formalin test (acute inflammatory pain), tail-flick test (spinal reflex), and hot-plate test (supraspinal reflex).
Results: All probiotic-treated groups showed a significant increase in pain threshold compared to control. In the formalin and tail-flick tests, L. helveticus produced the greatest increase in tolerance. In the hot-plate test, L. rhamnosus and B. longum yielded the longest reaction latencies.
Conclusion: Daily gavage of these probiotic strains likely reduces acute pain sensitivity through multiple pathways: increased production of analgesic metabolites (tryptophan, SCFAs), enhanced anti-inflammatory cytokines, activation of the endogenous opioid system, modulation of the HPA axis, and strengthening of descending PAG–RVM pain-inhibitory pathways. These strains warrant further clinical investigation as adjunctive analgesics.
Keywords: Inflammation, Pain, Pain Modulation, Probiotic

P124, Sex-Specific Neuroadaptations in Reward Circuitry Following Perinatal Stress and Cocaine Sensitization in Rats

Farzaneh Bagheri[1, 2], Alessandra Gaetano[1,2], Ferdinando Nicoletti[2,3], Sara Morley-Fletcher[1], Stefania Maccari[1,4]

1.GlycoStress team, Unité de Glycobiologie Structurale et Fonctionnelle, CNRS, UMR 8576, UGSF, Université de Lille, F-59655, Villeneuve d'Ascq, France
2. Departments of Physiology and Pharmacology "V. Erspamer", University Sapienza of Rome, 00185, Rome, Italy
3. IRCCS Neuromed, 86077 Pozzilli, Italy
4. Dept of Science and Medical-Surgical Biotechnology, University Sapienza of Rome, Rome, Italy

Background: Perinatal stress in rats (PRS) induces long-lasting neurobiological and behavioral alterations, such as increased sensitivity to psychostimulants, reduced risk-taking behavior, and impairment in the dopaminergic and metabotropic glutamate receptor system. In this study, we investigated how a history of behavioral sensitization to cocaine affects reward-related and emotional behaviors in male and female PRS rats in comparison with control animals.
Methods: We assessed cocaine preference using the conditioned place preference (CPP) paradigm, risk-taking in the light/dark test, and emotional behavior in the forced swim test. Adult offspring underwent behavioral testing and western blot analysis was performed in NAc (nucleus accumbens) for mGlu2/3, mGlu5, DAT (dopamine transporter) and TH (tyrosine hydroxylase) receptors.
Results: PRS rats of both sexes showed an increased preference for cocaine in the CPP test compared to controls. Cocaine also reversed PRS-related emotional deficits, reducing immobility in the forced swim test. In the light/dark box, cocaine increased risk-taking behavior in PRS males but not females, indicating a sex-specific effect.
Glutamatergic receptors (mGlu2/3, mGlu5) were elevated in PRS animals, with cocaine enhancing mGlu expression in a sex- and stress-dependent manner. Dopaminergic markers (DAT, TH) showed a non-significant upward trend after cocaine, suggesting possible NAc dopaminergic activation.
Conclusion: Our findings indicate that cocaine sensitivity and emotion-related behavioral changes are sex-specific and interconnected outcomes in the PRS model. The co-upregulation of glutamatergic (mGlu2/3, mGlu5) and dopaminergic (DAT, TH) markers suggests a shared molecular mechanism driving the pathological reprogramming of the reward circuitry following perinatal stress.
Keywords: Perinatal stress, Cocaine sensitization, Sex differences, Reward circuitry.

P125, The effect of social hierarchy on depressive-like behaviors in male rats

Romina Baghinejad[1], Maryam Fallahi [1], Ali Jaafari suha[1], Narges Hosseinmardi[1], Mahyar Janahmadi[1], Hossein Azizi[2]

1. Department of Physiology, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran
2. Department of Physiology, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran

Background: Social hierarchy is one of the inevitable structures in social groups. Individuals at different hierarchical positions experience varying degrees of psychosocial stress, which may lead to depressive-like behaviors and a tendency toward pleasure-seeking as a coping mechanism. This study aimed to investigate the role of social rank in the development of depressive-like behaviors and pleasure-seeking tendencies in male Wistar rats.

Methods: Three male littermate rats were home-caged in standard cages post-weaning at the age of 4–5 weeks. Social Dominance Tube Test was used to assess relative dominance rank between cage-mates across three consecutive weeks in five test trials after post-natal day 56 (weeks 9–11). After rank stabilization, the forced swim test and sucrose preference test were conducted in the fifteenth week to assess depressive-like behaviors.

Results: Rats were categorized into dominant, subordinate, and intermediate groups based on their average number of wins in the tube test. Dominant rats exhibited significantly greater immobility in the forced swim test compared to both intermediate and subordinate groups (Two-Way ANOVA, $P<0.05$). In the sucrose preference test, dominant rats showed a significantly higher tendency to consume sucrose than the intermediate group (Kruskal-Wallis, $P<0.05$).

Conclusion: Overall, the results indicated that intermediate rats showed lower anxiety-like behavior, while dominant rats exhibited more depressive-like behavior. The increased sucrose consumption in dominant rats may reflect a compensatory pleasure-seeking response to their psychological state.

Keywords: Social hierarchy, Social status, Depressive-like behavior, Pleasure-seeking

P126, The ameliorating effects of vitamin C on hypothyroidism-associated learning and memory deficit in juvenile rats

Mohammad Bakhshi[1], Farimah Beheshti[2], Rasul Saberi[1,3], Mahmoud Hosseini[3]
1. Applied Biomedical Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Physiology, School of Medicine, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
3. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Herein we investigated the effects of Vitamin C (Vit C) on hypothyroidism-associated learning and memory deficit in juvenile rats
Methods: Pregnant rats were kept separately. After delivery, they were randomly divided into six groups: Control; Propylthiouracil (PTU) 0.005% PTU; Propylthiouracil+ Vit C groups; besides PTU, dams in these groups received 10, 100 and 500 mg/kg Vit C, and a positive control which received 100 mg/kg Vit C. After delivery, the pups continued to receive the treatments up to 56th day. Ten male offspring of each group tested in passive avoidance (PA) and Morris water maze (MWM). Then Brains were removed for biochemical testing.
Results: PTU reduced step-through latency (STL) in PA and spent time in target quadrant in MWM. While increased time latency and traveled distance during MWM. PTU decreased thiol content, superoxide dismutase (SOD) and catalase (CAT) activities in the brain, while increased malondialdehyde (MDA). In PA test of Vit C groups STL was increased. All Vit C doses increased the spent time in the target quadrant in probe trail of MWM. Also time latency and traveled distance was reduced without affecting the traveling speed in MWM test. Vit C increased thiol, SOD and CAT in the brain tissues while, reduced MDA.
Conclusion: Results of this study confirmed that Vit C is beneficial for learning and memory. It also revealed that Vit C has protective effects on hypothyroidism-associated learning and memory deficit in juvenile rats which might be a result of the antioxidative effects.
Keywords: Vitamin C, Hypothyroidism, Memory, Oxidative Stress

P127, A review of 5 choice serial reaction time task for assessing cognitive functions in animal models

Saeideh Baradaran[1,4], Elham Alaee[2], Elmira Beirami[1], Hamid Gholami PourBadie[4], Hossein Azizi[2], Mohammad Sayyah[4]

1. Department of Animal Sciences, Faculty of Biological Sciences, Kharazmi University, Tehran, Iran
2. Department of Physiology, Faculty of Medical Sciences, Islamic Azad University Tehran Medical Sciences, Tehrab, Iran
3. Department of Physiology, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran
4. Department of Physiology and Pharmacology, Institute Pasteur of Iran, Tehran, Iran

Background: Investigating deficits in attention and response inhibition, and their role in psychiatric disorders, requires precise laboratory techniques. The 5-Choice Serial Reaction Time (5-CSRT) task is a common method for measuring visual attention processes in rodents and is frequently used to study impulsivity and attentiveness in these animals. This test evaluates the effects of pharmacological treatments and neurodegenerative damage on various aspects of attentional control, including sustained, selective, and divided attention. It also explores the involvement of neural systems linked to attention and their relevance to behavioral-psychological disorders. Collected data can determine whether other factors such as sedatives, motivational deficits, or motor impairments contribute to functional changes. The adaptability of this test can be enhanced through pharmacological, molecular, and genetic techniques.

Methods: In this paradigm, subjects must detect random visual stimuli presented in one of five locations in a chamber over numerous trials. Animals undergo daily 30-minute training sessions for 30–40 days to learn appropriately timed responses for reward acquisition. Incorrect responses such as failing to respond, selecting the wrong location, or responding at inappropriate times result in a brief time-out period of darkness (as punishment) with no reward provided.

Results: Results from this task clarify the role of specific neural systems in regulating attention and impulsivity, as well as their association with disorders such as ADHD and neurodegenerative diseases.

Conclusion: This review examines the historical development of the 5-CSRTT as a robust tool in clinical and laboratory research, the neurobehavioral parameters it assesses, and its experimental design and procedural stages.

Keywords: Five-Choice Serial Reaction Time Test, Impulsivity, Attention

P129, Exploring the effects of empagliflozin administration and physical training on cognitive functions, amyloid beta-induced Alzheimer's rat model

Helia Behrouzfar[1], Pejman Mortazavi[2], Shokoufeh Hassani[3], Saeed Aghebat Bekheir[4]
1. Faculty of Veterinary Medicine, Science and Research Branch of Islamic Azad University, Tehran, Iran
2. Department of Pathology, Faculty of Specialized Veterinary Science, Science and Research Branch, Islamic Azad University, Tehran, Iran
3. Toxicology and Diseases Group (TDG), Pharmaceutical Sciences Research Center (PSRC), Tehran University of Medical Sciences (TUMS), Tehran, Iran
4. Department of Toxicology and Pharmacology, Faculty of Pharmacy, Tehran University of Medical Sciences, Tehran, Iran

Background: Alzheimer's disease (AD) is a widely prevailing and neurodegenerative disorder that leads to dementia and mortality worldwide. Previous investigations have reported the beneficial effects of physical exercise on brain function, linked to anti-inflammatory effects in brain vascular system. Empagliflozin, one of the conventional anti-diabetic agents, has exhibited potential neuroprotective properties in the central nervous system.
Materials and Methods: In the present investigation, AD was induced in control, exercise, empagliflozin (10 mg/kg BW, PO), and combined intervention groups using intrahippocampal injections of amyloid-beta (Aβ) prepared solution utilizing stereotaxic surgery method. The therapeutic effects of each treatment, including exercise alone, empagliflozin alone, and exercise plus Empagliflozin, were studied. After 28 days, spatial memory tests were used to assess memory and learning. Furthermore, histopathological and immunohistochemical (GFAP) analyses were carried out, and the ADP/ATP ratio in the isolated mitochondria from brain was measured by HPLC.
Results: Our results showed that the combined program of physical training and empagliflozin consumption in the Aβ-induced AD model drastically improved cognitive functions and neurological parameters such as target finding time, traveled distance, time spent in the target quadrant, as well as ADP/ATP ratios in brain mitochondria. Additionally, it diminished necrotic cell death and reduced Aβ plaques but did not notably affect astrocyte activity.
Conclusion: Given the potential similarities between underlying mechanisms of physical training and empagliflozin's beneficial actions and findings of our study, their combined regimen can be considered as a novel and optimistic treatment strategy for AD.
Keywords: Alzheimer's disease, Amyloid beta, Empagliflozin, Spatial memory, Mitochondria.

P130, The effect of nabumetone on pentylenetetrazol-induced seizure threshold in male Wistar rats

Mehrnaz Boveiri[1], Naser Mirazi[1], Abdolkarim Hosseini[2], Ali Vesalimahmoud[1]
1. Department of Biology, Faculty of Basic Sciences, Bu-Ali Sina University, Hamedan, Iran
2. Department of Physiology, Faculty of Sciences, Shahid Beheshti University, Tehran, Iran

Background: Epilepsy is a common neurological disorder characterized by recurrent seizures due to increased neuronal excitability. Neuroinflammation and oxidative stress are key contributors to seizure initiation and progression. Cyclooxygenase (COX) activity generates reactive oxygen species and prostaglandins, which can modulate astrocyte function and enhance glutamate release, leading to neuronal hyperexcitability. Nabumetone, a non-steroidal anti-inflammatory drug, inhibits COX and reduces prostaglandin production, potentially mitigating oxidative stress and glutamate-mediated excitotoxicity. This study aimed to evaluate the antiepileptic and antioxidant effects of nabumetone in a PTZ-induced seizure model.
Methods: Twenty-four male Wistar rats (200–250 g) were randomly assigned to four groups: control (normal saline), PTZ (60 mg/kg), and PTZ combined with nabumetone at 25 or 50 mg/kg. PTZ was administered intraperitoneally to induce seizures, and nabumetone was co-administered. Seizure threshold was assessed behaviorally, and serum levels of reduced glutathione (GSH) and malondialdehyde (MDA) were measured.
Results: Nabumetone at 50 mg/kg significantly increased seizure threshold compared to the PTZ group ($P<0.001$). Serum GSH levels were significantly elevated ($P<0.05$), while MDA levels were markedly reduced ($P<0.001$) in the high-dose group. The low-dose group showed no significant changes compared to PTZ alone.
Conclusion: Nabumetone showed neuroprotective effects in the PTZ-induced seizure model. The higher dose increased seizure threshold, enhanced antioxidant capacity, and reduced lipid peroxidation. These results suggest that nabumetone may reduce seizure susceptibility by strengthening antioxidant defenses and decreasing oxidative stress.
Keywords: Epilepsy, Nabumetone, Seizure, Rat, Pentylenetetrazol

P132, Injection of cinnamic acid before testing sulpiride-induced conditioned fear reduces its expression in immature mice

Mahsa Pakzadfard[1], Manizheh Karami[1], Mahnaz Rahimpour[1]
1. Department of Biology, Faculty of Basic Sciences, Shahed University, Tehran, Iran

Background: Several experiments have implicated sulpiride, a dopamine (DA) D2 antagonist, in the induction of conditioned fear in mice, however, the interfering effects of cinnamic acid, a plant-derived substance, on this issue have not yet been investigated in immature mice (our goal).
Methods: Weaned mice (three weeks old) were divided into three groups and subjected to a 3-day fear conditioning paradigm. Control group received saline (1 ml/kg, i.p.) and two groups received sulpiride (2 mg/kg, i.p.). On the first day, all of them were familiarized with the two-compartment conditioned box for 10 min, and then on the second day (with 2 sessions of 30 min, and 4 h interval) they were first injected with saline or sulpiride and then exposed to a specific compartment with fear cues (light, sound). On the third day, only one sulpiride group received cinnamic acid pretest (9 mg/kg, i.p.) and all of them were tested for 10 min. The mean time spent in the fear-conditioned side was compared between the familiarization and test days.
Results: Fear conditioning scores were significantly increased in the sulpiride alone group compared to the control group. Administration of cinnamic acid reversed this score and a significant reduction in avoidance was demonstrated.
Conclusion: Cinnamic acid reduces sulpiride-induced fear in immature mice.
Keywords: Fear conditioning, Sulpiride, Cinnamic acid, Immature, Mice

P133, Evaluation of neuroprotective effects of liraglutide on spatial memory in rat model of vascular dementia

Soroush Pejhan [1], Ghazal Karimi Jashni [1], Masoud Haghani [1]
1. Department of physiology, Medicine faculty, Shiraz University of Medical Sciences, Shiraz, Iran

Background: Vascular dementia is one of the most common forms of dementia but it doesn't have any specific treatment. Liraglutide, a glucagon-like peptide-1 (GLP-1) receptor agonist, exhibits robust neuroprotective actions through anti-inflammatory, antioxidant, anti-apoptotic, and synaptic-modulating mechanisms. This study explores the Liraglutide effect on spatial memory.
Methods: Eighteen adult male Sprague–Dawley rats were randomly divided into three groups (n = 6 per group): Sham, 2VO, and 2VO + Liraglutide. Chronic cerebral hypoperfusion was induced using the 2VO method. Animals in the 2VO + Liraglutide group received daily intraperitoneal injections of liraglutide for 30 consecutive days following 2VO induction. Spatial memory was assessed using the Morris Water Maze, including acquisition trials and a probe test. Data were analyzed using one-way ANOVA followed by Tukey's post hoc test in PRISM, with significance set at $p < 0.05$.
Results: Rats subjected to 2VO exhibited significant impairments in probe trial compared with Sham and 2VO + Liraglutide groups (P value=0.006 and P value=0.01 respectively) indicating enhanced memory retention in 2VO + Liraglutide group. Escape latency during acquisition trials also tended to improve in the treatment group in block3 compared to 2VO (P value=0.004).
Conclusion: As a potent GLP-1 receptor agonist with strong neuroprotective properties, liraglutide effectively mitigated cognitive deficits induced by chronic cerebral hypoperfusion. These findings suggest liraglutide as a promising therapeutic candidate for vascular dementia through GLP-1–mediated neuroprotection and preservation of hippocampal function.
Keywords: Vascular dementia, 2-vessel occlusion (2VO), spatial memory, Liraglutide, Chronic cerebral hypoperfusion

P134, Targeting GABAergic signaling for neuroprotection and improvement of hippocampal demyelination-associated cognitive deficits

Fereshteh Pourabdolhossein[1], Maryam sadat Mirhadi[2], Samaneh Dehghan[3], Mohamad Javan[4]
1. Physiology Departments, School of Medicine, Babol University of Medical Sciences, Babol, Iran
2. Student Research Committee, Babol University of Medical Sciences, Babol, Iran
3. Stem Cell and Regenerative Medicine Research center, Iran University of Medical Sciences, Tehran, Iran
4. Physiology Departments, School of Medicine, Tarbiat Modares University, Tehran, Iran

Background: Gamma-aminobutyric acid type A (GABA-A) receptors play a key role in hippocampal inhibitory neurotransmission, yet their involvement in demyelination-associated cognitive dysfunction remains unclear. Previous findings suggest that bicuculline, a GABA-A receptor antagonist, ameliorates spatial memory deficits in a lysophosphatidylcholine (LPC)-induced demyelination model. This study aimed to elucidate the underlying mechanisms, focusing on neuroinflammation and remyelination.
Methods: Adult male Wistar rats (200–220g) received stereotaxic LPC injections into the hippocampus to induce focal demyelination. Animals were divided into control, LPC, LPC+vehicle (saline), LPC+bicuculline (BM), and LPC+muscimol (MS) groups. Bicuculline (0.05 µg/2 µL) and muscimol (0.1 µg/2 µL) were administered intracerebroventricularly once daily for 21 days post-LPC. Cognitive performance was evaluated using the Y-maze spontaneous alternation and passive avoidance tests. Following behavioral assessments, hippocampal tissues were analyzed by immunofluorescence for myelin basic protein (MBP), immunohistochemistry for glial fibrillary acidic protein (GFAP), and qPCR for myelin markers (Olig2, PLP), inflammatory mediators (NF-κB, TNF-α, IL-1β, iNOS), and the anti-inflammatory cytokine IL-10.
Results: Bicuculline markedly improved LPC-induced impairments in both spontaneous alternation and passive avoidance performance, whereas muscimol produced no significant effect. MBP staining revealed severe demyelination in LPC-treated rats, which was reversed by bicuculline but not muscimol. qPCR analyses showed that bicuculline upregulated Olig2 and PLP expression while downregulating NF-κB, TNF-α, IL-1β, and iNOS. Conversely, IL-10 expression was significantly increased only in the bicuculline-treated group. GFAP immunoreactivity indicated robust astrocyte activation in LPC and vehicle groups, attenuated by bicuculline treatment.
Conclusion: GABA-A receptor antagonism by bicuculline confers neuroprotective effects through modulation of neuroinflammation and promotion of remyelination, thereby facilitating cognitive recovery. These findings highlight GABA-A receptor antagonists as potential therapeutic agents for cognitive deficits associated with demyelinating disorders
Keywords: Demyelination, Hippocampus, Neuroinflammation, GABA receptor, Bicuculline, Muscimol

P135, Sirt1-modulated lingo-1 by resveratrol & vitamin D3 improves essential tremor model

Zeynab Pirmoradi[1], Moazamehosadat Razavinasab[2], Mohammad Shabani[3], Monavareh Soti[3], Fatemeh Shasavari[3]

1. Neuroscience Research Center, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
2. Department of Physiology and Pharmacology, Afzalipour School of Medicine, Kerman University of Medical Sciences, Kerman, Iran an, Iran
3. Kerman Neuroscience Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerm.

Background: Essential Tremor (ET), linked to cerebellar dysfunction and Purkinje cell degeneration, involves upregulated Lingo-1, which inhibits axonal regeneration, and reduced Sirtuin-1 (Sirt1), a neuroprotective protein. Resveratrol and 1,25-dihydroxyvitamin D3 (VitD3) activate Sirt1, alleviating oxidative stress and inflammation.
Methods: This study examined whether Resveratrol and VitD3 co-treatment could modulate the Sirt1–Lingo-1 axis and improve ET symptoms. Harmaline-induced tremor rats were treated with Resveratrol, VitD3, or both. Behavioral tests assessed tremors, motor coordination, anxiety, and memory, while molecular and histological analyses evaluated Sirt1 and Lingo-1 expression and neuroprotection.
Results: Harmaline impaired coordination, increased tremors, and caused cognitive deficits; however, Resveratrol and Vitamin D3 mitigated these effects. Results revealed that co-treatment significantly increased Sirt1, reduced Lingo-1, and improved motor and cognitive functions. Co-treatment outperformed individual therapies, showing enhanced neuroprotection and behavioral recovery.
Conclusion: In conclusion, Resveratrol and VitD3 co-treatment effectively modulated the Sirt1–Lingo-1 axis, improved ET-related deficits, and provided neuroprotection, suggesting a promising therapeutic approach for ET management.
Keywords: Keywords: Essential Tremor, Sirt1, Lingo-1, Resveratrol, Vitamin D3, Neuroprotection

P136, Protective role of naloxone on dorsal hippocampal neuroplasticity during the acquisition and expression of morphine-induced dependence in adult male rats

Masoumeh Pirouzi[1], Manizheh Karami[1], MohammadReza Jalali Nadooshan[2]
1. Department of Biology, Faculty of Science, Shahed University, Tehran, Iran
2. Department of Pathology, Faculty of Medicine, Shahed University, Tehran, Iran

Background: Morphine dependence is associated with dorsal hippocampal (DH) neuroplasticity due to memory learning. Morphine exerts its effects through mu-opioid receptors on CA1 pyramidal neurons and through downstream G protein signaling. Naloxone (NLX), an opioid antagonist, competes with morphine for binding to the same receptor type. This study aimed to investigate the protective effects of NLX by measuring the neuroplasticity of dorsal hippocampal neurons and recording preference/aversion.
Methods: Adult male Wistar rats were randomly divided into control (saline 1 mg/kg, i.p.) and experimental (morphine 2.5, 5, 7.5 mg/kg, i.p.; NLX 0.4 mg/kg, i.p.) groups. Two NLX injection protocols were used: acquisition (injection before morphine during the conditioning phase) and expression (injection on the test day). Psychological dependence was assessed using the conditioned place preference (CPP) or aversion test. Neuroplasticity was studied by Golgi staining of DH neurons.
Results: Conditioning scores were significantly increased in some morphine groups compared with the control group. NLX administration significantly reversed these effects. Furthermore, dendritic spines of DH neurons were significantly increased in morphine groups, whereas in NLX + morphine-treated groups, they showed significant decreases during acquisition and expression.
Conclusion: NLX likely protects hippocampal neurons against morphine-induced dependence by affecting the neuroplasticity of DH neurons.
Keywords: Dorsal hippocampal, Neuroplasticity, Morphine, Naloxone, mu-opioid receptor

P137, Synergistic therapeutic effects of combined nicotinamide mononucleotide and melatonin on memory impairment and apoptosis in aged rats

Sajjad Taghizadeh [1], Leila Hosseini[2]
1. Student Research Committee, Tabriz University of Medical Sciences, Tabriz, Iran
2.Research Center of Psychiatry and Behavioral Sciences, Tabriz University of Medical Sciences, Tabriz, Iran

Background: Given the fact that both melatonin and nicotinamide mononucleotide (NMN) act as pleiotropic agents in numerous age-related memory impairments, we aimed to examine the effect of these compounds separately and together on the cognitive outcomes and apoptosis in aged rats.
Methods: Forty old and ten young (24 and 3 months old, respectively) male Wistar rats were randomly assigned to five groups: Young+Normal saline (NS), Aged+NS, Aged+Melatonin, Aged+NMN, and Aged+Melatonin+NMN. Melatonin (10 mg/kg) and NMN (100 mg/kg) were administered, separately or in combination for 28 every other day in aged animals. The Barnes maze and novel object recognition test were used to assess spatial and episodic-like memories, respectively. Moreover, apoptosis was evaluated in both the prefrontal cortex (PFC) and the hippocampus (HIP) regions.
Results: Behavioral findings revealed that NMN and melatonin separately or in combination alleviated aging-induced memory impairment. Furthermore, agents' co-administration decreased apoptotic cell count in both the PFC and HIP regions.
Conclusion: Our findings indicated that the agents separately or in combination (more potent) could induce neuroprotective effects and improve learning and memory in aged animal.
Keywords: Nicotinamide Mononucleotide, Cognitive deficits, Melatonin, Apoptosis

P138, Neural regeneration strategies in therapeutic advances for Huntington's disease: A review

Ali Tamimi[1], Parastoo Jalilian[2]
1. Department of Physiology, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran
2. Student Research Committee, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

Background: Huntington's disease (HD) arises from cytosine–adenine–guanine (CAG) repeat expansion in exon 1 of the huntingtin (HTT) gene and is defined by relentless neuronal degeneration. As disease-modifying therapies remain elusive, regenerative strategies that restore neuronal populations have emerged as a paradigm-shifting avenue. This review synthesizes recent advances in stem cell–based and extracellular vesicle–driven approaches that harness neurogenesis to counter neurodegeneration in HD.
Methods: A systematic search was conducted across major medical databases (PubMed, Embase, Web of Science, Google Scholar and Cochrane Library) from 2015 to 2025. The review was based on PRISMA guidelines.
Results: Out of the 240 papers were identified, 20 articles met the inclusion criteria. Emerging regenerative strategies for Huntington's disease (HD) demonstrate the potential to overcome longstanding therapeutic limitations. While early fetal and embryonic cell transplants achieved graft survival, integration remained limited. Contemporary approaches harness mesenchymal stem cells, astrocyte reprogramming, and exosome-mediated delivery of trophic molecules and miRNAs, offering a synergistic avenue for safe, effective, and clinically translatable neuronal restoration in HD.
Conclusion: Regenerative strategies in Huntington's disease highlight the therapeutic promise of adult neurogenesis. Despite progress, translating these insights into effective therapies demands interdisciplinary approaches, integrating cellular, molecular, and clinical innovations to fully harness neural regeneration and overcome current challenges.
Keywords: Cell therapy, Huntington's disease, Neurogenesis, Exosomes, Neurodegenerative disease

P139, Protective Effects of Vitamin B_{12} on Scopolamine-Induced Memory Impairment in Desert Rats: Behavioral Evidence

Zohreh Tavanbakhsh[1], Amin Esmaeily[2], Mahmoud Elahdadi Salmani[1], Seyed Mahmoud Hosseini[3], Arezoo Rajabian[4]

1. Department of Biology, Faculty of Sciences, Damghan University, Damghan, Iran
2. Department of Biology, Faculty of Sciences, Ferdowsi University of Mashhad, Mashhad, Iran
3. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
4. Department of Neuroscience, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Memory impairment caused by cholinergic dysfunction is a hallmark of cognitive decline and neurodegenerative diseases. Scopolamine, a muscarinic receptor antagonist, is widely used to induce temporary memory deficits in animal models. This study investigated the potential protective effects of Vitamin B_{12} (cobalamin) on scopolamine-induced memory impairment in desert rats.

Methods: Adult male desert rats were randomly divided into groups receiving normal saline (control), scopolamine (1 mg/kg), donepezil (1 mg/kg), or Vitamin B_{12} at doses of 500, 1000, and 2000 µg/kg. Memory performance was assessed using the Morris Water Maze (MWM) for spatial memory and the Passive Avoidance Test (PAT) for avoidance learning.

Results: Scopolamine significantly impaired spatial learning and memory in the MWM by increasing latency and distance to find the hidden platform ($P<0.001$). It also reduced performance in the PAT by decreasing latency to enter the dark compartment and increasing time spent in it ($P<0.01$). Treatment with Vitamin B_{12} significantly improved both spatial and avoidance memory in a dose-dependent manner, showing comparable results to the donepezil group ($P<0.001$).

Conclusion: Vitamin B_{12} effectively attenuated scopolamine-induced memory deficits in desert rats. These results suggest a neuroprotective role for Vitamin B_{12} in cholinergic-related memory impairments, supporting its potential application in treating cognitive disorders.

Keywords: Vitamin B_{12}, Scopolamine, Memory impairment, Desert rats, Cholinergic system

P140, Investigation of cognitive functions and expression of mitophagy genes (Drp1, Mfn2, Nrf1, Pgc1α) in the hippocampus of ovalbumin-sensitized aged mice

Mohammadreza Aslani, Elham Keramati, Hakimeh Saadati, Ali Abedi
Lung Diseases Research Center, Ardabil University of Medical Sciences, Ardabil, Iran

Background: Asthma is known as a chronic inflammatory disease of the airways in which many cells and cellular components play a role. The main characteristic of asthma is chronic inflammation and increased airway responsiveness, which is usually reversible spontaneously or by treatment. Given the growing trend of population aging, attention to asthma in conjunction with aging has been considered. There is limited evidence of the effect of aging on allergic airway inflammation in humans or antigen-sensitive aged mice. Studies have reported that mitophagy is a protective factor in allergic diseases such as asthma. On the other hand, studies have reported that behavioral changes occur in animals sensitized with ovalbumin.
The aim of the current study was to investigate the levels of genes involved in the mitophagy pathway along with the evaluation of cognitive and behavioral tests in mice in the context of asthma combined with aging.
Methods: 40 male BALB/C mice were randomly divided into four groups (n=10 in each group): 1- Control group, 2- Ovalbumin (OVA) group in which sensitization with OVA was performed, 3- D-galactose (D-gal) group: to induce aging, intraperitoneal injection of 150 mg/kg daily for 2 months was used, 4- Aging combined with sensitization with ovalbumin (OVA + D-gal): in this group, sensitization with ovalbumin was performed during the induction of aging with D-galactose. From the end of the sixth week, simultaneously with injection and sensitization, behavioral tests were performed in all four groups simultaneously. Finally, the hippocampus tissue was used for histopathological studies and also the expression of mitophagy genes (Drp1, Mfn2, Nrf1, Pgc1α) using Real Time PCR.
Results: The results showed that in the OVA, Ova + D-gal, and D-gal groups, there were changes in the expression of mitophagy genes in the hippocampus tissue with different ratios compared to the control group (P < 0.05). Behavioral test results showed a significant increase in anxiety test results, and the changes in the Ova and Ova+D-gal groups were greater than the control group. The level of observed histopathological changes in the hippocampus and frontal cortex tissues in the OVA, Ova + D-gal, and D-gal groups was greater than the control group.
Conclusion: In general, the results of the current study showed that in aged mice sensitized with ovalbumin, increased levels of stress and anxiety occurred, which was evident in the changes in behavioral test results and histopathological changes. The results also showed that the increased expression of mitophagy-related genes such as Drp1, Mfn2, Nrf1, and Pgc1α was more pronounced in the hippocampus and frontal cortex of aged mice sensitized with ovalbumin.
Keywords: Asthma, Aging, Ovalbumin, Mitophagy, Behavioral Test, Hippocampus.

P141, Mitochondrial transcriptional dysregulation: The central role of TFAM in aging

Tahereh Jamali[1], Sussan Kaboudanian Ardestani[2]
1. Immunoregulation Research Center, Shahed University, Tehran, Iran
2. Institute of Biochemistry and Biophysics, University of Tehran, Tehran, Iran

Background: Mitochondrial transcription factor A (TFAM) is a pivotal regulator of mitochondrial gene expression, genome maintenance, nucleoid architecture, and maintaining mtDNA integrity. Declining TFAM expression and activity during aging contributes to mitochondrial dysfunction, reduced ATP production, and increased oxidative damage.
Methods: This study is a systematic review. PubMed, Scopus, and Google Scholar were searched using keywords related to TFAM, mtDNA, aging, and mitochondrial transcription machinery components. Experimental and review articles reporting age-associated changes in TFAM, post-translational modifications, and cellular consequences were selected.
Results: Aging is associated with significant reduction in TFAM levels and stability. TFAM's ability to bind mtDNA and support transcription of electron transport chain (OXPHOS) genes is impaired, leading to decreased ATP production. Elevated mitochondrial ROS induces oxidative damage to mtDNA and post-translational modifications of TFAM (oxidation, nitration, phosphorylation), further diminishing its protective and transcriptional functions. Concurrent dysfunction of other mitochondrial transcription components (TFB1M, TFB2M, POLRMT) exacerbates transcriptional insufficiency. Cellular consequences include ROS accumulation, activation of inflammatory pathways, heightened apoptotic sensitivity, and reduced cellular resilience. High-energy-demand tissues such as neurons, cardiomyocytes, and immune cells are particularly vulnerable, resulting in neurodegeneration, cardiac aging, and immunosenescence. Aging-associated TFAM dysfunction also correlates with altered nucleoid architecture and reduced mtDNA copy number, contributing to broader metabolic disturbances and impaired stress responses.
Conclusion: TFAM dysregulation is a central mechanism of mitochondrial decline during aging and contributes to hallmark features of cellular senescence. Strategies aimed at restoring TFAM levels, enhancing mitochondrial biogenesis, and protecting mtDNA integrity represent promising approaches to rejuvenate mitochondrial.
Keywords: TFAM; Aging; Mitochondria; mtDNA; Mitochondrial transcription

P142, Oral coenzyme Q10 supplementation improves cognitive deficits following nicotine-ethanol withdrawal by reversing biochemical alterations in the hippocampus of male rats

Shadmaneh Javdan[1], S. MohammadAhmadi Soleimani[2], Farimah Beheshti [3]
1. Student Research Committee, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
2. Departments of Physiology, School of Medicine, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
3. Neuroscience Research Center, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran

Background: Substance abuse during adolescence has become an increasingly concerning global issue. This stage of life is marked by significant neurobiological changes in the brain, which heighten vulnerability to risk-taking and impulsive behaviors. Among the most accessible substances for adolescents are alcohol and nicotine. Prolonged use of these substances can result in dependence and withdrawal, often leading to cognitive issues such as memory impairment. Coenzyme Q10 (CoQ10) has been shown to counteract learning and memory impairments associated with conditions like Alzheimer's disease and diabetes. In this study, we explored the potential of CoQ10 in reversing memory deficits caused by withdrawal from both nicotine and alcohol.
Method: To this end, Morris water maze and novel object recognition tests were done in male Wistar rats undergone adolescent nicotine-ethanol withdrawal and the effect of CoQ10 was assessed on at both behavioral and biochemical levels.
Results: Results indicated that CoQ10treatment could effectively prevent both memory deficits and biochemical alterations induced by nicotine-ethanol withdrawal. Interestingly, this ameliorative effect of CoQ10 was found to be dose-dependent in most experiments and almost equipotential to that of bupropion and naloxone co-administration, when administered at high doses.
Conclusion: Overall, CoQ10 appears to improve cognitive function following substance withdrawal by reducing oxidative damage, inflammation, and amyloid-beta levels, while enhancing cholinergic and neurotrophic signaling. However, further research is needed to determine its potential side effects and safety at higher doses in humans.
Keywords: Adolescence, Nicotine, Ethanol, Coenzyme Q10, Withdrawal, Memory

P143, Saffron and estrogen can affect cognitive behavior, hippocampal histopathology, and the GFAP- and Olig2-positive cells number in menopausal demyelinated rats

Zahra Javid[1], Mahnaz Taherianfard[1], Javad Sajedianfard[1], Azizollah Khodakaram Tafti[2]
1. Basic Science Department, School of Veterinary Medicine, Shiraz University, Shiraz, Iran
2. Pathobiological Science Department, School of Veterinary Medicine, Shiraz University, Shiraz, Iran

Background: Women have more major histocompatibility complex genes (certain mutated genes) associated with multiple sclerosis (MS) than men. The aim of the present study was to investigate how saffron and estrogen might affect cognitive and non-cognitive behavior in the Morris water maze (MWM), the number of glial fibrillary acid protein (GFAP)-positive astrocytes and the number of Olig2 positive cells (oligodendrocytes) in menopausal demyelinated rats.
Methods: Fifty female Sprague-Dawley rats weighing 200-250 g were maintained under standard conditions of 12/12 h darkness and 20-24°C temperature. All rats were randomly divided into 5 groups. Demyelination was induced by injecting 3 µl of 0.01% ethidium bromide (EB) into the dentate gyrus (DG). In addition, a saffron dose of 60 mg/kg/day was administered. Ovariectomy was performed by removal of both ovaries. In addition, cognitive and non-cognitive behaviors were assessed using the MWM test. The number of GFAP and Olig2-positive cells was measured by immunohistochemistry using Image J software.
Results: Demyelination leads to impaired histopathology of hippocampal tissue. The extent of BBB disruption was significantly ($P<0.05$) greater in the treatment control groups than in the other groups, and MWM cognitive and non-cognitive behaviors were also impaired. The number of GFAP-positive astrocytes and Olig2 oligodendrocytes decreased significantly ($P<0.01$) in both treatment groups compared to the other groups.
Conclusion: Data indicating that saffron and estrogen reduced demyelination impairment. Saffron and estrogen affect the recovery of demyelination in menopausal rats. It improves histopathological defects, cognitive and non-cognitive behaviors and BBB dysfunction. This may be related to the changes in the number of GFAP- and Olig2-positive cells.
Keywords: Multiple sclerosis, Saffron, Estrogen, Morri's water maze

P144, Evaluation of the effect of honey on valproic acid induced damage in mitochondria isolated from male rat liver

Javad Khalili Fard[1], Tahereh Eteraf-Oskouei[1], Moslem Najafi[1], Hanieh Ranjkeshzadeh[1], Fatemeh Jodaei[1]

1. Department of Pharmacology and Toxicology, School of Pharmacy, Tabriz University of Medical Sciences, Tabriz, Iran

Background: Valproic acid (VPA) is a widely used antiepileptic drug, but its clinical utility can be limited because of hepatotoxicity induced by mitochondrial dysfunction. Honey is a natural product with antioxidant and anti-inflammatory properties and has been reported to exert protective effects against mitochondrial injury. This study aimed to evaluate the effects of honey from Ahar region of East Azerbaijan on VPA-induced mitochondrial damage in isolated male rat liver mitochondria.

Methods: Liver mitochondria were isolated from adult male rats and incubated in eight flasks: control, VPA (2 mM), honey (0.5, 1, and 2% w/v), and combined VPA + honey (0.5, 1, and 2% w/v). At 15, 30, and 60 minutes, mitochondrial function was assessed by measuring reactive oxygen species (ROS), mitochondrial membrane potential (MMP), and complex II activity. The study was performed in two phases, distinguishing the effects of VPA alone and VPA with its metabolites. Data were analyzed using one-way ANOVA in SPSS.

Results: In phase I, VPA alone did not significantly alter ROS levels. In phase II, VPA together with its metabolites significantly increased ROS production (at 60 minutes), decreased MMP (at 15 and 30 minutes), and reduced complex II activity (at 60 minutes) compared with the control ($p < 0.05$). Honey attenuated these alterations at all tested concentrations ($p < 0.05$).

Conclusion: These findings suggest that honey exerts a protective effect against VPA-induced mitochondrial dysfunction, likely through its antioxidant properties. Further mechanistic studies should be done to clarify the mechanisms underlying this protective effects.

Keywords: Valproic acid, Honey, Hepatotoxicity, Mitochondrial dysfunction, Rats.

P145, Effects of voluntary and forced exercise on serum, prefrontal cortex and hippocampal corticosterone levels in ovariectomized rats exposed to stress

Melika Jafari targh [1], Amirhossein Khalili tirtashi [2], Arvin Amiri [3], SeyedehRose Jamali [4], Sakineh Shafia [5]

1. Medical student, Student Research Committee, School of Medicine, Mazandaran University of Medical Sciences, Sari, Iran
2. Medical student, Student Research Committee, School of Medicine, Mazandaran University of Medical Sciences, Sari, Iran
3. Department of veterinary medicine, Faculty of veterinary medicine, Babol Branch, Islamic Azad University, babol, Iran
4. Department of Biology, Faculty of biotechnology, Babol Branch Islamic Azad University, babol, Iran
5. Associate Professor, Immunogenetics Research Center, Department of Physiology, Mazandaran University of Medical Sciences

Background: Post-traumatic stress disorder (PTSD) is linked to the hypothalamic pituitary adrenal (HPA) axis dysfunction and elevated glucocorticoids. Ovarian hormone deficiency increases vulnerability to stress and HPA axis disturbances. Exercise can modulate stress responses, however, the difference in the effect of voluntary and force exercise under conditions of Ovariectomy and stress remains unclear. This study investigated the effects of two exercise modalities on corticosterone in the serum, prefrontal cortex, and hippocampus in ovariectomized rats exposed to Single Prolonged Stress (SPS).

Methods: Adult female Wistar rats were divided in control and ovariectomized groups, each divided to SPS and nonSPS subgroups. SPS was induced using the standard protocol. Animals were further assigned to sedentary, voluntary exercise (running wheel), forced exercise (treadmill) groups. After 4 weeks, corticosterone levels were measured using ELISA. Data were analyzed using ANOVA with significance set at $p \leq 0.05$.

Results: SPS significantly increased corticosterone levels in all tissues in both control and ovariectomized rats. Voluntary exercise reduced serum and prefrontal corticosterone in these two groups and reduced corticosterone in all tissues under stress. Ovariectomy elevated corticosterone in all regions. In ovariectomized nonSPS rats, voluntary exercise, but not forced exercise, significantly reduced serum and prefrontal corticosterone. In ovariectomized stressed rats, both types of exercise reduced only serum corticosterone levels.

Conclusion: Voluntary exercise exerts stronger effect than forced exercise, particularly in non-ovariectomized and nonSPS groups. These findings highlight the potential of voluntary exercise as a non-pharmacological approach for regulating HPA axis activity under stress-related and hormonal deficiency conditions.

Keywords: Corticosterone, Ovariectomy, Voluntary exercise, Forced exercise, Single Prolonged Stress (SPS)

P146, Studying of methamphetamine exposure impact during pregnancy and lactation on hippocampal doublecortin expression of rat offspring

Zahra Jalayeri-Darbandi [1], Aliakbar Rajabzadeh [2], Seyedeh Najibeh nasiri[1], Alireza Ebrahimzadeh-bideskan[3]

1. Tissue Engineering Research Group (TERG), Department of Anatomy and Cell Biology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Anatomy, Embryology, and Histology, School of Medicine, Babol University of Medical Sciences, Babol, Iran
3. Department of Anatomy and Cell Biology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: This study was aimed to elucidate the effect of methamphetamine (MA) exposure during pregnancy and lactation on doublecortin (DCX) expression in the hippocampus of rat offspring.

Methods: Thirty-five pregnant Wistar rats were divided randomly into seven groups, each consisting of 5 rats: three experimental groups were administered 5 mg/kg body weight (BW) intraperitoneal (i.p.) injections of MA during pregnancy and/or lactation; three sham groups received saline injections; and one control group received no injections. Following the interventions, two male pups (1 and 22 days old) were selected at random from each mother, sacrificed, and their brains analyzed using DCX immunohistochemistry.

Results: Administration of MA during pregnancy significantly reduced the number of DCX-positive cells in the CA1, CA3, and DG regions of the hippocampus in 1-day-old pups ($P \leq 0.05$). In 22-day-old pups, MA administration led to a significant decrease in DCX-positive cells in the CA1 and DG regions of the hippocampus only.

Conclusion: Our results suggest that the administration of MA during pregnancy had a more pronounced effect on DCX expression in the hippocampus of rat offspring compared to administration during the lactation period.

Keywords: Methamphetamine (MA), Doublecortin (DCX), Hippocamp

P147, Mitotherapy mitigates behavioral and sleep disturbances in aged insomnia rat by modulating circadian rhythm–related genes expression in the prefrontal cortex and hippocampus

Gonja Javani[1], Arshad Ghaffari-Nasab[2,3], Sajjad Taghizadeh[4]
1. Neurosciences Research Center, Tabriz University of Medical Sciences, Tabriz, Iran
2. Department of Basic Medical Sciences, Maragheh University of Medical Sciences, Maragheh, Iran
3. Drug Applied Research Center, Tabriz University of Medical Sciences, Tabriz, Iran
4. Department of Physiology, Tabriz University of Medical Sciences, Tabriz, Iran

Background: As a common age-related disorder, chronic insomnia is associated with cognitive impairment, mood impairment, and disruption of circadian rhythms in older adults. Sleep disturbances have also been linked to mitochondrial dysfunction, especially during aging, and contribute to circadian rhythm dysregulation. This study examined the effects of transplantation of young mitochondria on behavioral and molecular outcomes in aged insomnia rats.
Methods: Thirty aged rats (20-22 months old) were randomly divided into three experimental groups: control, insomnia model (Ins), and insomnia model receiving young mitochondria (Ins+Mit). Insomnia was induced by a chronic mild stress protocol and sleep deprivation. In the Ins+Mit group, mitotherapy was administered via intraventricular injection of mitochondria isolated from the brain tissue of young rats.
Results: Rats in the insomnia group exhibited lower sleep quality during the sodium pentobarbital-induced sleep test and showed increased depressive and anxiety behaviors. These behavioral changes were associated with alterations in the expression of CLOCK, BMAL-1, PER, and CRY genes in the prefrontal cortex and hippocampus. Interestingly, mitotherapy improved sleep quality and behavioral deficits in the Ins+Mit group and restored the mRNA levels of circadian cycle genes.
Conclusion: Overall, transplantation of young mitochondria could be a promising approach to improve sleep disorders caused by chronic stress during aging by modulating the expression of circadian rhythm genes in the prefrontal cortex and hippocampus.
Keywords: Aging, Insomnia, Circadian rhythm, Mitotherapy

P148, Effects of *Nigella sativa* Extract on anxiety-like behaviors and bdnf expression in the prefrontal cortex and hippocampus of rats exposed to chronic unpredictable mild stress

Ali mosavi[1], Asma Hatami[2], Manijeh Dogani[3], Mohammad Reza Vaez-Mahdavi[4], Nayere Askari[5,6]
1. Department of Biology, Faculty of Sciences, Shahid Bahonar University of Kerman, Kerman, Iran
2. Department of Medicinal Chemistry, Faculty of Pharmacy, Shahid Beheshti University of Medical Sciences, Tehran, Iran
3. Department of Biology, Faculty of Sciences, Shahid Bahonar University of Kerman, Kerman, Iran
4. Department of Physiology, School of Medicine, Shahed University, Tehran, Iran
5. Faculty of Basic Sciences, Shahed University, Tehran, Iran
6. Immunoregulation Research Center, Shahed University, Tehran, Iran

Background: Chronic Unpredictable Mild Stress (CUMS) disrupts the hypothalamic–pituitary–adrenal (HPA) axis and neurobiological processes, leading to anxiety-like behaviors. *Nigella sativa* possesses anxiolytic and anti-inflammatory properties and may modulate stress-induced behavioral alterations. This study examined the effects of hydroalcoholic *N. sativa* extract.on anxiety-like behaviors and BDNF expression in the prefrontal cortex and hippocampus of rats subjected to CUMS

Methods: Rats were exposed to 21 days of CUMS involving two daily stressors. Anxiety-like behaviors were evaluated using the Elevated Plus Maze (EPM). *N. sativa* extract (200 and 400 mg/kg) was administered by gavage. Prefrontal cortex and hippocampal tissues were collected, and BDNF mRNA levels were quantified using SYBR Green Real-Time PCR. Data were analyzed using one-way ANOVA

Results: CUMS significantly increased anxiety-like behaviors and reduced open-arm exploration. Treatment with *N. sativa* extract attenuated anxiety-like behaviors and significantly increased BDNF expression in both brain regions.

Conclusion: CUMS induces behavioral disturbances and reduces BDNF expression in key brain regions. *Nigella sativa* exhibits protective and restorative effects by decreasing anxiety-like behaviors and enhancing BDNF expression under chronic stress conditions.

Keywords: *Nigella sativa*; Anxiety-like behavior; BDNF; Hippocampus; Prefrontal cortex; Chronic Unpredictable Mild Stress

P149, Investigating oxidative stress markers in the brain of rat models of Alzheimer's, Parkinson's and Multiple Sclerosis

Hatami Nemati Homeira[1]
1. Associate professor of Animal physiology. Department of Animal Biology, Faculty of Natural Sciences, University of Tabriz, Tabriz, Iran

Background: Neurodegenerative diseases such as Alzheimer's, Parkinson's, and multiple sclerosis are characterized by oxidative stress, which plays a crucial role in their pathophysiology. This study aimed to investigate the alterations in malondialdehyde (MDA), a marker of oxidative stress, and superoxide dismutase (SOD), an essential antioxidant enzyme, in the brains of rats subjected to these diseases.
Methods: Male Wistar rats were divided into four groups: a control group and groups induced with Alzheimer's, Parkinson's, and multiple sclerosis. The diseases were induced according to references. After the completion of induction period, brain tissues were collected for biochemical analysis. MDA levels were quantified using the thiobarbituric acid reactive substances (TBARS) assay, while SOD activity was measured using a colorimetric assay.
Results: results indicated a significant increase in MDA levels in the Alzheimer's and Parkinson's groups compared to controls **(**$P<0.05$). Conversely, SOD activity was significantly decreased **(**$P<0.05$) in these groups, indicating impaired antioxidant defense mechanisms. The multiple sclerosis group exhibited similar trends, with increased MDA and reduced SOD levels **(**$P<0.05$).
Conclusion: this study demonstrates that oxidative stress, as evidenced by elevated MDA and decreased SOD levels, is significantly altered in the brains of rats with neurodegenerative diseases. These findings underscore the potential of targeting oxidative stress pathways in developing therapeutic strategies for these conditions. Further research is warranted to explore the therapeutic implications of modulating oxidative stress in neurodegeneration.
Keywords: Neurodegenerative disease, Oxidative stress, Rat's brain

P150, The neurobehavioral impact of stress and the therapeutic role of valproic acid in a PTSD animal model

Mohammad Saleh Hajghani[1], Mansoureh Sabzalizadeh[2], Ali Shamsara[3], Taherh Haghpanah[3], Mohammad Haghani[1], Amir Abbas Arabpour[1], Melika Farhadi[1], Mohammad Reza Afarinesh[4]

1. Neuroscience Research Center, Institute of Neuropharmachology, Kerman University of Medical Sciences, Kerman, Iran

2.Neuroscience Research Center, Institute of Neuropharmachology, Kerman University of Medical Sciences, Kerman, Iran; Cognitive Neuroscience Research Center, Institute of Neuropharmachology, Kerman University of Medical Sciences, Kerman, Iran

3.Department of Anatomy, Afzalipour School of Medicine, Kerman University of Medical Sciences, Kerman, Iran

4.Neuroscience Research Center, Institute of Neuropharmachology, Kerman University of Medical Sciences, Kerman, Iran; Cognitive Neuroscience Research Center, Institute of Neuropharmachology, Kerman University of Medical Sciences, Kerman, Iran

Background: This study examines the impact of stress on cognitive and behavioral functions and evaluates Valproic Acid (VPA) as a potential therapy in a mouse model of Post-Traumatic Stress Disorder (PTSD).

Methods: Sixty-three male mice were assigned to control, PTSD, VPA, and PTSD + VPA groups, with behavioral assessments including anxiety, social interaction, memory, and depression-like tests. Histological analyses assessed neuronal integrity in the hippocampus, amygdala, cingulate cortex, and insula cortex.

Results: Stress significantly impaired cognitive performance, indicated by a lower Preference Index (PI%) in the novel object recognition task. Social interaction tests revealed decreased engagement in the PTSD group, reflecting social withdrawal. Behavioral assessments indicated increased immobility time in the tail suspension and forced swimming tests among PTSD mice, suggesting depression-like behaviors. In contrast, VPA treatment reduced immobility time, with the PTSD + VPA group showing improvements comparable to controls. Histological evaluations showed a higher percentage of degenerated cells in the hippocampus, amygdala, cingulate cortex, and insula cortex of the PTSD group versus controls. VPA administration significantly lowered the percentage of degenerated cells in the PTSD + VPA group, indicating neuroprotective effects, which were also noted in the hippocampus, amygdala, cingulate cortex, and insula cortex.

Conclusion: These findings suggest VPA's potential as a therapeutic agent for PTSD, warranting further pharmacological investigation.

Keywords: Cognitive, PTSD, Pain, Valproic Acid

P151, Impaired anterior cingulate cortex–amygdala synchrony during empathy-related behavior in a rat model of Autism

Negar Haji Reza Boroujerdi[1], Sepideh Ghazvineh[2], Mohammad Reza Raoufy[2]
1. Faculty of Veterinary Medicine, Science and Research Branch, Islamic Azad University, Tehran, Iran
2. Department of Physiology, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran

Background: Autism Spectrum Disorder (ASD) is a neurodevelopmental condition frequently characterized as a synaptopathy. A core feature of ASD is altered social behavior, notably deficits in empathy. The anterior cingulate cortex (ACC) and basolateral amygdala (BLA) are central to the regulation of social and empathic behaviors. This study investigated electrophysiological alterations in the ACC–BLA circuit during empathy-related behavior in a rat model of autism.
Methods: Autism was induced in sixteen male Wistar rats via prenatal exposure to valproic acid (VPA). Following stereotaxic implantation of electrodes in the ACC and BLA, local field potential (LFP) recordings were obtained during behavioral tests assessing empathy-related behavior. Electrophysiological signals were analyzed using MATLAB software.
Results: VPA-exposed rats exhibited significantly increased spectral power at theta band (4-12 Hz) during empathy-related behavior in both the ACC and BLA compared to controls. Cross-correlation analysis revealed unidirectional information flow from ACC to BLA in both groups, with reduced temporal synchrony in the autism model.
Conclusion: ASD-related pathology is associated with increased theta-band activity in the ACC and BLA, accompanied by disrupted temporal coordination between these regions. These alterations may underlie the observed impairments in social and empathic behavior, highlighting the ACC–BLA circuit as a potential target for neurophysiological biomarkers and therapeutic interventions in autism.
Keywords: Autism, Anterior Cingulate Cortex, Basolateral Amygdala, Empathy, Electrophysiology

P152, The role of central serotonergic system on food intake caused by intracerebroventricular injection of leptin in broilers

Mohammadhassan Shamshirgaran[1], Vahid Hamedianasl[2], Morteza Zendehdel[3], Keyvan Hassani[1]
1.Department of Basic Sciences, Faculty of Veterinary Medicine,Garmsar Branch, Islamic Azad University, Garmsar, Iran
2.Department of Basic Sciences, Faculty of Veterinary Medicine, Ferdowsi University of Mashhad, Mashhad, Iran
3. Department of Basic Sciences, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran

Background: Previous studies have shown that leptin and serotonergic agonists regulate food intake in birds and mammals. The present study was conducted to investigate the effects of central administration of leptin, fluoxetine, and serotonergic agonists and antagonists on food intake, as well as to determine the relationship between leptin and the serotonergic system in broiler chicks.
Methods: This experiment was performed on five main groups, each consisting of four experimental subgroups, including one control and three treatment subgroups. Eleven one-day-old broiler chicks were used in each experimental subgroup (a total of 44 chicks per main group). To examine the role of the serotonergic system in leptin-induced food intake, intracerebroventricular (ICV) injections were performed on day 5. In all experimental groups, chicks were food-deprived for 3 hours prior to the injection, and each chick received 10 µL of saline or different doses of the pharmacological compounds used in this study. Immediately after injection, the chicks were returned to their cages and provided free access to food and water. Cumulative food intake (g) was measured at 30, 60, and 120 minutes post-injection.
Results: According to the results obtained from this experimental phase, overall food intake in leptin-treated broiler chicks at doses of 5 and 10 µg was significantly reduced compared to the control group ($P < 0.05$). The findings also demonstrated that leptin reduced cumulative food intake in a dose-dependent manner. Co-administration of leptin with p-chlorophenylalanine (a serotonin synthesis inhibitor), fluoxetine (a serotonin reuptake inhibitor), 8-OH-DPAT (a 5-HT1A receptor agonist), and SB242084 (a 5-HT2C receptor antagonist) revealed that leptin-induced anorexia is mediated through the central serotonergic system.
Conclusion: These results suggest that leptin-induced reduction in food intake is likely mediated by serotonergic 5-HT2C receptors in broiler chicks.
Keywords: Food intake, Broiler, Serotonergic system, leptin

P153, Effects of the modified Atkins diet on learning, memory, and anxiety in intact rats

Narges-al-Sadat Haeri[1], Hojjatallah Alaei[1], Parham Reisi[1], Zahra Jokar[1]
1. Department of Physiology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran

Background: The ketogenic diet and its variants—particularly the modified Atkins diet (MAD)—are increasingly used both for weight management and as adjunct therapies in several neurological and non-neurological disorders. MAD, due to its relatively lower fat content and higher allowable protein and carbohydrate intake, is less restrictive and more acceptable than the classic ketogenic diet, while still producing similar metabolic effects. Although various human and animal studies have reported beneficial outcomes associated with MAD, some findings remain inconsistent, and the potential medium- or long-term adverse effects of MAD on general physiology, especially brain function, have not been thoroughly evaluated.
Methods: Adult male Wistar rats were fed either a control diet or MAD for one month. Caloric intake and body weight were monitored. At the end of the intervention, standardized behavioral assays were conducted to evaluate cognitive performance and anxiety-like behavior. Induction of ketosis was also monitored.
Results: MAD-fed rats consumed more calories yet showed attenuated weight gain compared to controls. Behavioral outcomes revealed no significant impairments in learning, memory, or anxiety-related responses. The MAD successfully induced a ketotic metabolic state.
Conclusion: Medium-term adherence to MAD induced metabolic alterations consistent with ketosis and prevented excessive weight gain without producing detectable deficits in cognitive or anxiety-related behaviors in adult rats. While these findings suggest that MAD may be metabolically effective without Medium-term neurological impairment, further studies with longer durations and broader physiological assessments are required before drawing definitive conclusions about its long-term safety.
Keywords: Modified Atkins diet, Learning, Memory, Anxiety, Physiological behaviors

P154, Evaluated of the effect of astrocytes-derived exosome on neurogenesis by experimentally induced mouse AD model.

Parinaz Haddadi[1], Mohammad Karimipour[2], Reza Rahbarghazi[3], Majid Mahdavi[4]
1. Department of Biochemistry, Faculty of Natural Sciences, University of Tabriz, Tabriz, Iran
2. Department of Anatomical Sciences, Faculty of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran
3. Department of Applied Cell Sciences, Faculty of Advanced Medical Sciences, Tabriz University of Medical Sciences, Tabriz, Iran
4. Institute of Biochemistry and Biophysics, University of Tehran, Tehran, Iran

Background: Alzheimer's disease (AD) is the most common neurodegenerative disorder worldwide and characterized by memory deficits, cognitive dysfunctions and impairment of recent memory. Amyloid plaques and neurofibrillary tangles are two main hallmarks of AD. Imbalance between Aβ production from an amyloid precursor protein and its removal from the brain is the main cause of Aβ accumulation and its pathogenesis. Research about exosomes in the field of neuroscience opened up in recent years and play a fundamental role in nervous system. Exosomes extracted from astrocyte cells can be considered as a suitable solution for the movement of neural stem cells and re-neuronogenesis in damaged tissue.
Methods: Hippocampus injections of Aβ 1-42 was performed using stereotaxic surgery. The mice were anesthetized by IP injection of ketamine and xylazine (10/100mg/kg). according to Paxinus atlas the adapted from the bregma features via anteroposterior (AP)=-2, mediolateral (ML)=1.3 and dorsoventral (DV)=-2.2. Animals were maintained for 23 days in the standard conditions to accelerate the AD-like pathologies. To confirm the existence of amyloid plaques, a thioflavin-S staining was performed. To investigate the effect of ADE on neurogenesis, the expression level of NeuN was assessed by immunofluorescent staining.
Results: The results showed that the number of Aβ plaques formed in the hippocampal tissue was increased and created a model of Alzheimer's disease. The results of BrdU/NeuN expression in different groups showed that the percentage of cells expressing these markers in the Alzheimer's group was significantly reduced compared to the control group. In fact, our findings showed that ADE injection into the hippocampus was able to significantly improve hippocampal neurogenesis even in the presence of Aβ.
Conclusion: Induction of experimentally of beta amyloid 1-42 in to hippocampus induced mouse AD model. Also Our findings indicate that astrocyte derived exosomes can improve neurogenesis.
Keywords: Alzheimer's disease (AD), ADE, NeuN, neurogenesis

P155, Investigation of the effects of lipopolysaccharide preconditioning on neuropathic pain induced by chronic sciatic nerve compression injury in rats

Soqra Hesam[1], Fatemeh Piri[1], Mahshid Moradpour[1], Hamid Sepehri[1]
1. Neuroscience Research Center, School of Medicine, Golestan University of Medical Sciences, Gorgan, Iran

Background: Neuropathic pain is a chronic pain caused by nerve injury and associated with pro-inflammatory cytokine activity. This study investigated the effect of lipopolysaccharide (LPS) preconditioning on neuropathic pain induced by chronic constriction injury (CCI) of the sciatic nerve in male rats.
Methods: In this study, Lipopolysaccharide (LPS) was injected intraperitoneally at a dose of 0.1 mg. Three days post-injection, CCI was induced on the sciatic nerve in the rats. Consequently, the subjects were categorized into the following groups: 1- Control group, 2- CCI group without LPS, 3- CCI group with 0.1 mg LPS, 4- 0.1 mg LPS group. On days zero, seven, and fourteen following nerve constriction, all rats were evaluated for the inhibitory effect of LPS on neuropathic pain acquisition using behavioral tests including the acetone test and hot plate test, with data analysis performed using Graph Pad Prism software**.**
Results: Based on the results obtained, the injection of 0.1 mg LPS in healthy animals did not produce a significant change in pain threshold compared to the control group. Animals subjected to CCI responded more intensely to both thermal and cold stimuli. In contrast, the group that received 0.1 mg LPS in addition to undergoing CCI showed a decreased reaction to thermal and cold stimuli compared to the CCI group.
Conclusion: The results of this experiment indicate that 0.1 mg of LPS can reduce pain levels following nerve injury by affecting the pain threshold.
Keywords: CCI, neuropathic pain, cytokines, lipopolysaccharide.

P156, The Role of Zinc and Magnesium in brain health and neurodegenerative diseases

Hamed Ghazavi[1, 4], Somaye Hesami[1, 3, 4], Elham Zare[2, 3], Pejman Hosseinzadeh[3]
1. Department of Neuroscience, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Medical Genetics and Molecular Medicine, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Student Research Committee, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
4. Neuroscience Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Zinc and magnesium are essential trace elements involved in numerous neuronal functions, including neurotransmission, synaptic plasticity, and antioxidant defense. Dysregulation of these minerals has been implicated in the pathogenesis of neurodegenerative diseases such as Alzheimer's disease, Parkinson's disease, and multiple sclerosis. This study aimed to review and synthesize current findings on the role of zinc and magnesium in maintaining brain health and their involvement in the onset and progression of major neurodegenerative diseases.
Methods: This study was conducted using scientific databases, including PubMed, Scopus, and Web of Science. Relevant articles published between 2000 and 2025 were selected using keywords such as "zinc," "magnesium," "neuroprotection," and "neurodegenerative diseases." Emphasis was placed on both animal and human studies that investigated the molecular and cellular mechanisms affected by these elements
Results: Findings suggest that zinc plays a dual role in the central nervous system: while physiological levels support neurogenesis and synaptic integrity, excessive zinc release during excitotoxicity can induce neuronal death. Magnesium contributes to neural stability through modulation of the NMDA receptor and its anti-inflammatory properties. Both elements influence oxidative stress, mitochondrial function, and neuroinflammation. Deficiencies in either element have been consistently associated with accelerated cognitive decline and increased vulnerability to neurodegeneration
Conclusion: Optimal levels of zinc and magnesium are crucial for maintaining neuronal function and protecting against neurodegenerative disorders. Further clinical trials are needed to determine the therapeutic potential of supplementation strategies in early-stage disease management.
Keywords: Zinc, Magnesium, Brain Health, Neurodegeneration, Neuroinflammation

P157, Immunometabolic pathways linking gut microbiota to Alzheimer's disease

Hamed Ghazavi[1, 5], Somaye Hesami[1, 3, 5], Elham Zare[2, 3], Pejman Hosseinzadeh[3], Seyyed Mohammad Tabatabaei[4]

1. Department of Neuroscience, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Medical Genetics and Molecular Medicine, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Student Research Committee, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
4. Department of Medical Informatics, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
5. Neuroscience Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Alzheimer's disease (AD) is a progressive neurodegenerative disorder and the leading cause of memory loss worldwide. It is marked by amyloid-beta (Aβ) plaque buildup, tau protein tangles, synaptic dysfunction, and cognitive decline. Recent studies suggest that chronic neuroinflammation and metabolic disturbances significantly contribute to AD progression. Among emerging factors, the gut microbiota—a complex community of microorganisms residing in the digestive tract—has garnered attention for its role in brain health via the gut-brain axis. This review aims to synthesize current evidence on immunometabolic mechanisms linking gut microbiota alterations with AD onset and progression.

Methods: A systematic review and meta-analysis were conducted, evaluating studies on gut microbial composition, bacterial metabolites, immune responses, and physiological changes in AD. Literature was sourced from PubMed, Scopus, and Web of Science, following PRISMA guidelines.

Results: Findings indicate that gut dysbiosis correlates with increased intestinal permeability ("leaky gut"), systemic inflammation, blood-brain barrier disruption, and elevated Aβ and tau pathology. Microbial metabolites—particularly short-chain fatty acids (SCFAs) and lipopolysaccharides (LPS)—influence neuroinflammatory and neurodegenerative pathways, potentially exacerbating AD.

Conclusion: The bidirectional interaction between the gut microbiota and the brain through immune and metabolic signaling offers novel insight into AD pathogenesis. Recognizing the gut microbiome as a modifiable factor may lead to the development of innovative biomarkers and therapeutic strategies for AD prevention and treatment.

Keywords: Gastrointestinal Microbiome, Alzheimer's Disease, Microbiota-Gut-Brain Axis, Dysbiosis

P158, Cannabidiol enhances stress-induced cellular damage: potential contribution of Kv2.1 inhibition

Leila Hasanzadeh [1], Fatemeh Sayehmiri [2], Mohsen Ilkhanizadeh-Qomi [1], Nima Naderi [3,4], Mohammad Sayyah [1], Majid Golkar [5], Hamid Gholami Pourbadie [1,4]

1. Department of Physiology and Pharmacology, Pasteur Institute of Iran, Tehran, Iran
2.Skull Base Research Center, Loghman Hakim Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran
3. Department of Pharmacology and Toxicology, Faculty of Pharmacy, Shahid Beheshti University of Medical Sciences, Tehran, Iran
4. Neuroscience Research Center, Faculty of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran
5. Department of Parasitology, Pasteur Institute of Iran, Tehran, Iran

Background: Kv2.1 channels, a subset of voltage-gated potassium channels, play critical roles in regulating cellular processes such as proliferation and apoptosis. While cannabidiol (CBD), a non-psychoactive phytocannabinoid, is known to modulate various ion channels, its specific effects on Kv2.1 channels remain largely unexplored.
Methods: In this study, we investigated the influence of CBD on cell viability under both normal and stress conditions. To achieve stable Kv2.1 expression, HEK293 cells were transfected using the Sleeping Beauty transposon XB100 system. Puromycin (4 µg/mL) was used for selection over multiple passages. Cell viability and morphological changes were assessed using MTT assays and Giemsa staining under standard culture conditions (DMEM) and nutrient deprivation (ND) to simulate metabolic stress. CBD was applied in concentrations ranging from 3 to 3000 nM.
Results: Under standard conditions, CBD did not significantly affect cell viability. However, under ND conditions, CBD-treated cells exhibited marked morphological deterioration and decreased viability, with these effects becoming more pronounced at higher CBD concentrations. Interestingly, Kv2.1-expressing cells showed improved baseline viability under ND, suggesting a protective role for the channel during metabolic stress.
Conclusion: These findings reveal a dose-dependent interaction between CBD and Kv2.1 and suggest that Kv2.1 may be a relevant therapeutic target in pathological conditions such as tumor microenvironments, where cells experience oxidative stress and nutrient deprivation.
Keywords: Kv2.1 channels, cannabidiol, ion channels, nutrient deprivation, cell viability

P159, Antioxidant effects of dimethyl fumarate and honey in mitigating morphine-induced tolerance in mice

Nima Hassan Zadeh Maleki[1], Sana Gharbalchi Orangi[1], Moslem Najafi[2], Bahloul Habibi asl[2], Alireza Parvizpour[2], Mina Islambulchilar[2]

1. Student Research Committee, Tabriz University of Medical Sciences, Tabriz, Iran
2. Department of Pharmacology & Toxicology, Faculty of Pharmacy, Tabriz University of Medical Science, Tabriz, Iran

Background: Chronic administration of morphine often results in the development of tolerance, which compromises its long-term analgesic efficacy. Emerging evidence implicates that oxidative stress and neuroinflammation are involved in the pathophysiology of morphine tolerance. This experimental study investigated the potential antioxidant effects of dimethyl fumarate (DMF) and natural honey, individually and in combination, on attenuating oxidative stress associated with morphine-induced tolerance in male Swiss albino mice.

Methods: Over 14 days, male Swiss albino mice received morphine (25 mg/kg, i.p.) alongside varying doses of DMF (10, 20, 40 mg/kg, i.p.), natural honey (100, 200, 400 mg/kg, i.p.), or their combination. Morphine tolerance was assessed using the hot plate test. On day 15, serum samples were collected to evaluate oxidative stress markers, including malondialdehyde (MDA) and total antioxidant capacity (TAC).

Results: Morphine-only groups exhibited significantly increased MDA levels and decreased TAC values ($p < 0.05$), indicative of heightened lipid peroxidation and compromised antioxidant defenses. In contrast, treatment with DMF, honey, or their combination significantly reduced MDA levels and elevated TAC ($p < 0.05$), with the most pronounced effects observed at the highest dose of DMF.

Conclusion: These findings suggest that DMF and natural honey can alleviate morphine-induced tolerance, likely through their antioxidant properties. The combined use of natural and pharmacological antioxidants may represent a promising strategy to mitigate opioid-induced oxidative stress and enhance long-term analgesic efficacy. Further research is warranted to elucidate the underlying molecular mechanisms and evaluate their clinical potential.

Keywords: Honey, Oxidative Stress, Dimethyl Fumarate (DMF)

P160, Comparative hepatotoxicity of chronic antidepressant use: biochemical and oxidative stress markers in rats

Sana Naseri[1], Mohamadmahyar Eshraghi[1], Mohamadreza Hosseini[1], Mohamadreza Abdollahi[1]
1. Department of Basic Sciences, Faculty of Veterinary Medicine, Islamic Azad University, Garmsar, Iran

Background: Although antidepressants are widely prescribed for mood disorders, concerns regarding their long-term hepatotoxic potential remain unresolved. This study aimed to investigate and compare the hepatic effects of chronic administration of fluoxetine, amitriptyline, venlafaxine, and mirtazapine by evaluating serum liver enzymes and oxidative stress biomarkers in rats.
Methods: Fifty adult male Wistar rats were randomly divided into five groups (n = 10): control, fluoxetine (10 mg/kg), amitriptyline (10 mg/kg), venlafaxine (20 mg/kg), and mirtazapine (15 mg/kg). All drugs were administered orally via gavage once daily for 8 weeks. Serum levels of alanine aminotransferase (ALT), aspartate aminotransferase (AST), and alkaline phosphatase (ALP) were measured. Liver tissues were excised, rinsed in saline, rapidly frozen in liquid nitrogen, and stored at −80 °C for biochemical assays of malondialdehyde (MDA), superoxide dismutase (SOD), and catalase (CAT). Data were analyzed using one-way ANOVA followed by Tukey's post hoc test in SPSS version 25 ($p < 0.05$).
Results: All drug-treated groups showed significant increases in ALT, AST, and ALP levels compared to controls, with amitriptyline and venlafaxine producing the most pronounced elevations ($p < 0.01$). MDA levels were markedly elevated, while SOD and CAT activities were significantly reduced in all treatment groups, indicating oxidative stress. Mirtazapine induced the least hepatic enzyme and oxidative alterations among the antidepressants.
Conclusion: Chronic administration of fluoxetine, amitriptyline, venlafaxine, and mirtazapine induces varying degrees of hepatotoxicity. Amitriptyline and venlafaxine demonstrated the highest risk, whereas mirtazapine exhibited a more favorable hepatic profile, warranting careful selection during prolonged therapy.
Keywords: Hepatotoxicity, Antidepressants, Oxidative Stress, Liver Enzymes, Rats

P161, Neurobiological consequences of high salt diet: impaired learning, memory, and hippocampal remodeling in adult male rats

Gohar Sharieh Hosseini[1], Mehdi Zarifi [2], Aminollah Bahaoddini[1,] Mohammad Reza Namavar [3]
1. Department of Biology, College of Science, Shiraz University, Shiraz, Iran
2. Department of Clinical Studies, School of Veterinary Medicine, Shiraz University, Shiraz, Iran
3. Histomorphometry and Stereology Research Center, Department of Anatomical Sciences, Shiraz University of Medical Science, Shiraz, Iran

Background: Neurocognitive disorders are a crucial subject in scientific research today, driven by the increasing prevalence of associated risk factors. Growing evidence suggests that excessive sodium intake can have detrimental effects on the brain, potentially impairing learning and memory, heavily dependent on the hippocampus. This research aimed to elucidate the structural and behavioral consequences of a high-salt diet, focusing on its effects on the hippocampus.
Methods: Twenty Wistar adult male rats were randomly divided into the following groups: The control group received a standard diet and the experimental group received a high salt diet for two months. Spatial memory performance was evaluated using the Morris water maze, recording parameters such as escape latency and total distance to locate the hidden platform. Subsequent morphometric analysis of the hippocampus was conducted to assess the thickness of its different layers.
Results: The results revealed a significant increase in both escape latency and total distance traveled in the Morris water maze for rats on the high salt diet compared to the control group, indicating significant deficits in learning and memory. Furthermore, morphometric evaluation showed a significant reduction in the thickness of hippocampal layers in the high salt diet group.
Conclusion: These findings demonstrate that a high salt diet negatively impacts learning and memory performance and induces significant structural alterations in the hippocampus. This study underscores the potential neurocognitive risks associated with high dietary salt intake and highlights the hippocampus as a potential target for salt-induced damage.
Keywords: High Salt Diet, Cognitive Impairment, Hippocampal Morphology.

P162, Effect of corylus avellana consumption on social interaction deficits in a valproic acid-induced rat model of Autism

Elaheh sadat Hosseini Manesh[1], Solmaz Khalifeh[2]
1. M.Sc. in Biology (Animal Science–Physiology), Faculty of Medicine, Islamic Azad University, Tehran Medical Sciences Branch, Tehran, Iran
2. Department of Physiology, TeMS.C., Islamic Azad University, Iran

Background: Autism Spectrum Disorder (ASD) is characterized by impaired social communication. The valproic acid (VPA) model is a well-established prenatal model that mimics these core behavioral deficits. Oxidative stress is implicated in ASD pathophysiology. Corylus avellana, rich in neuroprotective compounds, was investigated for its effect on social interaction deficits in a VPA-induced rat model.
Methods: Pregnant Wistar rats received a single VPA injection (500 mg/kg) on embryonic day 12.5. Male offspring were grouped as control, autism, and Corylus avellana-treated. The treated group received a Hazelnut diet for 20 days post-weaning. Social interaction was assessed using the Three-Chamber Sociability test, measuring time with a stranger rat versus an empty cage.
Results: VPA-exposed offspring exhibited significant social deficits compared to controls. The Corylus avellana-treated group demonstrated a trend of improvement in sociability. Specifically, time with the stranger rat increased by approximately 2.14-fold compared to the untreated autism group, suggesting a potential restorative effect of Corylus avellana on social deficits.
Conclusion: Oral consumption of Corylus avellana showed a positive trend in alleviating social interaction deficits in the VPA-induced autism model. These findings suggest that dietary Corylus avellana may serve as a beneficial supplement for ASD behavioral symptoms.
Keywords: Autism Spectrum Disorder, Valproic Acid, Social Interaction, Corylus avellana

P163, Investigation of the role of central dopaminergic receptors in somatostatin-induced food intake in broiler chickens

Hossein Hakimzade naghavi[1], Sogand Fallahfar[1], Mostafa Bakhtiari[1], Seyed Keyvan Hasani[1]
1. Department of Physiology, Faculty of Veterinary Medicine, Islamic Azad University, Garmsar Branch, Garmsar, Iran

Background: This study aimed to assess the effects of centrally administered dopaminergic receptor antagonists—SCH23390 (D1), AMI-193 (D2), NGB2904 (D3), L-741,742 (D4)—and 6-OHDA (a dopamine-depleting agent) on somatostatin-induced food intake in broiler chickens.
Methods: The experiment was conducted on six main groups, each comprising four subgroups (one control and three treatments), with 11, one-day-old broiler chicks per subgroup (44 chicks per main group). On post-hatch day 5, chicks received intracerebroventricular (ICV) injections. All groups were food-deprived for 3 hours prior to injection. Each chick was injected with 10 µL of saline or specific doses of the pharmacological agents. After ICV administration, chicks were returned to their cages with free access to food and water. Cumulative food intake (in grams) was recorded at 30, 60, and 120 minutes post-injection.
Results: Somatostatin significantly increased cumulative food intake in a dose-dependent manner. Co-injection of L-DOPA (1.25 µg) attenuated the somatostatin-induced hyperphagia ($P < 0.05$), while co-administration of SCH23390 (5 nmol) enhanced it significantly ($P < 0.05$). AMI-193 (5 nmol) co-injection had no significant effect ($P > 0.05$). Likewise, NGB2904 (6.4 nmol) and L-741,742 (6 nmol) did not significantly alter somatostatin-induced food intake ($P < 0.05$).
Conclusion: These results suggest that somatostatin-induced food intake is likely mediated by dopaminergic receptors in broiler chickens.
Keywords: somatostatin**,** dopaminergic system, broiler chickens

P164, Effect of sucrose consumption on anxiety-like behaviors and blood factors in adult male mice under two intermittent fasting models

Mohammadali Heydari[1], Mahnaz Kesmati[1], Mozhgan Torabi[1]
1. Department of Biology, Faculty of Science, Shahid Chamran University of Ahvaz, Ahvaz, Iran

Background: Positive effects of fasting on physical and mental health have been demonstrated. Conflicting results have been reported regarding the consumption of sugary substances during fasting on anxiety and stress. This study aimed to investigate the effects of two fasting models over two weeks on anxiety-like behaviors and serum biochemical factors in the presence and absence of sucrose in laboratory animals.
Methods: In this study, adult male mice were divided into 6 groups including control (normal diet), 10% sucrose solution, TRE (Time-restricted eating) (16:8 h/h diet), TRE + 10% sucrose solution group, PF (Periodic fasting) (5:2 day/day diet), and PF + 10% sucrose solution. Anxiety-like behavior was measured using the hole-board test. Serum corticosterone, ROS (Reactive Oxygen Species), TOS (Total Oxidant Status), and TAC (Total Antioxidant Capacity) levels were measured too.
Results: The TRE fasting model significantly reduced anxiety-like behavior in the hole-board test ($P<0.001$), whereas this effect was not observed in the PF model. Sucrose consumption increased anxiety-like behaviors ($P<0.001$) and diminished the anti-anxiety effects of TRE fasting. This effect was not observed in the PF model. Blood parameters (corticosterone, ROS, TOS, TAC) did not change in any group.
Conclusion: Two fasting models (TRE and PF) appear to have distinct capacities for inhibiting anxiety-like behaviors. The inhibitory mechanism of sucrose under the TRE fasting model **is unlikely to** involve changes in the aforementioned blood parameters.
Keywords: Anxiety-like behavior, Corticosteron, Fasting, ROS, Sucrose

P165, Omega-3 Fatty acid supplementation prevents ethanol-induced cognitive deficits in adolescent rats by modulating oxidative and inflammatory imbalance

Mahdi Mohammadkhani Khakhian[1], S. Mohammad Ahmadi-Soleimani[2, 3], Hassan Azhdari-Zarmehri[2,3], Farimah Beheshti[2,3]

1. Student Research Committee, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
2. Departments of Physiology, School of Medicine, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
3. Neuroscience Research Center, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran

Background: Chronic ethanol (Eth) exposure during adolescence induces neurobehavioral impairments and neurochemical alterations. Omega-3 (O_3) polyunsaturated fatty acids (ω-3 PUFAs) exhibit neuroprotective properties, though their efficacy against Et-induced cognitive deficits remains to be fully elucidated.

Methods: Male Wistar rats (postnatal day 21) were randomly assigned to six experimental groups (n=10/group): (1) Vehicle control, (2) Eth (20% v/v in drinking water), (3-5) Eth+O_3 (50/100/ 150 mg/kg, i.p.), and (6) O_3 alone (150 mg/kg). Following 5 weeks of treatment, cognitive performance was assessed using Morris water maze (MWM) and passive avoidance (PA) paradigms. Biochemical analyses measured malondialdehyde (MDA), thiol groups, superoxide dismutase (SOD), catalase (CAT), and interleukin-6 (IL-6) levels in hippocampal and cortical tissues.

Results: Adolescent ethanol intake impairs learning and memory function in MWM and PA tests. It was showed that Eth induced oxidative stress and neuro-inflammation. O_3 improved learning and impairment induced by Eth by reduction the adverse effects of Eth on the oxidant/antioxidant balance in the hippocampi. Furthermore, we found that O_3 prevented the Eth-induced increase of hippocampal IL-6.

Conclusion: O_3 supplementation prevents Eth-induced cognitive deficits in adolescent rats, potentially through dual modulation of oxidative stress and neuro-inflammatory imbalance. These findings support the potential therapeutic use of O_3 in adolescent alcohol abuse disorders.

Keywords: Adolescence, Ethanol, Learning and memory, Oxidative stress, Neuro-inflammation.

P166, Saffron improves the electrical and enzymatic activity of the dentate gyrus in cuprizone-induced multiple sclerosis in rats

Leila Khaledi[1], Mahnaz Taherianfard[1], Mohammad Mahdi Doorodmand[2]
1. Department of Basic Science, School of Vet Med., Shiraz University
2. Department of Chemistry, College of Science, Shiraz University, Iran

Background: Multiple Sclerosis (MS) is a chronic neuroinflammatory disease of the Central Nervous System (CNS). Neuroinflammation leads to synapse dysfunction in the gray matter. Synaptic dysfunction in MS occurs early and independently of white matter demyelination and is likely to correlate with electrical activity in the MS. Therefore, this study aims to investigate the effect of saffron on electrical and enzymatic activities in demyelinated rats by Cuprizone (CPZ).
Methods: Forty male Sprague-Dawley rats were randomly divided into four groups. The Sham group, Treatment control group, Saffron Treatment group, and Saffron Prevention group. Electrical activity was determined using the multichannel recording system. Enzymatic activity was measured using the ELISA kit. Statistical analysis was performed using one-way analysis of variance and the significance level was $P<0.05$.
Results: Based on the data, saffron extract noticeably ($P<0.001$) improved baseline electrical activity, current-clamp induced voltage change and Voltage-clamp induced current change of dentate gyrus neurons compared to the treatment control group. Saffron significantly ($P<0.001$) ameliorated Mitochondrial Superoxide Dismutase (SOD) and catalyze activity in demyelinated rats.
Conclusions: The present results indicate that saffron can improve the electrical and enzymatic activity in the hippocampus of demyelinated rats with CPZ, due to its antioxidant properties.
Keywords: Saffron, Cuprizone, Demyelination, electrical activity, mitochondrial enzyme activity

P168, Influence of gut microbiome on levodopa response in Parkinson's disease: A systematic review

Somayeh Khalesi[1, 2], Mazyar Erfani[1], Sama Nadi[1]
1. Department of Biology, Kavian Institute of Higher Education, Mashhad, Iran
2. Department of Biology, Faculty of Sciences, Ferdowsi University of Mashhad, Mashhad, Iran

Background: Parkinson's disease (PD) is a neurodegenerative movement disorder. A pathological feature of this disease, is the progressive loss of dopaminergic neurons in the substantia nigra. Levodopa (L-Dopa) is currently the main treatment agent, because its conversion to dopamine improves motor symptom control. The treatment results produce different outcomes, since some patients develop resistance to treatment and experience variable motor symptom responses. Recent studies suggest that gut bacteria metabolize L-Dopa through specific enzymatic pathways, making microbiome–drug interactions highly relevant to therapeutic efficacy.
Methods: Researchers conducted a systematic evaluation of existing literature through a search of PubMed, Scopus and Web of Science databases for articles published from 2015 to 2025. The research selected studies which analyzed gut microbiome composition together with Enterococcus faecalis tyrosine decarboxylase activity in microbial L-Dopa metabolism to understand their influence on treatment results.
Results: Research shows that particular bacteria species within the gut microbiome directly transform L-Dopa into dopamine inside the intestinal lumen, which decreases drug absorption and restricts dopamine access to the central nervous system. Early research indicates that probiotic treatments, dietary changes and microbiome-based therapies show potential for enhancing L-Dopa treatment outcomes; but the available clinical research provides mixed and limited evidence.
Conclusion: The effectiveness of L-Dopa treatment is differently based on the combination of gut microbiome metabolism and gastrointestinal factors. The review examines how microbial functions affect L-Dopa drug availability and treatment effectiveness, which suggests the need for personalized treatment approaches in future clinical trials.
Keywords: Parkinson's disease, Gut microbiome, L-Dopa metabolism, Enterococcus faecalis.

P169, Adolescent rat vulnerability to self-harm: The role of sleep deprivation

Fatemeh khani[1], Habibolah Khazaie[1], Ali Zakiei[1], Mohammad-Taher Moradi[1], Ali Pourmotabbed[2], Hossein Azizi[3]

1.Sleep Disorders Research Center, Health Policy and Promotion Institute, Kermanshah University of Medical Sciences, Kermanshah, Iran
2. Department of Physiology, Kermanshah University of Medical Sciences, Kermanshah, Iran
3. Department of Physiology, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran

Background: Sleep is a fundamental biological process that supports emotional balance and executive function, and its disruption during adolescence, a period characterized by rapid neural development, may have profound behavioral consequences. While sleep deprivation has been associated with increased impulsivity and impaired emotion regulation, its specific contribution to self-injurious behaviors is not yet well understood. The present study examined how different durations of sleep deprivation affect the emergence and severity of self-injurious behaviors in adolescent Wistar rats.
Methods: Forty Wistar rats were assigned to control or sleep deprivation (24, 48, or 72 h) groups using a multiplatform model of selective sleep disruption. Animals were monitored for seven days after deprivation, and self-injurious behaviors were measured using a standardized severity scale.
Results: Statistical analyses revealed a significant sleep-deprivation-dependent relationship between sleep deprivation and self-injurious scores, with the 48-hour and 72-hour groups showing significantly higher levels of makeup-related lesions and repetitive self-injurious behaviors compared with the control group. The most severe outcomes were observed after 72 hours of sleep deprivation.
Conclusion: These findings suggest that prolonged wakefulness may increase vulnerability to self-injurious tendencies, potentially through dysregulation of neurochemical pathways governing stress and emotional control. Understanding these mechanisms may help improve strategies to prevent maladaptive behaviors associated with chronic sleep disruption during adolescence.
Keywords: Sleep, Self-injurious behaviors, Adolescence, Rats

P170, Protective role of coenzyme q10 against manganese-induced behavioral impairments and oxidative damage in the hippocampus

Ali khodabakhshi korelaei[1], Vahid Khodashenas[1], Tourandokht Baluchnejadmojarad[1], Mehrdad Roghani[2]
1. Department of physiology, School of medicine, Iran University of medical sciences, Tehran, Iran
2. Department of physiology, School of medicine, Shahed University, Tehran, Iran

Background: Manganese is essential for various brain functions and metabolic pathways; however, excessive accumulation beyond physiological levels can lead to cognitive and memory impairments, as well as oxidative stress. Given its ability to reduce oxidative stress and mitigate memory deficits, this study evaluates the protective role of Coenzyme Q10 against hippocampal injury induced by manganese overload.
Methods: The experiment was performed on 48 male Wistar rats, and both manganese (30 mg/kg) and CoQ10 (50 or 200 mg/kg) were administered orally through gavage for 28 consecutive days. At the end of the third week, behavioral tests including the Novel Object Discrimination, Y-maze, and Passive Avoidance Test were performed. On day 28, following anesthesia and transcardial perfusion, hippocampal tissue was collected for further biochemical and histological analyses.
Results: Coenzyme Q10 treatment ameliorated manganese-induced hippocampal damage by improving cognitive and memory performance, lowering oxidative stress markers (MDA, ROS), and enhancing the activity of antioxidant enzymes (SOD, catalase).
Conclusion: Coenzyme Q10 appears to protect against manganese-induced hippocampal dysfunction by enhancing cognitive and memory performance and attenuating oxidative stress.
Keywords: Manganese, Coenzyme Q10, Oxidative Stress, Memory

P171, Kolaviron attenuates behavioral alterations in prenatal valproate-induced Autism spectrum disorder

Vahid Khodashenas[1], Ali Khodabakhshi Korelaei[1], Tourandokht Baluchnejadmojarad[1], Mehrdad Roghani[2]

1. Department of Physiology, School of Medicine, Iran University of Medical Sciences, Tehran, Iran
2. Neurophysiology Research Center, Shahed University, Tehran, Iran

Background: Autism Spectrum Disorder (ASD) is a lifelong neurodevelopmental disorder characterized by deficits in social communication, restricted interests, and repetitive behaviors. Both genetic susceptibility and environmental influences contribute to its pathogenesis. One such environmental factor is prenatal exposure to valproic acid (VPA), which is widely used to induce autism-like features in animal models. Behavioral abnormalities induced by VPA include impaired social interaction and increased stereotypic behavior.

Methods: In this study, we investigated whether Kolaviron (KV)**,** a polyphenolic antioxidant extract from *Garcinia kola*, could mitigate behavioral impairments induced by VPA in a rat model of autism. Pregnant Wistar rats received a single intraperitoneal injection of VPA (600 mg/kg) on gestational day 12.5. Male offspring were weaned on postnatal day (PND) 21 and treated with either KV (50 or 100 mg/kg, orally), oxytocin (12 µg/kg, intranasally), or saline until PND 49. Behavioral tests assessing social interaction, repetitive behavior, and anxiety-like behavior were performed between PNDs 42–49

Results: Results showed that KV treatment led to a significant improvement in social interaction **and** a reduction in repetitive behaviors in VPA-exposed rats compared to untreated VPA controls. These effects were dose-dependent and comparable in some aspects to the group treated with oxytocin.

Conclusion: In conclusion, our findings suggest that KV can ameliorate core behavioral symptoms of ASD in the VPA model, highlighting its potential as a complementary therapeutic candidate for managing autism-related behavioral deficits.

Keywords: Autism Spectrum Disorder, Valproic Acid, Kolaviron

P172, The role of vitamin B12 in lipopolysaccharide-induced depression like behavior

Zahra Khosravi[1], Elham Taheri[1], Mahdi Amiri[1], Mahmoud Hosseini[2,3]
1. Department of Clinical Psychology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Applied Biomedical Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
3. Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Inflammation is currently proposed as key mechanism in depression. Vitamin B12 is suggested to have anti-neuroinflammation and has some neuroprotective effects. The study aimed to explore the role of vitamin B12 treatment on neuroinflammation induced by lipopolysaccharide (LPS) and subsequent depressive-like behaviors.
Methods: In the present study, seventy-five three-month-old male Wistar rats (250 ± 10) were randomly divided into: (1) Control, (2) LPS (1 mg/kg, i.p.), (3-5) LPS + vitamin B12 (250, 500, or 1000 µg/kg, orally). Depression was assessed by forced swim (FST), sucrose preference (SPT), while brain homogenates were analyzed for inflammation (tumor necrosis factor-alpha, TNF-α).
Results: LPS increased immobility time in FST, and reduced sucrose preference, indicating depression-like behavior. B12 (500–1000 µg/kg) significantly reduced immobility ($P < 0.05$-$P < 0.01$), whereas all doses restored sucrose preference. Biochemically, LPS elevated TNF-α level ($P < 0.001$). B12 dose-dependently attenuated TNF-α ($P < 0.001$).
Conclusion: Taken together, our results demonstrated that neuroinflammation induced by LPS in rats was associated by depression-like behaviors**.** Vitamin B12, specifically, at higher doses, alleviated depression like behaviors by reducing inflammation, suggesting a promising therapeutic role for depression therapy.
Keywords: Lipopolysaccharide, Depression, Inflammation, Vitamin B12

P173, Gut microbiota metabolites and brain health: urolithin a as a neuroprotective agent

Saeedeh Kheiripour [1], Masoud Fereidoni [2]
1. Department of Biology, Faculty of Science, Ferdowsi University of Mashhad, Mashhad, Iran
2. Department of Biology, Faculty of Science, Ferdowsi University of Mashhad, Mashhad, Iran

Background: Urolithins are a group of natural metabolites produced by the gut microbiota through the transformation of dietary polyphenols (such as ellagitannins found in pomegranates, strawberries, and nuts). Among the various types of urolithins (A, B, C, and D), urolithin A (UroA) exhibits the highest biological activity and is recognized as an anti-inflammatory, antioxidant, and autophagy-regulating agent. Recently, this compound has gained attention for its neuroprotective role in neurological disorders such as Alzheimer's disease, Parkinson's disease, multiple sclerosis (MS), and stroke.
Methods: In this review study, following a systematic search in scientific databases (PubMed, Scopus, Web of Science), 20 high-quality articles (2010–2024) were selected. Data on the biosynthesis of urolithins, the role of gut microbiota, and their neuroprotective effects were extracted and analyzed.
Results: Urolithin A (UroA) exerts neuroprotective effects by modulating cellular signaling pathways, particularly through the activation of stress- and metabolism-related transcription factors, thereby helping to maintain neuronal homeostasis. This metabolite also demonstrates the ability to regulate blood-brain barrier (BBB) function and reduce its permeability under inflammatory conditions. Recent studies suggest that UroA may further contribute to synaptic regeneration and enhanced neurotransmission. Given these multifaceted mechanisms, UroA emerges as a promising complementary strategy alongside conventional therapies for neurological disorders.
Conclusion: Despite the promising therapeutic potential of Urolithin A (UroA), several challenges—such as interindividual variability in its production (due to differences in gut microbiota and genetics), limited pharmacokinetic and safety data in humans, and the need to determine optimal dosing—have hindered its clinical development. To address these barriers, personalized approaches, including targeted probiotics, synthetic UroA formulations, and dietary interventions (increased intake of ellagitannin-rich foods), have been proposed. More rigorous clinical studies are essential to evaluate UroA's efficacy and safety.
Keywords: Urolithin A (UroA), Neuroprotection, Neurological disorders

P174, Prior sepsis increases brain susceptibility to future inflammatory insults

Hossein Salmani[1], Mahmoud Hosseini[2]
1. Cellular and Molecular Research Center, Sabzevar University of Medical Sciences, Sabzevar, Iran
2. Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Sepsis is increasingly recognized as a condition that leads to persistent alterations in brain function long after the acute illness has resolved. One proposed mechanism is that severe systemic inflammation may shift microglia into a primed state, rendering the brain more reactive to subsequent immune signals. Microglial priming has been described in aging, traumatic brain injury, and neurodegenerative disorders, and accumulating evidence suggests that systemic inflammatory events may exert similar effects. The present abstract summarizes our previously published paper examining whether survivors of sepsis show enhanced behavioral vulnerability when exposed to a later, mild inflammatory challenge.
Methods: Adult BALB/c mice received an intraperitoneal injection of LPS (5 mg/kg) to model sepsis. Behavioral recovery was monitored, and after a one-month interval, mice were administered a low-dose LPS challenge (0.33 mg/kg, i.p.) to evaluate sensitivity to secondary inflammation. Behavioral assessments—including the novel object recognition test (NOR), forced swim test (FST), and marble burying assay—were conducted 72 hours after the second inflammatory insult.
Results: Septic mice exhibited impaired recognition memory in the NOR relative to controls, whereas the subsequent low-dose inflammatory stimulus did not further influence this outcome. In contrast, mice that had experienced both sepsis and the secondary inflammation displayed elevated anxiety-like behavior in the marble burying task and more pronounced depressive-like behavior in the FST.
Conclusion: These findings indicate that a mild immune challenge can exacerbate affective disturbances in mice with a history of sepsis, supporting the concept of increased neuroimmune sensitivity following severe systemic inflammation.
Keywords: Sepsis, Microglial priming, Anxiety, Depression

P175, Effect of sodium butyrate on cognitive-behavioral functions, cholinergic activity and neuroinflammation of the entorhinal cortex in trimethyltin induced Alzheimer's disease

Yeganeh Darvish-Oladi and Mohammad Amin Edalatmanesh
1. Department of Biology, Shi. C, Islamic Azad University, Shiraz, Iran

Background: Trimethyltin (TMT) is a neurotoxic organotin that causes extensive neurodegeneration in the cerebral cortex. The aim of the present study was to evaluate the neuroprotective and anti-inflammatory effects of sodium butyrate (SB) on the entorhinal cortex (EC) in the TMT model of Alzheimer's disease (AD).
Methods: A total of 40 male Wistar rats were randomly assigned to 4 groups: control, TMT+Saline, TMT+SB100, TMT+SB200 and TMT+SB400. To induce AD, TMT (8 mg/kg body weight) was injected intraperitoneally (i.p.). After validating the model, SB was injected for 14 days (i.p.). Then, cognitive (working and passive avoidance memory) and anxiety (elevated plus maze and feeding suppression test) tests were performed. Finally, the expression levels of proinflammatory cytokines [interleukin (IL)-1β, IL-6 and tumor necrosis factor alpha (TNF-α)], cholinesterase enzyme (AChE) activity and neuronal density in the EC were measured.
Results: Compared to the TMT+Saline group, SB-treated groups showed significant increases in avoidance and working memory, significant decreases in anxiety-like behaviors, IL-1β, IL-6, TNF-α expression, and AChE activity. On the other hand, SB treatment resulted in a significant increase in neuronal density in the EC.
Conclusion: Sodium butyrate ameliorated cognitive and anxiety symptoms in the AD model by reducing TMT-induced cortical damage and neuroinflammation.
Keywords: Alzheimer's disease, Butyric acid, Trimethyltin compound, Neuroinflammatory diseases, Entorhinal cortex

P176, Hippocampal amyloid beta and GNFP and neuroinflammation-linked cognitive disorders reduced by Rosiglitazone

Mohsen Rajaee[1], Farimah Beheshti[2,3]
1. Student Research Committee, Torbat Heydaryeh University of Medical Sciences, Torbat Heydaryeh, Iran
2. Department of Biochemistry, School of Medicine, Torbat Heydaryeh University of Medical Sciences, Torbat Heydaryeh, Iran
3. Department of Physiology, School of Medicine, Torbat Heydaryeh University of Medical Sciences, Torbat Heydaryeh, Iran

Background: This study was aimed to measure the effectiveness of Rosiglitazone (Rosi) on amyloid beta(Aβ) and glial fibrillary acidic protein (GFAP) in the hippocampus and learning and memory deficits caused by neuroinflammation in rats.
Methods: The rats were divided into five groups: (1) Control group which received saline and vehicle instead of LPS and Rosi. (2) Lipopolysaccharide (LPS) group which only received LPS that had been dissolved in saline through intraperitoneal injection (1 mg/kg). groups 3-5 (Rosi 1, Rosi 3, Rosi 5) which in order received 1, 3 & 5 mg/kg of Rosi 30 min before LPS every day. The rats were injected Rosi or its vehicle 30 min before LPS and treatments took two weeks. Behavioral tests were also carried out in the second week and in the end, the hippocampal tissues were removed for biochemical analysis.
Results: Biochemical analysis indicated that Rosi has reversive effects on: (1) Increased levels of Aβ, GFAP, interleukin (IL)-6, tumor necrosis factor-α (TNF-α), nitric oxide (NO) metabolites and malondialdehyde (MDA) caused by LPS injection. (2) IL-10 and thiol concentration and activities of catalase (CAT) and superoxide dismutase (SOD) that have been attenuated by LPS. The behavioral tests of Morris water maze (MWM), probe trial and passive avoidance were carried out and the results were as follows: (1) In the MWM test, the LPS group had a longer latency to find the platform than the control group. (2) In the probe trial, the LPS group spent shorter time in the target quadrant in comparison with the control group. (3) The rats of the LPS group also had a shorter delay to enter the dark chamber than the control group. The results of Rosi-treated groups showed that Rosi had been able to reverse the parameters discussed above respectively.
Conclusion: Based on these findings, Rosi reduced Aβ, GFAP and oxidative stress and also learning and memory deficits caused by neuroinflammation in rats.
Keywords: Rosiglitazone, GFAP, Aβ, neuroinflammation, memory

P178, Evaluation of the effects of alpha-lipoic acid on cyclosporine-induced memory dysfunction and cellular immunosuppression in rat model

Fatemeh Rajabian [1], Hossein Hosseinzadeh[1, 2]
1. Department of Pharmacodynamics and Toxicology, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran
2. Pharmaceutical Research Center, Pharmaceutical Technology Institute, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Cyclosporine (CYC), a potent immunosuppressant, regulates autoimmune reactions and prevents organ rejection. However, its clinical use is limited by neurotoxicity and nephrotoxicity. Alpha-lipoic acid (ALA) possesses antioxidant, anti-inflammatory, and immunomodulatory properties and shows therapeutic potential in neurodegenerative disorders. This study evaluated the effects of ALA on CYC-induced memory impairment and cellular immunosuppression in rat.
Methods: Seven groups of male rats (n=6/group) were included as follows: Sham, CYC (25 mg/kg, alternate days), CYC + ALA (20, 40, or 80 mg/kg/day), CYC + Rivastigmine (1 mg/kg/day), and ALA alone (80 mg/kg/day). All administrations were intraperitoneal for 14 days. Spatial memory was assessed using Morris Water Maze (MWM). Hippocampal tissue was analyzed for histopathology, oxidative stress markers (MDA, GSH), and western blot (BDNF, CREB, p-CREB). Splenocyte viability and cytokine secretion (IFN-γ, IL-10) were assessed using resazurin assay, and ELISA, respectively. Renal function parameters (BUN, creatinine) were measured in the serum.
Results: CYC impaired spatial memory in MWM. CYC elevated hippocampal MDA levels while reducing GSH content, accompanied by ischemic neuronal changes, perineural/perivascular edema, and hyperemia. Furthermore, CYC downregulated BDNF expression and the p-CREB/CREB ratio. Concurrently, CYC suppressed lymphocyte proliferation and IFN-γ and IL-10 secretion. The levels of serum BUN were also elevated in the CYC group. In contrast, ALA treatment improved memory performance in the MWM, restored antioxidant capacity, upregulated BDNF and p-CREB/CREB levels, and ameliorated histopathological damage. Additionally, ALA regulated lymphocyte proliferation and cytokine production and decreased BUN levels.
Conclusion: These findings suggest that ALA exerts neuroprotective effects against CYC-induced memory dysfunction without impairing CYC's immunosuppressive efficacy.
Keywords: Cyclosporine, Alpha-Lipoic Acid, Neurotoxicity, Immunosuppression, Neuroprotection

P179, Yeast β-Glucan prevents anxiety-like behaviors in a rat model of aging

Fatemeh Rahmati-Dehkordi[1], Seyed Morteza Karimian[1], Elham Zahedi[1]
1. Department of Physiology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran

Background: Aging is an irreversible, and gradual loss of the function of each cell and organ tissue in the body. One of the most common problems among aging individuals is cognitive dysfunction. The standalone polysaccharide like yeast β-Glucan has been used to improve cognitive dysfunction of a wide spectrum of neurological disorders. In the present study we evaluated whether administration of yeast β-Glucan could help to prevent anxiety-like behaviors in an animal model of aging in rats.
Methods: In this experimental study, using D-galactose (180 mg/kg, intraperitoneally injection, for 8 weeks), a model of aging was induced in the two groups of rats. One group of these groups was administrated orally with yeast β-Glucan from week 5 to 8. However, control animals received vehicle only. Finally, Open Field Test (OFT) and Elevated Plus Maze Test (EPM) were used to assess the animals' anxiety-like behaviors.
Results: Analysis of the OFT test showed the increased immobility duration in D-galactose group compared control group ($p<0.05$). However, yeast β-Glucan decreased immobility duration compared to D-galactose group ($p<0.05$). In addition, the results of EPM showed decreased open arm time in D-galactose group compared to control group ($p<0.05$). However, yeast β-Glucan increased open arm time compared to D-galactose group ($p<0.05$).
Conclusion: These findings indicate that yeast β-Glucan may prevent anxiety-like behaviors, suggesting its promise as a treatment for age-related neurodegenerative diseases.
Keywords: Aging, Anxiety, Yeast β-glucan

P180, Olanzapine attenuates the morphine-induced conditioned place preference: The involvement of the D2-like Dopamine Receptors

Farkhondeh Rzazzaghi- Firozjaei[1], Hamid Reza Banafshe[1], Amir Ghaderi[1], Amineh Sadat Zahiry Pour[1]
1. Department of Addiction Studies, School of Medical, Kashan University of Medical Sciences, Kashan, Iran

Background: Opioid use disorder involves persistent molecular and cellular changes in the brain that drive compulsive drug-seeking behaviors. Morphine's rewarding effects are mediated by dopaminergic systems, especially via D2-like dopamine receptors. Olanzapine, a D2-like receptor antagonist, might influence these pathways and alter morphine dependence. This study aimed to investigate the effects of olanzapine on morphine-induced conditioned place preference (CPP) and on D2-like dopamine receptor expression in rats.
Methods: Adult rats were conditioned with subcutaneous morphine injections (5 mg/kg) for three days to establish CPP. Olanzapine was administered intraperitoneally at doses of 1.5, 3, and 4.5 mg/kg during CPP expression and extinction phases. Conditioning scores and locomotor activity were recorded during testing. Hippocampal D2-like dopamine receptor protein expression was assessed by Western blot in both phases.
Results: Olanzapine dose-dependently reduced morphine-induced CPP expression. Blocking D2 receptors also facilitated extinction by reducing the persistence of CPP. Western blot analysis showed significant reductions in hippocampal D2 receptor protein levels in olanzapine-treated groups compared to morphine controls during both expression and extinction phases.
Conclusion: Olanzapine reduces morphine-induced CPP and decreases hippocampal D2-like dopamine receptor expression, highlighting its potential as an adjunctive therapy for opioid dependence.
Keywords: Opioid dependence, Morphine, Olanzapine, Conditioned place preference, Hippocampus

P181, Simvastatin Mitigates Bisphenol A Neurotoxicity by Improving Memory and Reducing Oxidative Stress Markers: An Animal Model Study

Mohana Peiro[1], Delaram Eslimi Esfahani[1], Vahidehsadat Abbasnia[2], Adel Salari[1]
1. Department of Animal Science, Faculty of Biological Science, Kharazmi University, Tehran, Iran
2. Department of Biology, Payame Noor University, Tehran, Iran

Background: Working memory impairment is a key feature of cognitive decline, and Bisphenol A (BPA), an environmental neurotoxin, disrupts this function through neurobiochemical alterations. Simvastatin, known for its neuroprotective and antioxidant properties, may counteract such deficits. This study aimed to evaluate the effects of simvastatin on working memory, assessed by spontaneous alternation percentage (SAP) in the Y-maze test, in a BPA-induced rat model.
Methods: Male Wistar rats (n = 56) received daily oral treatments for 4 weeks: BPA (0.4 mg/kg/day) alone or combined with simvastatin at 1, 5, or 10 mg/kg/day; control and simvastatin-only groups were also included. Working memory was assessed in the Y-maze test over an 8-minute session, recording SAP as an index of working memory and total arm entries as a measure of locomotor activity. Data were analyzed using ANOVA, with statistical significance set at $p < 0.05$.
Results: BPA exposure significantly decreased SAP compared with the control group ($p < 0.05$), indicating working memory impairment, while total arm entries remained unchanged. Simvastatin attenuated these deficits in a dose-dependent manner, with higher doses significantly improving SAP ($p < 0.05$*).
Conclusion: Simvastatin improved BPA-induced working memory deficits by increasing SAP in the Y-maze test, supporting its potential as a neuroprotective candidate for mitigating cognitive impairments caused by environmental neurotoxicants.
Keywords: Bisphenol A, Simvastatin, Working Memory, Y-Maze, Neuroprotection

P182, Quantitative measurement of brain lipids by magnetic resonance spectroscopy: a new perspective in investigating neurological diseases

Auob Rustamzadeh[1], Amir Raoofi[2], Shahram Darabi[1,3]
1. Department of Anatomical Sciences, School of Medicine, Qazvin University of Medical Sciences, Qazvin, Iran
2. Cellular and Molecular Research Center, Sabzevar University of Medical Sciences, Sabzevar, Iran
3.Cellular and Molecular Research Center, Research Institute for Prevention of Non-communicable Diseases, Qazvin University of Medical Sciences, Qazvin, Iran

Background: Quantitative brain lipid measurement via magnetic resonance spectroscopy (MRS) offers a non-invasive method to explore neurological disease mechanisms. Lipids are vital for membrane integrity and myelination, and their metabolic alterations are linked to conditions like Alzheimer's, multiple sclerosis, and neurodevelopmental disorders.
Methods: This systematic study used databases including Web of Science, Scopus, PubMed, and Embase (2014–2024). Guided by the PRISMA statement, it applied defined keywords and excluded case reports, abstracts, posters, conference papers, and systematic reviews from the selection process.
Results: In high-grade gliomas, particularly glioblastoma, lipid/creatine (Lip/Cr) ratios are significantly elevated due to necrosis. For example, grade IV gliomas show a mean Lip/Cr ratio of 2.4 ± 0.6 compared to 0.8 ± 0.3 in grade II tumors, improving in tumor grading and prognosis. In multiple sclerosis (MS), increased Lip/Cr ratios indicate active demyelination. Active plaques exhibit Lip/Cr ratios of 1.7 ± 0.5 versus 0.5 ± 0.2 in normal-appearing white matter. These findings correlate with histopathological features such as myelin breakdown and inflammation especially due to advancements in MRS optimization and spectral quantification software (e.g., LCModel, TARQUIN).
Conclusion: Lipid-to-creatine ratios and absolute lipid concentrations measured by MRS are increasingly used to assess disease severity, treatment response, and prognosis in neurodegenerative and inflammatory brain disorders. Region-specific lipid accumulation, especially in the basal ganglia, thalamus, and white matter, provides insights into brain pathophysiology. Integrating MRS with fluid lipid biomarkers, enhances early diagnosis and monitoring. Future multi-modal research may advance understanding of lipid dysregulation and support development of lipid-targeted therapies.
Keywords: Magnetic Resonance Spectroscopy (MRS), Lipid, Neurological Diseases, Biomarkers.

P183, Modulatory role of astrocytic aquaporin-4 in synaptic plasticity alterations in a pentylenetetrazol-induced model of epilepsy

Fatemeh Rostami[1,2], Mahyar janahmadi[2], Narges Hosseinmardi[2]
1. Department of Physiology, School of Medicine, Mazandaran University of Medical Sciences, Sari, Iran
2. Department of Physiology, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: Astrocytes, key elements of tripartite synapses, contribute to the pathophysiology of neurological disorders, particularly epilepsy. Alterations in astrocytic channels and transporters, especially aquaporin-4 (AQP4) are implicated in synaptic transmission and plasticity. Recent studies propose that AQP4 may play a modulatory role in activity-dependent synaptic changes; however, its specific contribution to synaptic plasticity remains to be fully elucidated. Further research is necessary to clarify the mechanistic links between AQP4 function, astrocyte-mediated plasticity, and the pathogenesis of epilepsy.
Methods: In this study, the effect of AQP4 inhibitor, 2-(nicotinamide)-1, 3, 4-thiadiazole (TGN-020) during kindling on synaptic plasticity were investigated (1). Male Wistar rats were kindled by intraperitoneal (i.p) injection of PTZ (37.5 mg/kg/48 h) (2). TGN-020 was administered intracerebroventricularly 30 minutes before PTZ injection. One day following the last PTZ injection, extracellular electrophysiological recordings were used to assess synaptic plasticity. High-frequency stimulation (HFS) was applied to the Schaffer collateral for long-term potentiation (LTP) induction. Field excitatory postsynaptic potential (fEPSP) slope recorded from the hippocampal CA1 region was measured as an index of synaptic strength in the baseline and potentiated state.
Result: Inhibition of AQP4 increased the magnitude of synaptic potentiation in kindled animals (Two-way ANOVA, $P<0.001$). Additionally, AQP4 inhibition significantly reduced the paired-pulse index at inter-pulse intervals (IPI) of 200 ms before HFS (Two-way ANOVA, $P<0.001$) in non-epileptic animals.
Conclusion: AQP4 inhibition during kindling attenuates synaptic plasticity alterations in hippocampal CA1 neurons. These findings suggest astrocytic AQP4 plays a critical role in modulating synaptic plasticity in the chemical kindled epilepsy model.
Keywords: Astrocyte; Synaptic plasticity; Aquaporin-4; kindling

P184, Chronic injections of isovaline result in analgesic tolerance and cross-tolerance to salicylate, without affecting tolerance to morphine, in male mice.

Nastaran Roshd-Rashidi[1], Masoumeh Gholami[1]
1. Department of Physiology, School of Medicine, Arak University of Medical Sciences, Arak, Iran

Background: Opioid tolerance complicates pain management, and long-term NSAID use can cause tolerance to opioids like morphine, along with health risks such as peptic ulcers and heart failure. Therefore, new pharmacological approaches are needed to enhance chronic pain treatment.
Methods: In this study, we examined the effects of both short-term and long-term administration of isovaline, a compound structurally similar to glycine and GABA, which exerts analgesic effects via GABA-B receptors. Male Balb/c mice received daily intraperitoneal injections of isovaline (100 mg/kg) for five days to assess its impact on immediate pain response and the development of analgesic tolerance. On the sixth day, we evaluated potential cross-tolerance by administering sodium salicylate (300 mg/kg) or morphine (5 mg/kg) and measuring their antinociceptive effects.
Results: Isovaline induced a slower and weaker analgesic response compared to sodium salicylate and morphine, with its effectiveness diminishing over five days. Additionally, mice pretreated with isovaline showed reduced pain relief from sodium salicylate, demonstrating cross-tolerance, while morphine's analgesic effect remained unaffected.
Conclusion: Chronic isovaline use may cause cross-tolerance with sodium salicylate but not morphine, suggesting it interacts with NSAID-related pain pathways. This highlights the need for further research into pain treatments that reduce tolerance.
Keywords: anti-nociception, morphine, salicylate, isovaline, cross-tolerance, hot plate.

P185, Progressive development of pharmaco-resistance in a chronic PTZ-kindled epilepsy model in rats

Nastaran Roshd-Rashidi[1], Mohammadreza Palizvan[1]
1. Department of Physiology, School of Medicine, Arak University of Medical Sciences, Arak, Iran

Background: Epilepsy is a chronic neurological disorder marked by recurrent seizures and often drug resistance. This study examined the development of pharmaco-resistance in rats undergoing 90 days of PTZ-induced kindling, aiming to evaluate the reduced effectiveness of standard anticonvulsants after prolonged PTZ exposure.
Methods: Animals were assigned to four experimental groups: (1) control, (2) one-month kindling, (3) two-month kindling, and (4) three-month kindling. Using a standard protocol, rats received PTZ injections (37.5 mg/kg) every 48 hours for 13 doses, with seizures monitored post-injection. After each kindling phase, rats stabilized under standard conditions .Subsequently, the anticonvulsant efficacy of valproate sodium and levetiracetam was evaluated in each group.
Results: Chronic PTZ administration effectively induced kindling, with seizure severity increasing over time. The anticonvulsant efficacy of valproate sodium and levetiracetam declined significantly with longer kindling durations. One-month kindled rats responded well to treatment, whereas two- and three-month kindled rats showed reduced drug sensitivity, indicating the development of pharmaco-resistance. Statistical analysis confirmed significant differences in seizure severity and drug response between groups ($p < 0.05$).
Conclusion: Prolonged PTZ-induced kindling in rats results in resistance to standard antiseizure drugs, highlighting the progressive nature of epileptogenesis and diminishing drug effectiveness over time. Early treatment and new therapeutic approaches are essential for long-term epilepsy control. Further research is needed to uncover the mechanisms behind this drug resistance and identify new intervention targets.
Keywords: PTZ-Kindling, Valproate sodium, Levetiracetam, pharmaco-resistance.

P186, Effects of probiotic supplementation on gut-brain axis function and depression: A systematic review

Yekta Rezapour[1,2], AmirMohammad Ganjali[1,2], Hossein Javid[1,3,4]
1. Department of Medical Laboratory Sciences, Varastegan Institute for Medical Sciences, Mashhad, Iran
2. Student Research Committee, Varastegan Institute for Medical Sciences, Mashhad, Iran
3. Department of Clinical Biochemistry, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
4. Surgical Oncology Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: The bidirectional gut-brain axis, mediated by the vagus nerve and physiological mechanisms, is essential in governing behavior and mental health. The gut microbiome affects this axis and may influence cerebral function and depression symptoms. This systematic review aims to evaluate the effects of probiotic supplementation on the gut-brain axis and depression.
Methods: The Web of Science, PubMed, and ScienceDirect databases were systematically searched for research articles published between 2015 and 2025. The majority of the included studies focused on female participants. Out of approximately 300 initially identified articles, 17 met the inclusion criteria and were included in the final analysis.
Results: Several studies indicated that probiotic supplementation, particularly with Lactobacillus and Bifidobacterium strains, significantly alleviated depressive symptoms in participants. The enhancement was associated with lower cortisol levels and a decrease in inflammatory markers, including CRP, IL-6, and TNF-α. Probiotics enhanced gut barrier integrity, reducing endotoxin (LPS) translocation and subsequent neuroinflammation. Significant variability in probiotic dosage, strain selection, intervention duration, and psychological assessment tools (such as BDI, HADS, DASS-21) prevented direct comparisons among trials.
Conclusion: In order to methodological variation, definitive conclusions are constrained. Future meticulously designed, strain-specific, long-term trials utilizing standardized instruments are crucial to elucidate the role of probiotics in depression and the modulation of the gut-brain axis.
Keywords: Gut-brain axis, Probiotic, Depression, Female, Neurobiology

P187, Effects of acute and chronic zolpidem administration on synaptic plasticity and spatial memory in rats

Zahra Rezaeiasl[1], Mahmoud Salami Zavareh[1], Hamidreza Banafsheh[2]
1.Institute for Basic Sciences, Physiology Research Center, Kashan University of Medical Sciences, Kashan, Islamic Republic of Iran
2. Department of Pharmacology, Faculty of Medicine, Kashan University of Medical Sciences, Kashan, Iran

Background: Zolpidem is primarily recognized for its sedative effects, but its broader impact on neurological functions, particularly cognitive processes, remains less studied. This study aims to examine the effects of both acute and chronic zolpidem administration on synaptic plasticity, as well as spatial learning and memory, in rats.
Methods: The Morris water maze was used to evaluate spatial learning and memory, while hippocampal synaptic activity was measured through electrophysiological recordings. Rats were divided into three groups: control, acute (single dose of 15 mg/kg), and chronic (daily doses of 15 mg/kg over 26 days).
Results: No significant differences were observed in spatial performance among the groups. However, chronic treatment led to a significant decline in spatial memory compared to both control and acute groups. Electrophysiological data showed that while LTP was induced in both treatment groups, the levels were notably lower than in the control group.
Conclusion: Despite induction of LTP, in both treatment groups, it reduced relative to controls, but only chronic administration significantly impaired spatial memory. These findings suggest that prolonged use of zolpidem may pose a greater risk to cognitive function compared to acute use.
Keywords: zolpidem, chronic, spatial memory, long-term potentiation, acute

P188, Role of basolateral amygdala dopamine d1 receptors in acquisition and expression of morphine-induced CPP in rats

Zahra Rezaei[1], Hajjatollah Alaei[1], Parham Reisi[1]
1. Department of Physiology/School of Medicine, University of Medical Sciences, Isfahan, Iran

Background: Opioid addiction remains an important public health concern. The mesolimbic dopamine pathway, particularly dopamine D1 receptors in the basolateral amygdala (BLA), plays a critical role in reward-related behaviors.
Methods: A 5-day CPP protocol was performed to show morphine's rewarding effects. Adult male Wistar rats received bilateral cannula implantation into the basolateral amygdala (BLA). Morphine (0.5–10 mg/kg, s.c.) was administered to determine the effective dose. SCH23390, a selective D1 receptor antagonist (0.5–4 μg/rat), was microinjected into the BLA either during the conditioning phase or on the test day. Locomotor activity was recorded using ANY-maze software.
Results: Morphine at 5 mg/kg significantly increased CPP and locomotor activity. SCH23390 administration into the BLA during acquisition dose-dependently blocked CPP and reduced locomotor activity, with higher doses even induced aversion. When administered only on the test day, SCH23390 suppressed the expression of CPP without affecting locomotor activity.
Conclusion: This study showed that BLA D1 receptors are involved in both the acquisition and expression phases of morphine-induced conditioned place preference (CPP) in Wistar rats. Control these receptors may offer new strategies for the treatment of opioid addiction.
Keywords: Addiction, basolateral amygdala, dopamine-D1 receptor, morphine

P189, Cannabidiol Effects on BNST–DRN network and behavioral changes in a PTSD-like model

Mohammad Mojtaba Rafiee[1], Roya Varmazyar[1], Ardeshir Nabizadeh[1], Mir-Shahram Safari[1]
1. Neuroscience Research Center, Institute of Neuroscience and Cognition, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: Single prolonged stress (SPS), a model of post-traumatic stress disorder (PTSD), disrupts limbic circuits including the bed nucleus of the stria terminalis (BNST) and dorsal raphe nucleus (DRN) involved in threat and mood regulation. Cannabidiol (CBD) has anxiolytic- and antidepressant-like effects, but its impact on BNST–DRN oscillatory synchrony is unknown.
Methods: Bipolar electrodes were implanted in BNST and DRN of male rats (n = 12). Local field potentials were recorded in freely moving rats at baseline and 1 h, 24 h and 7 days after SPS. Elevated plus maze and forced swim test were performed at baseline and day 7. At 1 h post-SPS, rats received vehicle (DMSO; n=6) or CBD (15 mg/kg; n=6), and LFPs at 24 h and 7 days indexed acute and repeated CBD effects. DRN low-gamma power (25–45 Hz), BNST–DRN delta/theta connectivity and theta–gamma coupling was quantified with time–frequency analyses and cluster-based permutation tests.
Results: SPS significantly induced anxiety-/depression-like behavior, reducing open-arm exploration and swimming/climbing and increasing immobility in the swim test. CBD significantly attenuated these changes, increasing open-arm exploration and partly reversing these alterations. SPS also significantly increased DRN low-gamma power and strengthened BNST–DRN connectivity and theta–gamma coupling, indicating enhanced BNST–DRN synchrony. CBD significantly reduced these effects, lowering DRN gamma power, BNST–DRN delta/theta connectivity and theta–gamma coupling.
Conclusion: CBD partially normalizes SPS-induced BNST–DRN oscillatory synchrony and shows anxiolytic- and antidepressant-like effects, supporting BNST–DRN network modulation as a candidate mechanism.
Keywords: Cannabidiol, Single prolonged stress, Raphe Nuclei, Bed Nucleus of the Stria Terminalis, Neural Oscillations.

P190, Tamoxifen ameliorates ovariectomy-induced memory impairment and brain oxidative stress in female rats

Pourya Roknabadi[1,2], Hoda Zabihi[3], Mahmoud Hosseini[2,3]
1. Applied Biomedical Research Center, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Physiology, School of Medicine, Mashhad University of Medial Sciences, Mashhad, Iran
3. Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Given its modulatory role in estrogenic pathways, this study aimed to evaluate the effects of tamoxifen (TAM) on cognitive function and brain tissue oxidative stress in ovariectomized (OVX) rats.
Methods: The rats were randomly assigned to four experimental groups: (1) Sham, (2) OVX, (3) Sham-TAM, and (4) OVX-TAM. Animals in the Sham-TAM and OVX-TAM groups received TAM at a dose of 1 mg/kg daily for four weeks.
Results: Cognitive assessments demonstrated significant impairments in ovariectomized (OVX) rats. In the Morris water maze (MWM), OVX rats took longer to locate the hidden platform compared to Sham controls ($P<0.01$). Tamoxifen (TAM) treatment significantly reduced this escape latency ($P<0.01$). During the probe trial, OVX rats spent less time in the target quadrant ($P<0.01$), an impairment also reversed by TAM ($P<0.01$). In the passive avoidance test, OVX resulted in a shorter entry latency ($P<0.05$), which TAM treatment increased ($P<0.01$). Biochemically, TAM elevated total thiol ($P<0.05$) and reduced malondialdehyde levels ($P<0.01$) in OVX rats. The Sham-TAM group did not differ from the Sham group in any test.
Conclusion: These findings demonstrate that TAM administration mitigates cognitive impairments associated with ovariectomy. The observed restoration of learning and memory is consistent with a mechanism involving the attenuation of cerebral oxidative stress.
Keywords: Learning, Memory, Ovariectomy, Oxidative damage, Tamoxifen

P191, Effects of maternal stress on maternal care and hippocampal MDA levels in male rat offspring: Protective role of alpha-tocopherol

Roya Ranjbar Saber[1], Homeira Zardooz [1,2]
1. Neurophysiology Research Center, Institute of Neuroscience and Cognition, Shahid Beheshti University of Medical Sciences, Tehran, Iran
2. Department of Physiology, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: Maternal stress during gestation has the potential to alter maternal behaviors, resulting in long-lasting impact on the brain health of their offspring. This study examined the impact of maternal variable stress during gestation on maternal care and hippocampal Malondialdehyde (MDA) levels in male pubertal rat offspring, while also assessing the protective effects of α-tocopherol (vit E).
Methods: Pregnant female rats were randomly divided into four groups: stress, non-stress, stress + vit E, and non-stress + vit E. Animals in the stress groups were exposed to stress from gestational day 14 until the end of pregnancy. The vit E–treated groups received vit E injections during the same period. After parturition, maternal care behavior—including (Licking-Grooming, LG) was evaluated. In male offspring, the hippocampus was extracted at puberty (postnatal day 56) to measure MDA concentrations
Results: In dams who exposed to stress, the total number of LG events significantly decreased compared with the control group. In their adult offspring, the hippocampus MDA levels were elevated. Vit E administration in dams, restored their LG behavior towards their offspring and brought the levels of MDA in the offspring back to normal.
Conclusion: The results of the present study suggest that prenatal stress can interfere with the programming of different systems in the developing fetus and/or neonate. Specifically, reduced maternal LG may negatively affect the programming of the offspring nervous system oxidative balance, which could result in behavioral impairments. Administration of alpha-tocopherol, as an antioxidant, may help alleviate these negative effects.
Keywords: Maternal stress, Maternal care, Alpha-tocopherol, Hippocampus, MDA

P192, Effect of nano-oleocanthal on histopathological alterations and regulation of app and prnp gene expression in Alzheimer's rat model

Hooman Ravaei[1], Mohammad Zaefizadeh[2], Ali Abedi[3], Ghasem Fattahzadeh[4]
1. Young Researchers and Elite Club, Ardabil Branch, Islamic Azad University, Ardabil, Iran
2. Traditional Medicine and Hydrotherapy Research Center, Ardabil University of Medical Sciences, Ardabil, Iran
3. Department of Physiology, School of Medicine, Ardabil University of Medical Sciences, Iran
4. Department of Neurology, School of Medicine, Ardabil University of Medical Sciences, Iran

Background: Alzheimer's disease (AD) is a progressive neurodegenerative disorder characterized by amyloid plaque deposition, tau pathology, and neuronal loss. Natural bioactive compounds such as oleocanthal—an anti-inflammatory phenolic component of extra virgin olive oil—have recently gained attention for their potential neuroprotective effects. This study aimed to investigate the therapeutic potential of nano-formulated oleocanthal on histopathological changes and the expression of amyloid precursor protein (APP) and prion protein (PRNP) genes in an experimental rat model of AD.
Methods: Twenty-eight male Wistar rats (250–280 g) were randomly assigned into four groups: Healthy sham, Alzheimer's control, Oleocanthal-treated, and Nano-Oleocanthal-treated. AD was induced by intranasal administration of manganese nanoparticles for 21 consecutive days, followed by a 7-day rest. The treatment groups received intraperitoneal injections of 30 mg of oleocanthal or nano-oleocanthal daily for one week, followed by a one-week recovery period. Histopathological alterations in hippocampal tissues were assessed using hematoxylin and eosin (H&E) staining, while APP and PRNP expression levels were quantified by real-time PCR.
Results: MRI and behavioral analyses confirmed AD-like pathology, with evident hippocampal plaque formation. Nano-oleocanthal treatment significantly reduced neuronal degeneration and enhanced the expression of APP and PRNP genes compared to the Alzheimer's control group.
Conclusion: Nano-oleocanthal exhibits promising neuroprotective and gene-regulatory effects in AD, suggesting its potential as a preventive and therapeutic nanophytochemical candidate for future Alzheimer's disease interventions. Further mechanistic and clinical studies are warranted.
Keywords: Alzheimer's, APP, PRNP, Nano-Oleocanthal.

P193, Enhancing cognitive function in acute sleep-deprived individuals: comparative effect of intra-nasal air-puff and nasal respiration

Hanieh Riazi[1], Amir Shojaei[1]
1. Department of Physiology, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran

Background: Acute sleep deprivation impacts more than 30% of people worldwide and is known to cause notable cognitive impairments, including decreased alertness and unstable attention. Although it is a common issue, there are still few effective treatment options available. This study explored the comparative effects of intra-nasal air-puff and nasal breathing on cognitive deficits resulting from partial acute sleep deprivation, using both behavioral evaluations and electroencephalography (EEG) analysis.
Methods: We recruited 13 adult participants (male and female) who first underwent an EEG recording and a numerical Stroop test (NST) to establish baseline cognitive performance. Subsequently, participants restricted their sleep to 3-7 a.m. for next 24 h. The following day, participants were randomly assigned to two subgroups. Both subgroups underwent the same procedures, including resting-state EEG recording, intra-nasal air-puff, nasal breathing, and the NST; however, the order of intra-nasal air-puff and nasal breathing differed between the two subgroups.
Results: Intra-nasal air-puffing showed significantly more effectiveness in reducing percentage of error rate compared to nasal respiration. In addition, applying intra-nasal air-puff following sleep deprivation showed a more restorative effect in recovery of the changes in the power and complexity of both low-frequency (delta and theta) and high-frequency (beta and gamma) brain oscillations, and recovered EEG signal complexity. Furthermore, intra-nasal air-puff application also exhibited stronger reinstating outcome on intra default mode network functional connectivity.
Conclusion: These findings indicate that intra-nasal air-puff application can improve cognitive deficits caused by acute sleep deprivation, possibly by reinstating the neuronal activity in areas responsible for cognitive processing.
Keywords: acute sleep deprivation, electroencephalography, numerical Stroop test, intra-nasal air-puff, nasal respiration

P194.Purmorphamine improve D-galactose induced neural stem cells senescence by regulating increased NO production and decreasing levels of oxidants and some SASP factors

Zahra arsalani [1], Amir Ghanbari [2]
1. Islamic Azad University of Jahrom, Faculty of Basic Saieces ,Genetics Group
2. Cellular and Molecular Research Center, Yasuj University of Medical Sciences, Yasuj, Iran

Background: Cellular senescence is a permanent state of cell cycle arrest. Stem cell senescence disrupts tissue turnover, resulting in tissue aging and can induce neurodegenerative diseases in the nervous system. Improving or preventing the aging process of neural stem cells can play a role in improving neurodegenerative diseases; cell signaling pathways play an important role in controlling the aging process. Therefore, in the present study, the effect of puromorphamine as an inducer of the SHH signaling pathway on the aging of adult male mouse stem cells in culture was investigated.
Methods: After isolation and expansion of neural stem cells from mouse SVZ, to induce cell senescence in neural stem cells (ANSCs), the cells were treated with digalactose. After that, purmorphamine was added to the culture medium. Cell viability was checked by MTT method. Neurospher formed and Cells derived were counted. Number of senescent cells were identified based on increased lysosomal β-galactosidase activity by staining the cells by immunocytochemistry (ICC). The levels of NO metabolites and oxidative markers (malondialdehyde (MDA), total antioxidant capacity (TAC), total thiols (T-SH)) and inflammatory factors (interleukin 6 (IL-6), tumor necrosis factor alpha (TNF-a)) It was investigated in different groups. Graph pad prism 8.4.3 software was used for data analysis.
Results: Data analysis showed that cell viability increased with purmorphamine than control and d-gal groups. Cell viability and neurospher number improved in combination therapy of purmorphamine and d- gal than d- gal. SA-ß-gal activity was significantly decreased in purmorphamine-treated cells compared to cells exposed to D-galactose. In addition, it was shown that MDA reached its highest level in the d-galactose induced cell senescence group. This is despite the fact that after treatment with purmorphamine, its amount decreases significantly. Purmorphamine also increased TAC compared to the control group. Our findings also showed that the levels of IL-6 and TNF-alpha, as part of SASP factors, were significantly increased in the groups treated with d-galactose. While in control groups and purmorphamine decreased
Conclusion: Our results showed that purmorphamine can protect neural stem cells against D-galactose-induced oxidative stress and aging by regulating increased NO production and decreasing levels of oxidants and SASP factors.
Keywords: Cell senescence, Adult neural stem cells, purmorphamine

P195, The effect of vitamin A and C on doxorubicin induced memory impairment in male rat

Mahsa Rivandi[1], Hedieh Ghorbani[1], Salehe Teymouri[1], Marzieh Kafami[1]
1. Department of physiology, School of Medicine, Sabzevar University of Medical Sciences, Sabzevar, Iran

Background: Chemotherapy is widely used as a cancer treatment. This study was designed to determine the effects of vitamins A and C on memory impairment caused by the chemotherapeutic drug doxorubicin.
Methods: This study examined the effects of vitamins A and C on memory impairment caused by doxorubicin in 32 male Wistar rats. Over five weeks, four groups (control, doxorubicin alone, and doxorubicin with each vitamin) were assessed using behavioral tests (Shuttle Box, Novel Object). Oxidative stress markers (malondialdehyde and thiol) were then measured in the brain's cortex and hippocampus.
Results: The Shuttle Box test showed no significant group differences. However, in the novel object test, the doxorubicin group explored the new object for less time than controls, while vitamin A supplementation significantly increased exploration time compared to doxorubicin alone. Biochemically, doxorubicin increased malondialdehyde and decreased thiol levels in the cerebral cortex. Both vitamin A and vitamin C treatments significantly reduced malondialdehyde and increased thiol levels compared to the doxorubicin group.
Conclusion: Based on this study, doxorubicin increased cerebral cortex oxidative stress and impaired attention and cognition in rats, an effect reduced by vitamins A and C. However, it did not cause significant hippocampal damage or memory impairment in mice.
Keywords: Doxorubicin, Memory, Vitamin A, Vitamin C, Malondialdehyde

P196, Evaluation of malondialdehyde and tumor necrosis factor-alpha level in the brain of carbamazepine and vitamin B-6 combined treatment groups in the infantrat model of maximum electroshock seizure

Reza Zaredar[1]
1. Departmentof Biology, Faculty of BasicSciences, Shahed University, Tehran, Iran

Background: Despite the development of new drugs over the past 20 years, the proportion of drug-resistant epilepsy has not changed. In this study, the effect of vitamin B6 and carbamazepine cotreatment was investigated on the duration of the tonic response, the malondialdehyde (MDA) and tumor necrosis factor alpha (TNF-a) levels in the brain of neonate rats in the maximal electroshock (MES) model.
Methods: Seventy neonatal Wistar rats were divided into seven groups: (1) control, (2) saline and MES, (3) carbamazepine (40 mg/kg). (4 and 5) vitamin B-6 (300 and 600 mg/kg), and (6 and 7) vitamin B-6+ carbamazepine (300+ 40 mg/kg) and (600+40 mg/kg). All drugs were injected intraperitoneally 1 hour before applying MES. The duration of hind leg extension (HLE), and the level MDA and TNF-a in brain homogenate of rats were measured.
Results: The treatments did not affect the number of deaths of rats. Administration of carbamazepine (40mg/kg. i.p.) and vitamin B6 (300 mg/kg, i.p.) significantly ($p < 0.01$) reduced the HLE duration. Vitamin B-6 (600 mg/kg) only enhanced the reducing effect of carbamazepine on the duration of HLE compared to the carbamazepine alone group. Treatment with vitamin B-6 and carbamazepine alone reduced the level of MDA and TNF-a in the brain of convulsive rats, but their combined administration did not have a synergistic effect on the suppression of these factors.
Conclusion: The mechanism underlying the enhancement of the anticonvulsant response of carbamazepine administration with vitamin B-6 is independent of the modulation of MDA and TNF-a in the brain
Keywords: Seizures, Vitamin B6, infant, carbamazepine, Tumor Necrosis Factor-alpha,malondialdehyde.

P197, The protective role of β-hydroxybutyrate against behavioral and inflammatory alterations induced by high-fat diet and CFA in male rats

Marzieh Zarrin [1], Homeira Zardooz[1,2], Farzaneh Skandari[2], Fariba Azarkish[1], Homa Manaheji [1,2]
1. Department of Physiology, Faculty of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran
2. Neurophysiology Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: Chronic inflammation and metabolic dysfunction contribute to both peripheral and central alterations that affect behavior. High-fat diet and chronic inflammatory pain induced by Complete Freund's Adjuvant (CFA) are known to trigger neuroinflammatory and behavioral disturbances. β-Hydroxybutyrate (BHB) exhibits anti-inflammatory and neuroprotective properties. This study aimed to evaluate the potential of BHB to alleviate behavioral and inflammatory changes induced by a high-fat diet and CFA injection in male rats.
Methods: Thirty-six adult male rats were divided into six groups (n = 6). Animals were fed either a high-fat diet (HFD) or a normal diet (ND) and received intraplantar injections of CFA, vehicle, or saline (200 µL). β-Hydroxybutyrate (BHB) was administered orally for nine days after eight weeks of high-fat diet and one week post-CFA injection. Paw withdrawal latency (PWL) was recorded on days 0, 7, 14, and 21 to evaluate peripheral inflammation. Depression-like behavior, including anhedonia, was assessed using the sucrose preference test (SPT).
Results: CFA-injected showed significantly reduced paw withdrawal latency (PWL) on days 0, 7, 14, and 21. High-fat diet (HFD) rats exhibited more pronounced depression-like behavior compared to normal diet (ND). β-Hydroxybutyrate (BHB) treatment alleviated the PWL in the CFA group and improved depression-like behavior in HFD-fed rats**.**
Conclusion: β-Hydroxybutyrate attenuates inflammation- and high-fat diet-induced behavioral alterations. These results showed its potential as a therapeutic agent in metabolism and neuroinflammation conditions.
Keywords:. CFA, High- fat diet, Depression-like behaviors, Peripheral inflammation

P198, Herbal Immunomodulators Targeting ER Stress and Neuroinflammation in Alzheimer's Disease: A Systematic Review

Azim Zaeimbashi[1,3], Mahdi Abdsheikhi[2], Farzaneh Vafaee [1,3]
1. Department of Neuroscience, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Immunology, Faculty of Medicine Mashhad University of Medical Sciences Mashhad Iran
3. Neuroscience Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Dysregulation of the endoplasmic reticulum (ER) and the unfolded protein response (UPR) plays a central role in Alzheimer's disease (AD) by promoting protein misfolding, synaptic deficits, and neuroimmune disturbances. Certain herbal compounds with anti-inflammatory and antioxidant activities may counteract these ER-stress-induced neuroinflammatory processes. However, no comprehensive synthesis of evidence focusing on these mechanisms in AD has been published.
Methods: We systematically reviewed PubMed, Scopus, Web of Science, and EMBASE up to June 2025 for original studies, including in vitro, in vivo, and clinical reports, that evaluated herbal interventions modulating ER stress markers (GRP78/BiP, CHOP, PERK, IRE1α, ATF6) and neuroimmune outcomes (microglial activity, NF-κB, NLRP3, IL-1β, TNF-α) in AD models. Relevant studies were identified through systematic searches and data were extracted for analysis.
Results: Preclinical data consistently show that multiple phytochemicals—such as polyphenols, ginsenosides, berberine, and triterpenoid saponins—reduce ER-stress-related neuroinflammation. Mechanisms include suppression of PERK-CHOP signaling, inhibition of NF-κB/NLRP3 pathways, and promoting a shift of microglia from pro-inflammatory (M1) to neuroprotective (M2) states. These molecular effects were accompanied by decreased oxidative stress and improved cognitive outcomes in animal models. Evidence from human studies remains limited and variable, highlighting a clear translational gap.
Conclusion: Herbal immunomodulators targeting ER stress and neuroimmune pathways represent a promising multi-target approach for AD treatment. Further well-designed preclinical and early-phase clinical studies are needed to confirm efficacy and ensure safety in humans.
Keywords: Alzheimer Disease, Endoplasmic Reticulum Stress, Neuroinflammation, Phytotherapy, Immunomodulation

P199, Gynostemma pentaphyllum: Neuroprotective and immunomodulatory mechanisms via antioxidant and anti-inflammatory effects

Azim Zaeimbashi[1,3], Mahdi Abdsheikhi[2], Farzaneh Vafaee [1,3]
1. Department of Neuroscience, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Immunology, Faculty of Medicine Mashhad University of Medical Sciences Mashhad Iran
3. Neuroscience Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Neurodegenerative disorders pose a major challenge to global health, primarily due to progressive neuronal loss and dysregulation of immune responses. Gynostemma pentaphyllum, a traditional medicinal plant, has emerged as a promising candidate for supporting neuronal health and modulating immune function. Despite numerous preclinical studies, there is a lack of comprehensive narrative reviews summarizing its combined neuroprotective and immunomodulatory effects.
Methods: We conducted an extensive survey of studies published between 2000 and 2025, focusing on animal models of cognitive impairment, oxidative stress, and neuroinflammation. Selected studies evaluated behavioral outcomes, molecular markers, and cellular mechanisms to highlight pathways influenced by bioactive compounds in Gynostemma, particularly gypenosides.
Results: Evidence indicates that Gynostemma enhances neuronal survival by upregulating neurotrophic factors, such as BDNF, and activating CREB signaling pathways. At the same time, it reduces neuroinflammation by suppressing pro-inflammatory mediators including NF-κB, TNF-α, and IL-1β. Additionally, it strengthens antioxidant defenses through activation of Nrf2 signaling and increased activity of enzymes like SOD and GPx, resulting in decreased oxidative stress. The convergence of these mechanisms contributes to improved synaptic function and cognitive performance in multiple preclinical models, suggesting synergistic interactions between neuroprotection and immune modulation.
Conclusion: Overall, these findings support the potential of Gynostemma pentaphyllum as a therapeutic agent for preserving neuronal integrity and regulating immune responses. Further research, particularly translational and clinical studies, is required to determine optimal dosing, formulation, and efficacy in humans. Integrating mechanistic insights with clinical endpoints may accelerate the development of Gynostemma-based interventions for neurodegenerative and neuroinflammatory conditions.
Keywords: Gynostemma pentaphyllum, Neuroprotective Agents, Neuroimmunomodulation, Antioxidants, Anti-Inflammatory Agents

P200, The role of nitric oxide in improving cognitive impairment in an animal model of Alzheimer's disease induced by aluminum chloride

Reyhaneh Zeinali[1], Manizheh Karami[1], Hedayat Sahraei[2]
1. Department of Biology, Faculty of Basic Sciences, Shahed University, Tehran, Iran
2. Department of Physiology, Baghiyatollah University of Medical Sciences, Tehran, Iran

Background: Alzheimer's disease (AD) is a neurodegenerative disorder characterized by memory impairment and the accumulation of beta-amyloid plaques (AP) in the brain, particularly in the hippocampus. Sodium nitroprusside (SNP), by releasing nitric oxide (NO), and L-arginine may enhance memory performance. This study investigates the role of NO producers in improving cognitive deficits induced by ALCl3 (Al).
Methods: Male Wistar rats modeled for AD using Al. A three-phase conditioned place preference (CPP) protocol adjusted for novelty seeking over five days was employed. The rats were divided into three groups: control (I µL/rat, intra-CA1), Alzheimer's model receiving Al (25 µg/rat, intra-CA1), and Al-treated groups, which received SNP or L-arginine at doses of 0.05, 3, and 9 µg/rat, intra-CA1 pre-testing of the novelty seeking.
Results: Alzheimer's was induced by injecting Al into the CA1 region of the hippocampus. Administration of L-arginine or NPS, through increasing NO levels in the hippocampus, led to memory improvement in an Alzheimer's model induced by Al.
Conclusion: The NO pathway in the hippocampus, following treatment with NO producers, plays a significant role in improving the cognition in AD and is considered a potential therapeutic target.
Keywords: Alzheimer's disease, cognitive impairment, CA1, CPP, Novelty seeking behavior

P201, The impact of escitalopram on obsessive-compulsive disorder symptoms induced by chronic stress in male rats

Vajihe Saedi-Marghmaleki[1], Maryam Radahmadi[1], Hojjatallah Alaei[1], Hossein Khanahmad[2]
1. Department of Physiology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran
2. Department of Genetics and Molecular Biology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran

Background: Obsessive-Compulsive Disorder (OCD) is a prevalent anxiety disorder that can be exacerbated by chronic stress. This study aimed to evaluate the effect of escitalopram on obsessive-compulsive symptoms in male rats subjected to chronic predictable (PCMS) and unpredictable (UCMS) stress.
Methods: Forty-nine male rats were randomly assigned to seven groups: Control (Co), Sham (Sh), Predictable stress (P.St), Unpredictable stress (UP.St), Escitalopram (Esc), Predictable stress-escitalopram (P.St-Esc), and Unpredictable stress-escitalopram (UP.St-Esc). Stress protocol was applied for 2 hours/day for 21 days. Escitalopram (10 mg/kg, i.p.) was administered daily. OCD symptoms were assessed using the Marble Burying (MB) test, recording the number of marbles buried.
Results: The UP.St group showed a significant increase in marble burying compared to control group, indicating the OCD induction in unpredictable stress conditions. Escitalopram treatment did not significantly reduce the number of buried marbles in the UP.St-Esc group compared to the UP.St group. However, the UP.St-Esc group still exhibited higher OCD symptoms than both the control, and escitalopram, and P.St-Esc groups.
Conclusion: Escitalopram did not induce OCD symptoms by chronic stress in the predictable stress subjects. In addition, there were the OCD in the unpredictable stress conditions with and without escitalopram administration. It suggested that unpredictable stress was so destructive that even escitalopram could not play a beneficial role in managing stress-related OCD. Therefore, escitalopram was not effective for improvement induced-OCD by predictable and unpredictable stress conditions.
Keywords: Escitalopram, Obsessive-Compulsive Disorder, Predictable stress, Unpredictable stress.

P202, Simvastatin modulates inflammation, amyloidogenesis, and mitochondrial function in trimethyltin neurotoxic model

Adel Salari[1, 2], Mehrdad Roghani[2], Mohsen Khalili[2], Mahdieh Taheri[2]
1. Department of Physiology, Faculty of Biological Science, Kharazmi University, Tehran, Iran
2. Neurophysiology Research Center, Shahed University, Tehran, Iran

Background: Trimethyltin (TMT) is a highly neurotoxic organotin compound known to selectively damage the hippocampus, provoke neuroinflammation, and cause cognitive dysfunctions reminiscent of those observed in Alzheimer's disease (AD). Simvastatin, an HMG-CoA reductase inhibitor primarily used for dyslipidemia, has exhibited pleiotropic neuroprotective properties, including anti-inflammatory and antioxidant effects. The present study aimed to investigate the impact of simvastatin on inflammatory cytokine profiles, β-secretase (BACE1) activity, and mitochondrial membrane potential (MMP) in a rat model of TMT-induced neurotoxicity.
Methods: Forty adult male Wistar rats (200–250 g) were randomly assigned to five groups (n=8): control, control + simvastatin (30 mg/kg), TMT, TMT + simvastatin (10 mg/kg), and TMT + simvastatin (30 mg/kg). TMT (8 mg/kg, i.p.) was administered as a single dose to induce neurotoxicity. Simvastatin was administered orally for 21 consecutive days, starting one hour post-TMT. Hippocampal levels of TNF-α, IL-17, IL-10, BACE1, and MMP were quantified. Behavioral and histological evaluations were also performed. Statistical analysis was conducted using one-way ANOVA followed by Tukey's post hoc test.
Results: Simvastatin significantly attenuated pro-inflammatory cytokines (TNF-α, IL-17), upregulated anti-inflammatory IL-10, inhibited BACE1 expression, and restored MMP in TMT-exposed rats, indicating reduced neuroinflammation and mitochondrial dysfunction.
Conclusion: These findings underscore the therapeutic potential of simvastatin in mitigating TMT-induced neurodegeneration via multifaceted modulation of inflammatory and amyloidogenic pathways as well as mitochondrial preservation, supporting its prospective utility in treating AD-related neuropathologies.
Keywords: Alzheimer's disease, Simvastatin, Cognition, Trimethyltin, Neuroprotection.

P203, Orlistat induced alterations in depressive behavior in mice after BCG inoculation

Azadeh Mesripour[1], Nazanin Behrooz[1]
1. Department of Pharmacology and Toxicology, Pharmaceutical Science Research Center, School of Pharmacy and Pharmaceutical Sciences, Isfahan University of Medical Sciences, Isfahan, Iran

Background: Research has indicated that weight-loss medications can contribute to depression. Given that Orlistat is a commonly used weight loss drug, this study examined its effects on depressive behavior in mice, both on its own and following depression induced by the Bacillus Calmette-Guerin (BCG) vaccine.
Methods: Male NMRI mice weighing 28±2 grams were used (10 animals in each group). Orlistat (25 mg/kg, gavage), and the reference antidepressant imipramine (10 mg/kg, intraperitoneally) were administered for 14 Day. One dose of BCG (0.2 ml per animal) was inoculated intraperitoneally. After evaluating the locomotor activity, depression was checked by the forced swimming test (FST), novelty suppressed feeding test (NSFT) and sucrose preference.
Results: The locomotor activity in different groups was not different from the control group. BCG inoculation induced depressive behavior; orlistat alone did not cause significant changes in depressive behavior compared to the control group. However, in mice that received BCG, the immobility time during FST significantly increased following orlistat administration ($p < 0.05$), Latency time and food consumption during NSFT did not change compared to the BCG-only group, in contrary to imipramine-BCG group. But orlistat, like imipramine, was able to eliminate the reluctance caused by administration of BCG in the sucrose preference test.
Conclusion: The changes observed during orlistat administration in mice depressed by BCG suggest that orlistat may exacerbate despair behavior. While caution is necessary when extrapolating animal results to humans, it can be inferred that orlistat should be used carefully in patients experiencing depression.
Keywords: Depression, Orlistat, Animal study, Antidepressants, BCG

P204, Effects of Exosomal miRNA on Spatial Memory Performance in Alzheimer's Animal Models: A Systematic Review and Meta-analysis

Azam Abedi[1], Fatemeh Abbaszadeh[2], Leila Dargahi[3]
1. Tissue Engineering and Regenerative Medicine Research Center, Baqiyatallah University of Medical Sciences, Tehran, Iran
2. Neurobiology Research Center, Institute of Neuroscience and Cognition, Shahid Beheshti University of Medical Sciences, Tehran, Iran
3. Neuroscience Research Center, Institute of Neuroscience and Cognition, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: Alzheimer's disease is a progressive disorder that results in the deterioration of spatial memory. Exosomes have been extensively explored in preclinical Alzheimer's models. This meta-analysis aims to evaluate the effectiveness of exosomal miRNA in enhancing spatial memory in animal models of Alzheimer's disease.
Methods: A comprehensive search of PubMed, Embase, Scopus, and Web of Science was conducted from inception to July 18, 2025. Relevant studies were selected based on inclusion criteria, and a random-effects model was used to assess the effect of exosomal miRNA treatment. Results were expressed as Standardized Mean Difference (SMD), with primary outcomes being memory assessment via Morris Water Maze (MWM) and Novel Object Recognition (NOR). Risk of Bias (ROB) was assessed using the SYRCLE tool for animal studies, and Review Manager software was used for analysis.
Results: A total of 14 preclinical studies were included. The findings revealed that exosomal miRNA treatment significantly improved memory performance in Alzheimer's disease models. In the MWM test, significant improvements were observed in escape latency (SMD: -1.59; 95% CI: [-2.29, -0.89]), platform crossing (SMD: 1.82; 95% CI: [1.15, 2.50]), and time spent in the target quadrant (SMD: 1.96; 95% CI: [1.14, 2.78]). Additionally, improvements in memory performance were noted in the NOR test (SMD: 2.28; 95% CI: [1.24, 3.33]). Sensitivity analysis and heterogeneity testing revealed a decrease in variability across studies.
Conclusion: This meta-analysis demonstrates that exosomal miRNAs significantly enhance spatial memory in animal models of Alzheimer's disease, supporting their potential as therapeutic agents and highlighting the need for further standardized research.
Keywords: Spatial memory, Exosome treatment, Exosomal miRNAs

P205, Interplay of MeCP2/REST/synaptophysin-BDNF and intranasal oxytocin influence on Aβ-induced memory and cognitive impairments

Nahid Sarahian[1]
1. Neuroscience Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Islamic Republic of Iran

Background: Alzheimer's disease (AD) is linked to the accumulation of Aβ, increased tau hyperphosphorylation, persistent neuroinflammation, and a decline in neurotrophic factors, neurogenesis, and synaptic plasticity. Oxytocin (OT) has a significant impact on memory and learning. We examined the influence of intranasal (IN) OT on synaptic plasticity, neurogenesis, histone acetylation, and spatial and cognitive memories in rats.
Methods: Aβ25-35 (5 µg/2.5 µl) was administered bilaterally in the CA1 of male Wistar rats for four consecutive days. After seven days of recovery, OT (2 µg/µl, 10 µl in each nostril) was administered IN for seven consecutive days. Working, spatial, and cognitive memories, and gene expression of neurogenesis- and synaptic plasticity-involved factors were measured in the hippocampus. Histone acetylation (H3K9 and H4K8) was also measured using western blotting.
Results: IN administration of OT significantly improved working and spatial memory impairment induced by Aβ and increased the factors involved in synaptic plasticity (MeCP2, REST, synaptophysin, and BDNF) and neurogenesis (Ki67 and DCX). We also found an enhancement in the levels of H3K9ac and H4K8ac following OT administration.
Conclusion: These findings indicated that IN OT could improve hippocampus-related behaviors by increasing synaptic plasticity, stimulating neurogenesis, and chromatin plasticity.
Keywords: Alzheimer's disease; Histone acetylation; Memory; Neurogenesis; Neuroplasticity; Oxytocin.

P206, Effect of developmental period manipulation of the serotonergic system on spatial memory, brain-derived neurotrophic factor (BDNF) levels, and morphology of the neurons in the hippocampus

Hakimeh Saadati[1] Safa Ghaher fard[2], Nona Sakhaie[2], Farshid Sadegzadeh[2], Zahra Mashhadi[2]
1. Pharmaceutical Sciences Research Center, Ardabil University of Medical Sciences, Ardabil, Iran
2. Students Research Committee, School of Medicine, Ardabil University of Medical Sciences, Ardabil, Iran

Background: Previous evidence suggests that serotonin (5-HT) is an essential neurotransmitter for the refined organization of the cerebral cortex. Several studies have indicated that altered serotonin signaling contributes to cognitive impairment and psychiatric disorders. Despite increasing evidence that 5-HT can impact neuronal morphology, neurogenesis, and cognitive functions, the exact role of this neurotransmitter in the development of hippocampal neurons is not yet fully understood.
Methods: In the present study, we examined the effects of the para-chlorophenylalanine (PCPA; postnatal days 10-20) on the hippocampal and prefrontal cortex of serotonin and brain-derived neurotrophic factor (BDNF) levels. We also focused on the morphology of the neurons in the hippocampus and spatial learning and memory.
Results: Our paradigm used is the daily administration of PCPA, a reversible inhibitor of 5-HT synthesis, during the postnatal days 10-20. We evaluated the 5-HT depletion caused by this treatment and indicated that it led to a decrease in serotonin levels in the hippocampus and prefrontal cortex. Postnatal serotonin depletion induced subtle alterations in the neuronal populations of the hippocampus and impaired spatial memory in the adult period of life. Developmental serotonin depletion also decreased the BDNF levels in the hippocampus and prefrontal cortex. We found that critical developmental serotonin depletion caused atrophy and loss of neurons, as well as significant neuronal loss in the hippocampal CA1, CA3, and DG areas.
Conclusion: Thus, serotonin, an essential neurotransmitter, can influence neuronal morphology, development, and hippocampus-dependent memory.
Keywords: Developmental period, Serotonin depletion, Hippocampal neuron morphology, Spatial memory, BDNF

P207, The effects of postnatal serotonin depletion on cognitive functions in sleep-deprived male rats

Hakimeh Saadati[1], Zahra Mashhadi[2], Safa Ghaher fard[2]
1. Pharmaceutical Sciences Research Center, Ardabil University of Medical Sciences, Ardabil, Iran
2. Students Research Committee, School of Medicine, Ardabil University of Medical Sciences, Ardabil, Iran

Background: Serotonin is a monoamine neurotransmitter that plays a major role in regulating physiological and cognitive functions. Serotonergic system dysfunction is involved in the etiology of various psychiatric and neurological disorders.
Methods: Therefore, the present study was designed to investigate the effects of early-life serotonin depletion on cognitive disorders caused by sleep deprivation. Serotonin was depleted by para-chlorophenylalanine (PCPA, 100 mg/kg, s.c.) from postnatal day 10 to 20, followed by sleep deprivation induced through the multiple platform apparatus for 24 hours at postnatal day 60.
After examining the novel object recognition and passive avoidance memories, the hippocampi and prefrontal cortex were dissected to assess brain-derived neurotrophic factor (BDNF) mRNA expression by PCR.
Results: Our findings showed that postnatal serotonin depletion and sleep deprivation impaired novel object recognition and passive avoidance memories, and altered BDNF levels. In the same way, the serotonin depletion in early life before sleep deprivation exacerbated the harmful effects of sleep deprivation on cognitive function and BDNF levels.
Conclusion: It can be claimed that the serotonergic system plays a major role in the modulation of sleep and cognitive functions.
Keywords: BDNF, Passive avoidance memory, Recognition memory, Serotonin, Sleep deprivation

P209, The role of estrogen receptor beta (ERβ) in modulating Alzheimer's disease progression

Mohammadreza Soltani[1], Amir Hossein Zarifkar[2]
1. Student Research Committee, Larestan University of Medical Sciences, Larestan, Iran
2. Department of Basic Sciences, School of Medicine, Larestan University of Medical Sciences, Larestan, Iran

Background: Approximately two-thirds of individuals with Alzheimer's disease (AD) are women. The female sex hormone estrogen contributes to neuroprotection, and its decline during menopause is considered a potential risk factor for the development of AD.
Methods: The present paper is a review study. In this study, 10 articles published between 2020 and 2025, including quantitative studies, meta-analyses, original research articles, and systematic reviews, were examined. The inclusion criteria were the availability of full-text articles and publication within the years 2020 to 2025, while the exclusion criterion consisted of case report studies. The keywords used in this review were: Alzheimer's disease, Estrogen receptor beta, Sex hormones, Neuroprotection
Results: Research has shown that ERβ activation provides protection against amyloid plaque accumulation and cognitive decline in both men and women. Interestingly, this neuroprotective effect appears to function differently across brain regions and exhibits sex-specific influences on neuroinflammation and microglial immune activity. Surgical menopause (ovariectomy) increases amyloid levels, which are reduced by ERβ activation, although neuroinflammation remains elevated and persistent. In this study, soluble Aβ levels were found to be higher in the cortex and hippocampus of female mice compared with males, accompanied by greater microglial activation. Ultimately, the findings indicated that ERβ does not alter APP processing but instead exerts its protective effects, at least in part, through microglial activation in a sex-specific manner.
Conclusion: In conclusion, this novel approach may represent a significant step forward in advancing our understanding of Alzheimer's disease and developing more effective therapeutic strategies.
Keywords: Alzheimer's disease, Estrogen receptor beta, Sex hormones, Neuroprotection

P210, Yoga vs. aerobic cycling: effects on stress, fatigue, and motor performance in multiple sclerosis patients

Mahdiar Salmani[1], Mohammad Javad Khataee[2], Zahra Mohammadnia[3], Mahmood Soltani[1], Fahimeh Lavi[4]

1. Department of Physical Education, Mashhad Branch, Islamic Azad University, Mashhad, Iran
2. Department of Immunology, School of Medicine, Golestan University of Medical Sciences, Gorgan, Iran
3. Department of Virology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
4. Department of Immunology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Multiple sclerosis (MS) is a long-term autoimmune condition that harms the myelin sheath, resulting in increased fatigue, reduced motor function, and elevated perceived stress. Exercise-based interventions such as yoga and aerobic training have been shown to improve psychological and physical outcomes in MS patients. There is still limited evidence for a direct comparison between these two exercise modalities; we aimed to compare the effects of yoga and aerobic cycling on perceived stress, fatigue, and motor performance in individuals with MS.

Methods: A comprehensive search was conducted across major databases, including PubMed, Google Scholar, Web of Science, and Scopus. The selected articles were published between 2016 and 2025. We found these articles using specific keywords that matched the goals of our study. Finally, we compared stress, fatigue, and mobility before and after these activities according to three assessments: the Perceived Stress Scale (PSS), the Fatigue Severity Scale (FSS), and the Timed Up and Go (TUG) test.

Results: The findings have shown that Participants in the yoga and aerobic cycling groups demonstrated significant decreases in perceived stress and fatigue relative to the control group. Although both interventions enhanced motor performance, aerobic cycling yielded more considerable improvements in balance and mobility. In contrast, yoga emerged as a powerful way to boost mental well-being.

Conclusion: The results suggest that yoga and aerobic cycling can reduce physical and mental symptoms in people with multiple sclerosis (MS). Therefore, a combination of these two exercises has the best effect in treatment programs among MS patients.

Keywords: Multiple sclerosis (MS), Yoga, Aerobic cycling, Perceived stress, Motor performance

P211, Investigation of Tfam, a mitochondrial biogenesis factor, following 40 Hz white light exposure in an STZ-induced Alzheimer's model

Elham Soleimani[1], Abolhassan Ahmadiani[2], Afsaneh Eliassi[3], Fariba Khodagholi[2]

1. Department of Neuroscience, School of Advanced Medical Sciences and Technologies, Hamadan University of Medical Sciences, Hamadan, Iran

2. Neuroscience Research Center, Institute of Neuroscience and Cognition, Shahid Beheshti University of Medical Sciences, Tehran, Iran

3. Neurophysiology Research Center, Institute of Neuroscience and Cognition, Shahid Beheshti University of Medical Sciences, Tehran, Iran; Department of Physiology, Faculty of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: Light, as a non-invasive environmental factor, has the potential to influence neuronal activity through modulating mitochondrial function. Accordingly, evaluating key regulators of mitochondrial biogenesis such as Tfam (Mitochondrial Transcription Factor A) is crucial to better understand the mechanisms underlying light-based therapeutic strategies.
Methods: To induce the Alzheimer's-like pathology, STZ was administered intracerebroventricularly (ICV) at a dose of 3 mg/kg. Following a 7-day recovery period after stereotaxic surgery, animals were exposed to 40 Hz white LED light for 15 minutes per day over a consecutive 7-day period. Twenty-four hours after the final exposure, brain tissues from the hippocampus, amygdala, and prefrontal cortex were collected. Tfam protein levels were quantified using Western blot analysis.
Results: The results showed no statistically significant differences in Tfam expression between light-exposed and control groups across all brain regions examined.
Conclusion: These findings suggest that under the current experimental conditions, 40 Hz white light exposure does not significantly modulate mitochondrial biogenesis through Tfam protein expression. This may be attributed to factors such as timing of tissue collection, duration of treatment, or the exclusive focus on protein level without assessing gene expression. Future investigations should consider extended exposure protocols and include transcriptional analysis to gain deeper insights into the neuromodulatory potential of pulsed white light therapy.
Keywords: Alzheimer's disease, streptozotocin, 40 Hz White Light, Tfam

P212, Low-frequency communication from olfactory bulb to prefrontal cortex in anxiety-like behaviors

Ali Samii Moghaddam [1], Mohammad Ali Mirshekar [1,2]
1. School of Medicine, Zahedan University of Medical Sciences, Zahedan, Iran
2. Clinical Immunology Research Center, Zahedan University of Medical Sciences, Zahedan, Iran

Background: Anxiety disorders involve altered brain circuit dynamics, but the neural mechanisms underlying olfactory-prefrontal interactions during anxiety remain unclear.
Methods: we recorded simultaneous local field potentials (LFPs) from the olfactory bulb (OB) and prefrontal cortex (PFC) in male Wistar rats during anxiety-provoking behavioral tests, including the Elevated Plus Maze (EPM) and Open Field (OF). Functional connectivity was assessed through beta-band (13–30 Hz) synchronization using cross-correlation and power correlation analyses.
Results: Behavioral tests revealed a significant increase in beta-frequency synchronization between OB and PFC during anxiogenic conditions compared to resting states. Notably, enhanced functional coupling was observed specifically in anxiogenic zones—the open arms of the EPM and the center area of the OF. These effects suggest an intensity-dependent increase in OB-PFC interaction associated with anxiety states.
Conclusion: Our findings identify beta-band OB-PFC synchronization as a novel electrophysiological marker of anxiety, providing insight into sensory-executive integration during threat processing. This enhanced connectivity may contribute to the neural circuitry underlying anxiety and represents a potential target for therapeutic intervention.
Keywords: Beta oscillations, Correlation, LFP.

P213, Anxiety-induced enhancement of beta OB-PFC functional connectivity

Ali Samii Moghaddam [1], Mohammad Ali Mirshekar [1,2]
1. School of Medicine, Zahedan University of Medical Sciences, Zahedan, Iran
2. Clinical Immunology Research Center, Zahedan University of Medical Sciences, Zahedan, Iran

Background: Anxiety disorders involve altered brain circuit dynamics, but the neural mechanisms underlying olfactory-prefrontal interactions during anxiety remain unclear.
Methods: we recorded simultaneous local field potentials (LFPs) from the olfactory bulb (OB) and prefrontal cortex (PFC) in male Wistar rats during anxiety-provoking behavioral tests, including the Elevated Plus Maze (EPM) and Open Field (OF). Functional connectivity was assessed through beta-band (13–30 Hz) synchronization using cross-correlation and power correlation analyses.
Results: Behavioral tests revealed a significant increase in beta-frequency synchronization between OB and PFC during anxiogenic conditions compared to resting states. Notably, enhanced functional coupling was observed specifically in anxiogenic zones—the open arms of the EPM and the center area of the OF. These effects suggest an intensity-dependent increase in OB-PFC interaction associated with anxiety states.
Conclusion: Our findings identify beta-band OB-PFC synchronization as a novel electrophysiological marker of anxiety, providing insight into sensory-executive integration during threat processing. This enhanced connectivity may contribute to the neural circuitry underlying anxiety and represents a potential target for therapeutic intervention.
Keywords: Beta oscillations, Correlation, LFP.

P214, Olfactory bulb stimulation attenuates depression-like behaviors in rats subjected to chronic unpredictable mild stress (CUMS)

Ashkan Sanaeirad[1], Payam Shahsavar[1], Mahmoud Rezaei [1], Armin Pourhosseiny [2], Seyed Javad Mirnajafi-Zadeh[1], Mohammad Reza Raoufy[1]
1. Department of Physiology, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran
2. Department of Pharmacology, Medical Science University, Tehran, Iran

Background: Major Depressive Disorder (MDD) is among the most prevalent psychiatric conditions globally. Due to the anatomical and functional connections between the olfactory system and mood-regulating brain regions, olfactory pathway stimulation has been proposed as a potential strategy for alleviating depressive symptoms.
Methods: Thirty-two male Wistar rats were randomly assigned to four groups: control and CUMS-exposed (depressed), with or without stimulation. Depression was induced using an eight-week Chronic Unpredictable Mild Stress (CUMS) protocol. One of the CUMS-exposed groups then received olfactory bulb stimulation (130 Hz, 60 minutes/day) for seven consecutive days. Behavioral assessments included the Sucrose Preference Test (SPT), Open Field Test (OFT), and Forced Swim Test (FST).
Results: CUMS exposure significantly reduced sucrose consumption, increased immobility time in the FST, and decreased locomotor activity in the OFT hallmarks of depression-like behavior. Olfactory bulb stimulation significantly improved sucrose intake, enhanced exploratory activity in the OFT, and reduced immobility time in the FST in CUMS-exposed rats.
Conclusion: These findings suggest that olfactory bulb stimulation may serve as a novel neuromodulatory approach to reduce depression-like behaviors.
Keywords: TRD, DBS, Olfactory bulb.

P215, Neuroprotective efficacy of quercus infectoria gall nanoparticles against toxoplasma gondii-induced neuroinflammation and cognitive impairment

Rezvan Sohrabi[1,2], Marzieh Rashidipour[2], Hossein Mahmoudvand[2], Mojtaba Khaksarian[2]
1. Neurophysiology Research Center, Institute of Neuroscience and Mental Health, Avicenna Health Research Institute, Hamadan University of Medical Sciences, Hamadan, Iran
2. Razi Herbal Medicines Research Center, Lorestan University of Medical Sciences, Khorramabad, Iran

Background: Toxoplasma gondii infection is increasingly recognized as a contributor to neuroinflammation and cognitive dysfunction. This study investigated the neuroprotective potential of Quercus infectoria gall extract nanoparticles (QIG-NPs) in a murine model of chronic toxoplasmosis, focusing on their modulatory effects on hippocampal inflammatory mediators.
Methods: Chronic toxoplasmosis was established in mice through intraperitoneal inoculation of 25–30 tissue cysts of the Tehran strain of T. gondii. Following infection confirmation, animals received oral QIG-NPs (50, 100, or 200 mg/kg) for 14 consecutive days. Spatial learning and memory were evaluated using the Morris water maze and passive avoidance tests. Hippocampal mRNA levels of TNF-α, IFN-γ, IL-1β, and iNOS were quantified by real-time PCR.
Results: T. gondii infection markedly impaired memory performance and upregulated pro-inflammatory gene expression. QIG-NP treatment significantly and dose-dependently improved cognitive outcomes while downregulating TNF-α, IFN-γ, IL-1β, and iNOS transcripts in the hippocampus.
Conclusion: QIG-NPs exert robust neuroprotective and anti-inflammatory effects against T. gondii-induced neuropathology. These findings highlight the therapeutic promise of Quercus infectoria nanoderivatives for managing infection-related neuroinflammatory disorders.
Keywords: Toxoplasma gondii , Quercus infectoria Gall, Nanoparticles, Neuroinflammation, Cognitive Impairment.

P216, Safranal alleviates schizophrenia-like symptoms in mice

Seyedeh Saboura Seyedan [1], Hamidreza Sadeghnia [2], Ali Namavar[3], Mohaddeseh Sadat Alavi[2]
1. Department of Clinical Psychology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Pharmacological Research Center of Medicinal Plants, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
3. Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Schizophrenia is a severe neuropsychiatric disorder characterized by core psychiatric symptoms, including positive, negative, and cognitive symptoms. Current treatments for schizophrenia affect positive symptoms but have limited efficacy on negative or cognitive symptoms. Safranal, a major saffron constituent ,has a wide range of pharmacological effects, including anti-inflammatory, antioxidant, and anti-apoptotic effects. Safranal has the potential to exert neuroprotective effects in neurological disorders. In this study, we investigated the effects of safranal on schizophrenic-like behaviors in mice induced by MK-801, an N-methyl-D-aspartate (NMDA) receptor antagonist.
Methods: Sixty male C57BL/6J mice were divided into six groups (n=10): control,MK-801 (0.3 mg/kg), risperidone (0.2 mg/kg), and safranal (0.75, 1.5, and 3 mg/kg). After injections, behavioral tests including open field (positive symptoms), social interaction (negative symptoms), novel object recognition (cognitive deficits), and elevated plus maze (anxiety-like behavior) were performed.
Results: Administration of safranal blocked MK-801-induced hyperactivity in the open field test. In the novel object recognition test, MK-801-induced attention and cognitive memory impairments were reversed by safranal administration. In addition, safranal normalized MK-801-induced anxiety in the elevated plus maze. Safranal significantly reduced MK-801-induced impairments in the social interaction test.
Conclusion: Safranal effectively reduces positive, negative, and cognitive symptoms of schizophrenia in the MK-801 model and can be an adjunct therapy for the management of schizophrenia symptoms.
Keywords: Safranal, Schizophrenia, MK-801, Negative symptoms, Cognitive deficits.

P217, Anacyclus pyrethrum treatment restores spatial learning in rats with Alzheimer-like pathology

Adib Valibeygi[1], Fateme Zareian[1], Alireza Tavassoli[2], Amirali Ebrahimbabaei[1], Manzarbanoo Shojaeifard[3]
1. Student Research Committee, Fasa University of Medical Sciences, Fasa, Iran
2. School of Medicine, Fasa University of Medical Sciences, Fasa, Iran
3. Department of Physiology, Fasa University of Medical Sciences, Fasa, Iran

Background: Alzheimer's disease is the primary cause of dementia. This study examined whether a hydroalcoholic extract of Anacyclus pyrethrum (AP) could enhance cognitive performance in rats exhibiting Alzheimer's pathology induced by intracerebroventricular administration of Amyloid-beta 1–42.
Methods: Cognitive function was evaluated using the Morris Water Maze (MWM) to assess spatial learning and memory. Positron emission tomography (PET) imaging was employed to verify the accurate induction of Alzheimer's pathology. Brain tissue was examined histologically to assess treatment effects on tau-related abnormalities.
Results: PET imaging confirmed proper Aβ deposition in the Alzheimer's model. In the MWM, AP-treated rats showed significant improvements compared to Alzheimer's rats, including spending more time in the target quadrant and traveling a shorter distance to reach the hidden platform. AP-treated animals exhibited noticeable performance improvements over time. Histological analysis showed reduced tau-related pathology after AP treatment.
Conclusion: Oral administration of AP extract notably enhanced spatial memory and cognitive functions in the Alzheimer's rat model. These results encourage further investigation of AP as a possible therapy for alleviating cognitive deficits associated with Alzheimer's disease.
Keywords: Alzheimer's disease, Dementia, Anacyclus Pyrethrum, Amyloid-beta, Positron emission tomography (PET).

P218, Cerebral ischemia-reperfusion-induced cardiac oxidative stress, apoptosis and TLR4/NF-κB signaling alterations: The effect of losartan

Yasaman Shakouri[1], Roya Naderi[2,3], Hamid Sorayya[4]

1. Student Research Committee, Urmia University of Medical Sciences, Urmia, Iran
2. Neurophysiology Research Center, Cellular and Molecular Medicine Research Institute, Urmia University of Medical Sciences, Urmia, Iran
3. Department of Physiology, School of Medicine, Urmia University of Medical Sciences, Urmia, Iran
4. Experimental and Applied Pharmaceutical Research Center, Urmia University of Medical Sciences, Urmia, Iran

Background: Cerebral ischemia is associated with myocardial injury and arrhythmias, although the underlying mechanisms are not well elucidated. The aim of this study is to explore the effect of cerebral ischemia reperfusion on oxidative stress inflammation and apoptosis and TLR4/NF-κB axis in the rat heart alone and in combination with losartan as an angiotensin II receptor blocker.

Methods: The experimental groups were as follows (n = 6): 1) sham 2) ischemia-reperfusion (IR, 20 min ischemia, 24 hours reperfusion), 3) ischemia-reperfusion+losartan (IR+LOS, 3 mg/kg, ip, 1 hour before ischemia). At the end of experiment, the samples collected for later measurement.

Results: In IR animals heart MDA and TOS increased while TAC and SOD concentration decreased compared to the sham rats. Apoptotic index was elevated in heart tissue. Molecular analysis showed that cerebral IR increased protein expression of cytochrome c, c-caspase3/p-caspase3 ratio, TLR4, NF-κB, with a concomitant up-regulation of HSP70. These alterations could be mitigated by using losartan treatment.

Conclusion: According to our results, cerebral IR increased cardiac oxidative stress and apoptosis which may be attributed to TLR4/NF-κB pathway. Additionally, it was revealed that losartan can be considered as a potential therapeutic target for preventing cardiac injury following cerebral IR.

Keywords: Ischemia, Heart, Losartan, Inflammation, Apoptosis.

P219, Protective effects of acute psilocybin on aluminum chloride induced learning and memory deficits in Zebrafish larvae

Mersedeh Shamsedin[1], Javad Fahanik Babaei[2], Khosrou Abdi[3], Mohammad Ali Faramarzi[4], Mahmoud Ghazi Khansari[1]

1. Department of Pharmacology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
2. Neuroscience Research Center Institute, Electrophysiology Research Center, Tehran University of Medical Sciences, Tehran, Iran
3. Iranian National Center for Addiction Studies (INCAS), Tehran University of Medical Sciences, Tehran, Iran
4. Department of Pharmaceutical Biotechnology, Faculty of Pharmacy, Tehran University of Medical Sciences, Tehran, Iran

Background: Aluminum chloride (AlCl) exposure induces neurotoxicity and cognitive deficits, serving as an experimental model relevant to Alzheimer's disease (AD) pathology, which necessitates novel therapeutic strategies. Psilocybin, a psychedelic compound, is increasingly investigated for its therapeutic potential, including neuroprotective properties. This study investigated the acute effects of psilocybin on AlCl -induced neurotoxicity in zebrafish larvae.
Methods: Zebrafish larvae were exposed to 200 µM AlCl to induce cognitive impairments. Larvae were subsequently exposed to various concentrations of psilocybin. Behavioral assays, including thigmotaxis, light/dark preference, and habituation tests, were used to evaluate learning, memory, and anxiety-like behaviors.
Results: Acute psilocybin treatment, notably at lower concentrations (0.3 µM), significantly enhanced behavioral performance in AlCl -treated larvae. Psilocybin antagonized AlCl -induced impairments across all assessed behavioral paradigms: thigmotaxis, light/dark preference, and habituation.
Conclusion: Acute psilocybin demonstrated significant neuroprotective effects against AlCl -induced neurotoxicity and rescued cognitive impairments in this zebrafish larval AD model. These findings highlight psilocybin's potential as a therapeutic agent for AD, warranting further research into its underlying mechanisms and optimal dosing.
Keywords: Psilocybin, Zebrafish, Aluminum chloride, Neurotoxicity, Cognitive impairment.

P220, Intracerebroventricular administration of NaHS ameliorated cognitive disorder by regulating hippocampus H2S/Thioredoxin-1/NMDA axis in PCOS

Masoud Shahraki[1,2] , Mahdi Hajiaqaei[2] , Azadeh Manshadi Tarafdari[3] , Behjat Seifi[2]
1. Department of Anatomy, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
2. Department of Physiology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
3. Department of Obstetrics and Gynecology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran

Background: Polycystic ovary syndrome (PCOS)-induced inflammation following oxidative stress, can negatively impact cognition through impaired neuroplasticity in the hippocampus and lead to cognitive impairment. The H_2S/Thioredoxin-1/NMDA axis is a critical pathway in memory and cognition. The objective of this study was to assess the effect of intracerebroventricular (i.c.v.) administration of sodium hydrosulfide (NaHS) on oxidative stress, neural damage, inflammation and cognitive disorder in a rat model of PCOS.
Methods: Thirty female Wistar rats were randomly divided into three groups: 1-sham, 2-PCOS 3-PCOS+ NaHS. NaHS (17µg/4µl) was administrated to the PCOS animals via i.c.v. injection after PCOS induction for one week daily. Then, cognitive disorder was evaluated by barnes maze and novel object recognition (NOR) test. At the end, hippocampus tissues were analyzed for oxidative stress, neuroinflammation (IL-1β, TNF-α) and investigating expression of Thioredoxin-1 (Trx-1) and NMDA receptors along with histology evaluation. Blood samples were analyzed for systemic inflammation (Serum IL-1β, TNF-α).
Results: PCOS resulted in cognitive disorders, elevated expression of pro-inflammatory cytokines, decreased Trx-1, and increased NMDA receptor expression in the hippocampus. i.c.v. Treatment with NaHS significantly improved cognitive impairment, hippocampal and serum levels of TNF-α, IL-1β. Concurrently, reduced MDA level and elevated SOD activity. Along with decreased Trx-1 and NMDA receptor expression in the hippocampus tissue.
Conclusion: The results of this study indicate that NaHS, through H_2S/Trx-1/NMDA axis, plays a neuroprotective role against cognitive impairments caused by PCOS. These findings indicate the therapeutic potential of H_2S-donating compounds in improving neurological complications associated with PCOS and suggest a new avenue for targeted neurometabolic interventions.
Key words: Polycystic ovary syndrome, Cognitive disorders, NaHS, hippocampus, Inflammation, Thioredoxin-1.

P221, Quercetin nanoemulsion reduces cognitive and motor deficits in essential tremor mice

Fatemeh Shasavari[1,4], Mohammad Shabani[1], Monavareh Soti[1], Zeynab Pirmoradi[2], Moazamehosadat Razavinasab[3]

1. Kerman Neuroscience Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
2. Neuroscience Research Center, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
3.Kerman Department of Physiology and Pharmacology, Afzalipour Faculty of Medicine, Kerman University of Medical Sciences, Kerman, Iran
4. Department of Biology, Faculty of Sciences, Shahid Bahonar University of Kerman, Kerman, Iran

Background: Essential tremor (ET), a motor disorder causing involuntary limb shaking, lacks effective treatments. Plant-derived compounds, especially in nanoemulsion formulations, show therapeutic promise. This study explores quercetin nanoemulsion (QueNE) in reducing neuronal dysfunction in a harmaline-induced ET model.
Methods: Thirty-two mice were assigned to four groups: Control (Cont), Harmaline (Harm, 10 mg/kg, intraperitoneally on days 3, 5, and 7), Quercetin Nanoemulsion (QueNE, 20 mg/kg, i.p., for 7 consecutive days), and Harmaline + QueNE (same dose and duration). Behavioral assessments were performed using the Open Field Test (OFT), Elevated Plus Maze (EPM), Tail Suspension Test (TST), wire grip test, rotarod, and passive avoidance test. Gene expression levels of NF-κB, TNF-α, IL-1β, IL-6, NMDA receptor, and Lingo-1 were evaluated via RT-PCR.
Results: Quercetin nanoemulsion effectively reduced harmaline-induced tremors, anxiety, and depression, though it exhibited limited efficacy in addressing severe motor dysfunction and memory impairments. QueNE treatment significantly downregulated inflammatory gene expression and modulated genes associated with neuroplasticity.
Conclusion: Quercetin nanoemulsion demonstrates potential as a protective agent against harmaline-induced neuronal dysfunction. These findings underscore the anti-inflammatory and neuroprotective properties of quercetin nanoemulsion, highlighting its promise as a therapeutic option for ET.
Keywords: Quercetin, Nanoemulsion, Essential Tremor, Mic.

P222, Underlying mechanisms of the neuroprotective effect of L-carnitine against Alzheimer's disease-associated spatial cognitive decline: An in vivo study

Hamid Shokati Basir[1], Shahab Ghaderi[1], Alireza Komaki[1]
1. Department of Neuroscience, School of Advanced Medical Sciences and Technologies, Hamadan University of Medical Sciences, Hamadan, Iran

Background: Alzheimer's disease (AD) is a progressive neurodegenerative disorder characterized by cognitive impairment and deficits in synaptic plasticity. This study aimed to evaluate the neuroprotective effects of L-carnitine (LC) against amyloid-beta 1–42 ($A\beta_{1-42}$)–induced spatial cognitive dysfunction in a rat model generated by intracerebroventricular (ICV) infusion of $A\beta_{1-42}$.
Methods: Forty adult male Wistar rats were randomly assigned to four experimental groups (n = 10 per group): Sham + Vehicle, Sham + LC (100 mg/kg/day, I.P.), AD + Vehicle ($A\beta_{1-42}$ ICV infusion), and AD + LC (100 mg/kg/day, I.P.). After a 28-day treatment period, spatial cognitive performance, hippocampal synaptic plasticity, oxidative stress markers, Aβ plaque deposition, and histological alterations were evaluated.
Results: Our findings showed that ICV administration of $A\beta_{1-42}$ significantly impaired spatial learning and memory in the Morris water maze, accompanied by a marked suppression of long-term potentiation (LTP) within the dentate gyrus, as reflected by reduced field excitatory postsynaptic potential (fEPSP) slope and population spike amplitude. $A\beta_{1-42}$ also decreased antioxidant enzyme activity, increased lipid peroxidation, elevated Aβ burden, and induced neuronal loss in the hippocampus. In contrast, LC administration markedly mitigated these Aβ-related neuropathological alterations. LC improved behavioral performance, restored LTP parameters, enhanced antioxidant defenses, reduced lipid peroxidation, and decreased Aβ deposition, ultimately preventing neuronal degeneration.
Conclusion: Collectively, these results provide strong evidence that LC effectively counteracts Aβ-induced cognitive impairment, likely through its antioxidant properties and its ability to preserve synaptic function and neuronal integrity.
Keywords: Alzheimer's disease, Amyloid beta-protein (1–42), L-carnitine, Long-term potentiation, Morris water maze.

P223, Anti-inflammatory and protective effects of Aripiprazole on TNBS-Induced colitis and associated depression in rats: Role of kynurenine pathway

Afrooz Mohammadgholi-Beiki[1], Mohammad Sheibani[1], Majid Jafari-Sabet[1], Manijeh Motevalian[1], Parvaneh Rahimi-Moghaddam[1]
1. Department of Pharmacology, School of Medicine, Iran University of Medical Sciences, Tehran, Iran

Background: The prevalence of depression is higher in patients with inflammatory bowel disease (IBD) than in the general population. Inflammatory cytokines and the kynurenine pathway (KP) play important roles in IBD and associated depression. Aripiprazole (ARP), an atypical antipsychotic, shows various anti-inflammatory properties and may be useful in treating major depressive disorder. This study aimed to evaluate the protective effects of ARP on TNBS-induced colitis and subsequent depression in rats, highlighting the role of the KP.
Methods: Fifty-six male Wistar rats were used, and all groups except for the normal and sham groups received a single dose of intra-rectal TNBS. Three different doses of ARP and dexamethasone were injected intraperitoneally for two weeks in treatment groups. On the 15th day, behavioral tests were performed to evaluate depressive-like behaviors. Colon ulcer index and histological changes were assessed. The tissue levels of inflammatory cytokines, KP markers, lipopolysaccharide (LPS), nuclear factor-kappa-B (NF-κB), and zonula occludens (ZO-1) were evaluated in the colon and hippocampus.
Results: TNBS effectively induced intestinal damages and subsequent depressive-like symptoms in rats. TNBS treatment significantly elevated the intestinal content of inflammatory cytokines and NF-κB expression, dysregulated the KP markers balance in both colon and hippocampus tissues, and increased the serum levels of LPS. However, treatment with ARP for 14 days successfully reversed these alterations, particularly at higher doses.
Conclusion: ARP could alleviate IBD-induced colon damage and associated depressive-like behaviors mainly via suppressing inflammatory cytokines activity, serum LPS concentration, and affecting the NF-κB/kynurenine pathway.
Keywords: Aripiprazole; Depression; Inflammation; Inflammatory bowel disease; Kynurenine pathway.

P224, Harnessing the Role of Insulin Growth Factor in Glioblastoma Multiforme: A Comprehensive Review

Ali Nakhaei[1], Sadaf Afshari[2], Mohammad Mohammadian[1], Seyed Sajad Ahmadi[3], Elmira Mohatshami[4], Mohammad Jalili-Nik[5], Mahsa Jalali[6], Amir R. Afshari[6, 7, 8], Amirhossein Sahebkar[4, 9, 10]

1. Student Research Committee, MMS.C., Islamic Azad University, Mashhad, Iran
2. Student Research Committee, Faculty of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran
3.Department of Ophthalmology, Khatam-Ol-Anbia Hospital, Mashhad University of Medical Sciences, Mashhad, Iran
4. School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran
.5Department of Medical Biochemistry, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
6. Department of Basic Sciences, Faculty of Medicine, Mashhad Medical Sciences, Islamic Azad University, Mashhad, Iran
7. Natural Products and Medicinal Plants Research Center, North Khorasan University of Medical Sciences, Bojnurd, Iran
8. Department of Physiology and Pharmacology, Faculty of Medicine, North Khorasan University of Medical Sciences, Bojnurd, Iran
9. Biotechnology Research Center, Pharmaceutical Technology Institute, Mashhad University of Medical Sciences, Mashhad, Iran
10. Neurogenic Inflammation Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Glioblastoma (GB) is an aggressive primary brain tumor characterized by rapid proliferation, invasiveness, and resistance to conventional therapies. The insulin-like growth factor (IGF) signaling system plays a pivotal role in GB development and progression by regulating tumor growth, survival, and therapeutic resistance. Understanding the complex molecular networks associated with IGF signaling may provide novel insights into potential therapeutic targets.

Methods: This narrative review summarizes and critically evaluates current experimental and clinical studies investigating the role of the IGF system and its downstream signaling pathways in glioblastoma. Published data regarding IGF-1, IGF-1 receptor (IGF1R), IGF-binding proteins—particularly IGFBP-2—and their interactions with key signaling molecules such as PI3K/AKT, ERK1/2, Hedgehog, and integrin-mediated pathways were analyzed.

Results: IGF-1–regulated microRNA networks were shown to reduce glioblastoma responsiveness to temozolomide therapy. Overexpression of PDGFR, IGF1R, PI3K, and ERK1/2 contributes to tumor progression and therapeutic resistance. Crosstalk between IGF-R inhibitors and anti-EGFR therapies may result in resistance mediated through PI3K signaling. IGFBP-2 was identified as a critical modulator of GB invasiveness by regulating CD24 expression and activating integrin β1/ERK signaling. Additionally, the IGFBP-2/integrin/ILK/NF-κB axis promotes tumor proliferation in vivo. Dysregulation of the Hedgehog pathway and overexpression of GLI1 enhance glioma stem cell activity and tumorigenicity. Loss of PTEN function combined with elevated IGFBP-2 expression contributes to the aggressive phenotype of GB. Furthermore, IGFBP-2–induced upregulation of CD144 and MMP2 facilitates vasculogenic mimicry, a process associated with poor patient survival.

Conclusion: The IGF signaling network, particularly IGFBP-2–mediated pathways, plays a central role in glioblastoma progression, invasiveness, and resistance to therapy. Targeting key components of the IGF/IGFBP-2 signaling axes, including integrin β1/ERK and PI3K-related pathways, may represent promising therapeutic strategies to improve clinical outcomes in patients with glioblastoma.

Keywords: insulin growth factor, glioblastoma multiforme, insulin-like growth factor-binding protein, miRNA, survival

P225, Oral administration of crocin reverses memory loss induced by ethanol and nicotine abstinence in adolescent male rats

Siavash Saloori[1], Samaneh Kakhki[2], S. Mohammad Ahmadi-Soleimani[3,4] Farimah Beheshti [3,4]
1. Student Research Committee, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
2. Department of Clinical Biochemistry, School of Medicine, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
3. Departments of Physiology, School of Medicine, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
4. Neuroscience Research Center, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran

Background: Given the extensive body of research highlighting the diverse therapeutic properties of crocin, the primary bioactive compound in saffron, this study investigates its potential to mitigate learning and memory deficits induced by withdrawal from concurrent ethanol (Eth) and nicotine (Nic) exposure in adolescent male rats.
Methods: Memory function was evaluated using the Morris water maze and passive avoidance tests in male Wistar rats subjected to Nic-Eth withdrawal. The therapeutic effects of crocin were examined at both behavioral and biochemical levels, with a focus on inflammatory cytokines, oxidative stress markers, and cholinergic activity in hippocampal tissues. The experimental design comprised seven groups: 1) control (saline + saline), 2) Nic + Eth, 3–5) Nic + Eth + crocin (three doses), 6) Nic + Eth + bupropion + naloxone, and 7) saline + crocin.
Results: Crocin administration significantly attenuated Nic-Eth withdrawal-induced memory impairment, as evidenced by improved performance in behavioral tests. Furthermore, crocin treatment normalized biochemical disruptions, including inflammatory responses, oxidative stress, and cholinergic dysfunction, in hippocampal tissues. Notably, the therapeutic efficacy of crocin exhibited dose-dependency, with higher doses demonstrating comparable effects to the combined administration of bupropion and naloxone.
Conclusion: These findings suggest that crocin may serve as a viable therapeutic agent for managing Nic-Eth withdrawal-related cognitive deficits. However, further research is necessary to evaluate potential side effects and the tolerability of high-dose crocin in humans.
Keywords: Nicotine, Ethanol, Withdrawal, Crocin, Learning and memory impairment.

P227, The interaction between the cholinergic system and dextromethorphan on depression-like behaviors

Mahdiyeh Safary[1], Mohammad Reza Zarrindast[2], Sakineh Alijanpour[3], Mohaddeseh Ebrahimi-Ghiri[4], Shadi Sarahroodi[1]

1. Department of Pharmacology and Toxicology, Faculty of Pharmacy and Pharmaceutical Sciences, Tehran Medical Sciences Islamic Azad University, Tehran, Iran
2. Department of Pharmacology, Faculty of Medicine, Tehran University of Medical Sciences, Tehran, Iran
3. Department of Biology, Faculty of Science, Gonbad Kavous University, Gonbad, Iran
4. Department of Biology, Faculty of Sciences, Zanjan University, Zanjan, Iran

Background: Depression is a state of low mood that seriously affects the quality of society's life, emphasizing the need for novel treatments. This pre-clinical study investigated the cholinergic system's role in dextromethorphan's antidepressant effect, regarding the cholinergic-catecholaminergic hypothesis and dextromethorphan potential in mood and neurological disorders.
Methods: This study involved 126 male NMRI mice, anesthetized for cannula implantation in the cerebroventricular regions using a stereotaxic device based on the Paxinos-Franklin atlas. Pharmacological groups received dextromethorphan intraperitoneally and cholinergic antagonists (mecamylamine and scopolamine) intracerebroventricularly. After a week of recovery, depression-like behavior was assessed using the force swimming test, and locomotion was tested in an open field. Data were analyzed using one-way ANOVA with Tukey's post hoc test.
Results: Administration of scopolamine (2 and 12 µg/mice; $P<0.001$), mecamylamine (30 µg/mice; $P<0.005$), and dextromethorphan (60 mg/kg; $P<0.001$) reduced immobility time, indicating antidepressant effect. A subthreshold dose of scopolamine (0.3 µg/mice) co-administered with dextromethorphan reduced immobility time compared to dextromethorphan alone (15 and 30 mg/kg; $P<0.001$), suggesting scopolamine improving the antidepressant effect. In contrast, the subthreshold dose of mecamylamine (5 µg/mouse) did not alter the antidepressant effect of the effective dose of dextromethorphan ($P>0.005$). Isobologram analysis showed a synergistic effect between dextromethorphan and scopolamine on depression-like behaviors in mice ($P<0.001$). Crossing numbers in the open-field test remained stable across groups.
Conclusion: The study indicates that dextromethorphan's antidepressant effect is mediated by inhibiting muscarinic receptors in the cholinergic system. The combination of dextromethorphan with scopolamine, a muscarinic receptor inhibitor, would be a promising anxiety treatment.
Keywords: Depression, Dextromethorphan, Cholinergic system, Mecamylamine, Scopolamine.

P228, The synergistic effect of dextromethorphan and mecamylamine on anxiety-like behaviors in mice

Mahdiyeh Safary[1], Mohammad Reza Zarrindast[2], Sakineh Alijanpour[3], Mohaddeseh Ebrahimi-Ghiri[4], Shadi Sarahroodi[1]

1. Department of Pharmacology and Toxicology, Faculty of Pharmacy and Pharmaceutical Sciences, Tehran Medical Sciences Islamic Azad University, Tehran, Iran
2. Department of Pharmacology, Faculty of Medicine, Tehran University of Medical Sciences, Tehran, Iran
3. Department of Biology, Faculty of Science, Gonbad Kavous University, Gonbad, Iran
4. Department of Biology, Faculty of Sciences, Zanjan University, Zanjan, Iran

Background: Anxiety is a state of irrational wariness that seriously affects the quality of society's life, emphasizing the need for novel treatments. Dextromethorphan (DXM), an uncompetitive NMDA receptor antagonist, is a commonly utilized non-opioid cough suppressant which also effectively impacts both neurological functions and the central nervous system. Furthermore, evidence suggests that the cholinergic system is linked to mood disorders. Regarding these, this pre-clinical study aimed to investigate the involvement of the nicotinic cholinergic system in the anxiolytic effect of DXM.

Methods: Male NMRI mice were anesthetized for cannula implantation in the cerebroventricular regions using a stereotaxic apparatus. Anxiety-like behavior was assessed using the elevated plus-maze (EPM).

Results: Intraperitoneal administration of DXM (30-60 mg/kg) dose-dependently increased the percentage of open arm time (%OAT) and open arm entries (%OAE) as measured by EPM, indicating an anxiolytic-like behavior to DXM. Furthermore, results showed intra-cerebroventricular (ICV) microinjection of mecamylamine (5-30 µg/mouse), a nicotinic acetylcholine receptor antagonist, produced anxiolytic behavior. Interestingly, intra-ICV microinjection of a subthreshold dose of mecamylamine (5 µg/mouse) enhanced dextromethorphan response at a dose of 15 mg/kg on %OAT. Isobologram analysis showed a synergistic effect between DXM and mecamylamine on anxiety-like behaviors in mice.

Conclusion: Taken together, it can be concluded that mecamylamine can be used to potentiate the anxiolytic effect of DXM. This combination would be a promising anxiety treatment.

Keywords: Anxiety, Dextromethorphan, Mecamylamine, mice.

P229, The effect of ferulic acid on anticonvulsant drugs carbamazepine and sodium valproate in kainic acid-induced seizure model in mice

Elaheh Taheri[1], Majid Hassanpourezatti[1]
1. Department of Biology, Basic Sciences School, Shahed University, Tehran, Iran

Background: Long-term use of anticonvulsant drugs causes side effects for patients. Ferulic acid (FA) is a phenolic compound with anti-inflammatory and neuroprotective potential. This study aimed to evaluate the effectiveness of FA on two anticonvulsant drugs, carbamazepine (CBZ) and sodium valproate (VPA), in kainic acid (KA)-induced seizures in mice.
Methods: Before subcutaneous administration of KA (10 mg/kg), male NMRI mice (weighing 25-30 g) were intraperitoneally injected with saline (1 ml/kg), diazepam (20 mg/kg), FA (20 and 80 mg/kg), VPA (200 mg/kg), CBZ (10 mg/kg), FA (20 mg/kg) + VPA (200 mg/kg) and FA (20 mg/kg) + CBZ (10 mg/kg). The seizure behavior of the mice was assessed and recorded for 2 hours after KA administration. Brain interleukin-1beta (IL-1β) and carbonyl protein (CP) levels were measured.
Results: FA at both doses of 20 and 80 mg/kg significantly reduced seizure severity and seizure-induced increases in brain IL-1β and CP levels. Furthermore, FA (20 mg/kg) combined with CBZ and VPA improved the effects of KA-induced seizures on brain IL-1β and CP levels.
Conclusion: The finding suggest that FA has anticonvulsant effects and enhances the anticonvulsant effects of VPA and CBZ by regulating IL-1β and CP in the brain.
Keywords: Ferulic acid, Anti-inflammatory, Anticonvulsant drugs, Kainic acid.

P230, Effect of ZnO nanoparticles coated with Eucalyptus camaldulensis essential oil on inflammatory pain in male mice: intraction with NMDA receptor

Mahsa Taheri mirghaed[1], Mozhgan Torabi[1], Mahnaz Kesmati[1], Matineh Ghomi[2]
1. Department of Biology, Faculty of Sciences, Shahid Chamran University of Ahvaz, Ahvaz, Iran
2. Department of Chemistry, Faculty of Sciences, Jundi Shapur University of Technology, Dezful, Iran

Background: Chronic inflammatory pain management remains a challenge due to the side effects and limitations of conventional analgesic drugs. This study investigated the analgesic effects of zinc oxide nanoparticles (ZnO NPs) coated with a nanoemulsion of eucalyptus essential oil in inflammatory pain, in the presence and absence of N-Methyl-D-Aspartate (NMDA) receptors in an animal model
Methods: Male mice were divided into groups of: control, ZnO NPs (1 and 5 mg/kg), eucalyptus essential oil nanoemulsion (50 mg/kg), coated-ZnO NPs (1 and 5 mg/kg), ketamine (0.1 mg/kg), and combination of ketamine with other compounds. Inflammatory pain was assessed using the formalin test. ZnO NPs were synthesized using a green method and coated with a nanoemulsion of eucalyptus essential oil. The nanoemulsion was prepared by combining the eucalyptus essential oil, Tween 80 surfactant, and deionized water under ultrasonic waves.
Results: ZnO NPs, eucalyptus essential oil nanoemulsion, and coated-ZnO NPs significantly induced analgesic effects in both the acute and chronic phases of the formalin test. Analgesic effect of the coated-ZnO NPs was stronger than on the other components. Ketamine reduced the analgesic effect of coated-ZnO NPs particularly in the acute phase, but did not affect analgesic effect of ZnO NPs or eucalyptus essential oil nanoemulsion alone.
Conclusion: The analgesic effect of coated-ZnO NPs is stronger than ZnO NPs. Ketamine reduced this analgesic effect, suggesting NMDA receptor involvement in their mechanism of action. These findings suggest a novel approach for managing inflammatory pain using low doses of natural and nanomaterial-based approaches
Keywords: Eucalyptus, Mouse, NMDA receptor, Pain, Zinc oxide nanoparticle.

P231, domperidone reduces morphine reward and facilitates extinction through hippocampal dopamine D2 receptor regulation in rats

Amineh Sadat Zahiry Pour [1], Hamid Reza Banafshe[1], Fatemeh Sadat Ghoreishi[2], Amir Ghaderi[1], Farkhondeh Rzazzaghi- Firozjaei[1]

1. Department of Addiction Studies, School of Medical, Kashan University of Medical Sciences, Kashan, Iran
2. Department of Psychiatry, Kashan University of Medical Sciences, Kashan, Iran

Background: Relapse into drug-seeking behavior is a hallmark of substance use disorder and a critical indicator for treatment evaluation. Morphine reinforces addiction by engaging brain regions involved in learning and memory, particularly the hippocampus. Dopamine D2 receptors in the hippocampus modulate reward-related synaptic plasticity. Domperidone, a peripheral D2 receptor antagonist, may modulate morphine-induced conditioned reward responses; however, its impact on hippocampal function remains poorly understood. This study aimed to investigate the effects of domperidone on morphine-induced conditioned place preference (CPP) and D2 receptor expression in the hippocampus.

Methods: Adult male Wistar rats were conditioned with morphine (5 mg/kg, subcutaneously) for three days. Domperidone (0.5, 1, or 2 mg/kg, intraperitoneally) was administered one hour before behavioral testing during expression and extinction phases. CPP scores and locomotor activity were recorded. Hippocampal D2 receptor expression was assessed using Western blot.

Results: Domperidone at 1 mg/kg significantly reduced CPP scores in the expression phase ($p < 0.001$); 2 mg/kg also caused a significant reduction ($p < 0.05$). In the extinction phase, 1 mg/kg domperidone significantly shortened the number of extinction days. Western blot showed that 1 mg/kg domperidone downregulated hippocampal D2 receptor expression in both phases. Locomotor activity remained unchanged across groups.

Conclusion: Domperidone reduces morphine-induced CPP and facilitates extinction, possibly through decreased hippocampal D2 receptor expression. Although primarily a peripheral agent, domperidone may exert indirect central effects, highlighting the potential of peripheral D2 antagonism in modulating opioid-related memory processes.

Keywords: Domperidone, Morphine, Conditioned Place Preference, Dopamine D2 Receptor, Hippocampus.

P232, Comparative effects of voluntary and forced exercise on cognitive performance and hippocampal integrity in a rat model of post-traumatic stress disorder

Nadia Abedi omali [1], Arvin amiri [2], Mousa kiani [3], Sakineh shafia [4]
1. Department of animal sciences, faculty of biological sciences, Kharazmi University, Tehran, Iran
2. Department of veterinary medicine, Faculty of veterinary medicine, Babol Branch Islamic Azad University, babol, Iran
3. Department of Psychiatry, zare Hospital, Mazandaran University of Medical Sciences, sari , Iran
4.Department of Physiology, Immunogenetic Research Center, Faculty of Medicine, Mazandaran University of Medical Sciences, Sari, Iran

Background: Post-traumatic stress disorder (PTSD) is associated with cognitive impairments and hippocampal neuronal loss. While exercise has shown therapeutic potential in stress-related conditions, comparative data on different exercise modalities in animal models of PTSD remain limited.
Methods: This study evaluated the effects of voluntary (running wheel, RW) and forced (treadmill running, TR) exercise on cognitive performance and hippocampal integrity in a rat model of PTSD induced by single prolonged stress (SPS). Male Wistar rats were randomly assigned to non-stressed or SPS groups, with or without exercise interventions. Cognitive performance was assessed using the Object Location Memory Test (OLMT) and Object Recognition Memory Test (ORMT) and hippocampal neuronal density was analyzed using hematoxylin and eosin staining.
Results: SPS exposure significantly impaired spatial and recognition memory and reduced hippocampal neuronal density in sedentary rats. Both RW and TR interventions improved cognitive performance and preserved hippocampal structure. Voluntary exercise produced greater improvements in memory performance compared to forced exercise.
Conclusion: Both voluntary and forced exercise can alleviate cognitive, and structural impairments in a rat model of PTSD, with voluntary exercise showing superior therapeutic efficacy. These findings highlight the role of physical activity, particularly voluntary modalities, as a promising non-pharmacological approach for mitigating the neurobiological consequences of traumatic stress.
Keywords: Post-Traumatic Stress Disorder, Voluntary Exercise, Forced Exercise, Animal Model, Single Prolonged Stress.

P233, Effects of cannabidiol on inflammatory pain in rats

Zahra Aalidaeijavadi [1], Masoud Seddighfar[2], Fariba Khodagholi [3], Abbas Haghparast [1,2,3,4,5]
1. Neuroscience Research Center, Institute of Neuroscience and Cognition, Shahid Beheshti University of Medical Sciences, Tehran, Iran
2. Neurobiology Research Center, Institute of Neuroscience and Cognition, Shahid Beheshti University of Medical Sciences, Tehran, Iran
3. School of Cognitive Sciences, Institute for Research in Fundamental Sciences, Tehran, Iran
4. Department of Basic Sciences, Iranian Academy of Medical Sciences, Tehran, Iran
5 .National Brain Mapping Laboratory (NBML), Tehran, Iran

Background: Cannabidiol (CBD), a non-psychoactive phytocannabinoid derived from Cannabis sativa, has gained increasing attention due to its anti-inflammatory and analgesic properties without the psychotropic effects of classical cannabinoids. Although evidence supports a role for CBD in pain modulation, its effects on different phases of inflammatory pain remain incompletely understood. This study investigated the effects of CBD on the acute neurogenic and late inflammatory phases of formalin-induced pain.
Methods: Male Wistar rats received intracerebroventricular (ICV) administration of CBD (25–200 μg/5 μL) prior to the formalin test. Pain-related behaviors were assessed during the acute (0–5 min) and inflammatory (20–50 min) phases following formalin injection. Locomotor activity was evaluated using the open-field test to rule out motor impairment.
Results: Formalin injection induced a robust biphasic nociceptive response ($P < 0.001$). CBD significantly and dose-dependently attenuated pain behaviors during both phases compared with the vehicle group ($P < 0.001$). Among the tested doses, 100 μg produced the most pronounced and sustained antinociceptive effect. Open-field analysis showed no significant differences in locomotor activity, indicating that CBD-induced analgesia was not associated with sedation or motor dysfunction.
Conclusion: These findings demonstrate that centrally administered CBD effectively reduces both early and late phases of formalin-induced inflammatory pain, supporting its potential as a non-opioid therapeutic candidate for inflammatory pain management.
Keywords: Cannabidiol, Inflammatory pain, Formalin test, Analgesia, Endocannabinoid system.

P234, Pioglitazone mitigates TMT-induced cognitive and biochemical deficits in rats: Focus on oxidative and inflammatory biomarkers

Nasim Abaspour[1,4], Mehrdad Roghani[2,4], Maryam Bagheri[3], Mohsen Khalili[2,4]
1. Department of Biology, Faculty of Basic Sciences, Shahed University, Tehran, Iran
2. Department of Physiology, Faculty of Medicine, Shahed University.Tehran, Iran
3. Department of Physiology, School of Medicine, Ilam University of Medical Sciences, Ilam, Iran
4. Neurophysiology Research Center, Shahed University, Tehran, Iran

Background: Alzheimer's disease (AD) is associated with oxidative stress, inflammation, and hippocampal dysfunction. TMT selectively induces hippocampal damage, modeling AD-like pathology. Pioglitazone, a PPARγ agonist, has anti-inflammatory and antioxidant properties with potential CNS benefits. This study investigated the neuroprotective effects of pioglitazone on behavioral, oxidative, and inflammatory changes in a trimethyltin (TMT)-induced rat model of neurodegeneration.
Methods: Forty adult male Wistar rats were randomly assigned to four groups: control, pioglitazone (20 mg/kg/day), TMT (8 mg/kg, i.p.), and TMT + pioglitazone. Treatments lasted three weeks. Spatial memory was assessed using the Barnes maze test. Hippocampal levels of SOD, TNF-α, IL-10, and AChE were quantified using colorimetric and ELISA-based assays.
Results: TMT significantly increased Barnes maze errors (14.62 ± 1.13) and latency (87.5 ± 4.6 s) vs. control (5.25 ± 0.5 errors, 26.87 ± 2.1 s; $p<0.0001$). Pioglitazone treatment reduced errors (9.62 ± 0.87; $p=0.0178$) and latency (58.37 ± 3.8 s; $p=0.0348$). Biochemically, TMT decreased SOD activity and IL-10 levels while elevating TNF-α and AChE activity. In addition, Pioglitazone significantly restored SOD and IL-10 and reduced TNF-α and AChE ($p<0.05$ for all comparisons vs. TMT). These findings confirm the antioxidant and anti-inflammatory effects of pioglitazone, correlating with improved cognitive function.
Conclusion: Pioglitazone attenuates TMT-induced neuroinflammation, oxidative stress, and cognitive decline. Its modulatory effects on SOD, TNF-α, IL-10, and AChE support its therapeutic potential in AD-related neurodegeneration.
Keywords: oxidative stress, inflammation, trimethyltin, Pioglitazone.

P235, Does sex influence brain function and behavior in a rat model of diabetic nephropathy?

Farzaneh abdollahi [1,2], Zahra Soltani [1,2], Rohollah Nikooie [3], Mohammad Khaksari hadad[1,2], Yousof Mir[4], Fatemeh musavi mehdiabadi [5]

1. Endocrinology and Metabolism Research Center, Institute of Basic and Clinical Physiology Sciences, Kerman University of Medical Sciences, Kerman, Iran
2. Department of Physiology and Pharmacology, Kerman University of Medical Sciences, Kerman, Iran
3. Department of Exercise Physiology, Faculty of Physical Education and Sport Sciences, Shahid Bahonar University, Shahid Bahonar University of Kerman
4. Neuroscience Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
5. Physiology Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran

Background: Diabetic nephropathy (DN) is a major microvascular complication of diabetes and a leading cause of end-stage renal disease. However, the role of biological sex in modulating its neurobehavioral manifestations remains unclear. This study investigated the influence of sex on cognitive performance and depressive, anxiety-like, and social behaviors in a streptozotocin (STZ)-induced rat model of DN.
Methods: Twenty-eight male and female Wistar rats were divided into four groups (control male, control female, DN male, DN female). DN was induced by a single intraperitoneal STZ injection. Behavioral assessments after eight weeks included the Forced Swim Test (depression), Zero Maze (anxiety), Social Interaction Test, and Morris Water Maze (spatial memory). Biochemical parameters were also measured.
Results: DN induction was confirmed by hyperglycemia and proteinuria in both sexes. While DN universally impaired behavior, significant sex-dependent patterns emerged. Female DN rats exhibited more pronounced depressive-like behavior. Male DN rats showed more severe spatial memory deficits in the probe trial. DN eliminated the baseline sex difference in sociability and caused a more pronounced reduction in social preference in females. Anxiety-like behavior was similarly affected in both sexes.
Conclusion: The findings demonstrate that DN induces widespread neurobehavioral deficits, with phenotypic expression significantly modulated by biological sex. These results underscore the critical importance of considering sex as a key biological variable in preclinical DN research and managing its complications.
Keywords: Diabetic Nephropathy, Sex Differences, Cognitive Dysfunction, Depression, Anxiety.

P236, The effect of hesperidin on neuroinflammation and JNK/C-jun signaling pathway in a reserpine-induced Parkinson's disease model

Amer Abdollahnejad Banaderi[1], Maryam Rafieirad[2], Mohammad Amin Edalatmanesh[1], Mohsen Forouzanfar[3]

1. Department of Biology, Shi. C., Islamic Azad University, Shiraz, Iran
2. Department of Biology, Izeh. C., Islamic Azad University, Izeh, Iran
3. Department of Biology, Marv. C., Islamic Azad University, Marvdasht, Iran

Background: Parkinson's disease (PD) is a neurodegenerative disease associated with neuroinflammation. This study aimed to evaluate the anti-inflammatory effect of hesperidin (HES) and its relationship with the JNK/C-jun signaling pathway in the hippocampus of a reserpine (RES)-induced PD rat model.

Methods: 40 male Wistar rats were divided into 5 groups: control, HES vehicle and RES vehicle (VH+VR), RES (1 mg/5 days/ip) and HES vehicle (RES+VH), HES (50 mg/14 days/oral) and RES vehicle (HES+VR), and RES and HES (RES+HES) treated groups. The model was validated using catalepsy test. Hippocampal proinflammatory cytokines [interleukin (IL)-1β, IL-6 and tumor necrosis factor alpha (TNF-α)] and anti-inflammatory cytokines (IL-10) and JNK/C-jun gene expression were measured in the hippocampus.

Results: A significant increase in the hippocampal IL-1β, IL-6 and TNF-α levels and a significant decrease in IL-10 along with an increase in JNK/C-jun gene expression were observed in the RES+VH group compared to the control group. On the other hand, tissue levels of IL-1β, IL-6 and TNF-α and JNK/C-jun expression in the RES+HES group showed a significant decrease compared to the HES+VR group, and the level of IL-10 was significantly increased.

Conclusion: Hesperidin ameliorates reserpine-induced neuroinflammation in the hippocampus of Parkinson's disease model rats by modulating the JNK/C-jun signaling pathway.

Keywords: Reserpine, Parkinson's disease, Hesperidin, Neuroinflammation.

P237, Ascorbic acid attenuates stress-induced cognitive dysfunction in adolescent male rats via behavioral, biochemical, and electrophysiological modulations

Yeganeh Abdolahi[1], Samaneh Kakhki[2], Farimah Beheshti[3,4]
1. Student Research Committee, Torbat Heydaryeh University of Medical Sciences, Torbat Heydaryeh, Iran
2. Department of Biochemistry, School of Medicine, Torbat Heydaryeh University of Medical Sciences, Torbat Heydaryeh, Iran
3. Department of Physiology, School of Medicine, Torbat Heydaryeh University of Medical Sciences, Torbat Heydaryeh, Iran
4. Neuroscience Research Center, Torbat Heydaryeh University of Medical Sciences, Torbat Heydaryeh, Iran

Background: This study investigated the neuroprotective effects of ascorbic acid (AA) against chronic unpredictable mild stress (CUMS)-induced deficits in synaptic plasticity, learning, and memory in adolescent male rats.
Methods: The animals were allocated into six groups: (1) vehicle control, (2) CUMS-exposed, (3–5) CUMS-exposed and treated with varying doses of AA (10, 100, or 400 mg/kg, oral gavage), and (6) AA-only (400 mg/kg, oral gavage).
Results: Behavioral assessments revealed that CUMS rats treated with AA (400 mg/kg) exhibited significantly reduced escape latency and increased target quadrant dwell time in the Morris water maze, alongside improved retention latency in the passive avoidance test. Biochemical analyses demonstrated that high-dose AA (400 mg/kg) significantly attenuated oxidative stress markers (reduced nitrite and malondialdehyde (MDA) levels) while enhancing antioxidant defenses (elevated thiol content, superoxide dismutase (SOD), and catalase activity). Furthermore, AA treatment upregulated anti-inflammatory (IL-10), neurotrophic (BDNF), and neurogenic (Ki67) markers, while downregulating pro-inflammatory (TNF-α) and cholinergic (AChE activity) mediators in CUMS-exposed rats.
Conclusion: Our findings indicate that adolescent chronic stress disrupts cognitive function and synaptic plasticity, whereas AA exerts protective effects by mitigating oxidative stress, suppressing neuroinflammation, and promoting BDNF-mediated neurogenesis.
Keywords: Ascorbic acid, chronic unpredictable mild stress, synaptic plasticity, oxidative stress, BDNF.

P239, Evaluation of acetyle choline esterase and butyrylcholine esterase inhibitory activity of *Capparis spinosa* L fruit extract and fractions

Nikta Azizi Tafti [1], Saeed Mohammadi Motamed [2], Mina Saeedi [3]
1. Faculty of Pharmacy and Pharmaceutical Sciences, Tehran Medical Sciences, Islamic Azad University, Tehran, Iran
2. Department of Pharmacognosy, Faculty of Pharmacy and Pharmaceutical Sciences, Tehran Medical Sciences, Islamic Azad University, Tehran, Iran
3. Persian Medicine and Pharmacy Research Center, Tehran University of Medical Science, Tehran, Iran

Background: Plants are important sources of bioactive compounds and have contributed to many therapeutic agents. Alzheimer's disease, marked by reduced acetylcholine levels, may benefit from acetylcholinesterase inhibition. Based on reports of neuroprotective effects in Capparis species, Capparis spinosa L. was chosen for investigation.
Methods: Fruits of C. spinosa from northern Iran were dried and extracted with methanol using maceration. The extract was fractionated with solvents of different polarities, including hexane, dichloromethane, ethyl acetate, ethanol, and water. Inhibitory effects on acetylcholinesterase (AChE) and butyrylcholinesterase (BChE) were evaluated using Ellman's method, and IC_{50} values were determined.
Results: Among the samples tested on AChE, the total extract, ethyl acetate fraction, and hexane fraction showed the strongest inhibition. The total extract displayed the highest effect with an IC_{50} of 75.65 ± 0.92 µg/ml, while water and ethanol fractions had minimal activity. In BChE assays, the hexane, dichloromethane, and ethyl acetate fractions showed notable inhibition. The hexane fraction displayed the highest BChE inhibition, with an IC_{50} of 25.02 ± 1.49 µg/ml.
Conclusion: Results indicate that Capparis spinosa L. has meaningful AChE and BChE inhibitory effects. The weak activity of polar fractions suggests that active compounds are concentrated in non-polar fractions. Studies on this plant support the role of lipophilic molecules—such as β-sitosterol, linoleic acid, and terpenoids including carvacrol, and linalool—in anticholinesterase activity. These compounds may contribute significantly to the observed effects. Further purification and analytical studies are required to isolate and characterize the active constituents.
Keywords: AchE, Alzheimer, BchE, Capparis, Fraction.

P241, Effects of prenatal opioid exposure on the developing brain: A comprehensive review

Elham Alaee[1], Hossein Azizi[2]
1. Department of Physiology, TMS.c., Islamic Azad University, Tehran, Iran
2. Department of Physiology, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran

Background: Pregnancy represents a critical developmental phase for both the mother and the fetus, offering a window of vulnerability to environmental aberrations. A significant number of newborns exhibit opioid withdrawal syndrome at birth as a consequence of maternal opioid use during pregnancy. Prenatal opioid exposure (POE) has been linked to a range of adverse outcomes in offspring, including impaired cognitive function, altered stress response, accelerated opioid tolerance, hyperalgesia, increased anxiety-like behaviors, and susceptibility to substance abuse. In addition to these neurobehavioral deficits, POE can delay growth and neurodevelopment, with evidence suggesting alterations in neural structures, synaptic plasticity, and neurochemical modifications as underlying mechanisms. Furthermore, these alterations can have long-lasting effects, persisting throughout an individual's lifespan. Considering the thoughtful impact of maternal opioid exposure on overall aspects of susceptibility to addiction later in life, it is essential to highlight efforts to prevent, treat, and manage opioid abuse during pregnancy.
Results: Therefore, we provide a comprehensive overview of the effects of POE on neurobehavioral development, as well as insights into the underlying mechanisms driving these detrimental outcomes.
Conclusion: By reviewing current knowledge in this field, we hope to inform the development of effective prevention and intervention strategies to mitigate the long-term consequences of POE and improve the health and well-being of affected individuals.
Keywords: Brain development, Cognition, Drug abuse, Pregnancy, Prenatal opioids exposure.

P242, The beneficial effect of berberine on behavioral impairments and oxidative stress induced by cuprizone

Mohaddeseh Sadat Alavi[1,2], Seyede Faeze Hosseini[3], Amir Afkhami Goli[3], Mahsa Aminizade[2], Emad Mokarramdust[2], Naghmeh Layegh Khavidaki[1], Fatemeh Forouzanfar[4], Hamid Reza Sadeghnia[1]

1.Pharmacological Research Center of Medicinal Plants, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran

2. Department of Pharmacology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

3.Department of Basic Sciences, Faculty of Veterinary Medicine, Ferdowsi University of Mashhad, Mashhad, Iran

4. Department of Neuroscience, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Multiple sclerosis (MS) is a neurological disorder characterized by progressive demyelination and neuroinflammation. Berberine, a plant-derived isoquinoline alkaloid found in Berberis species, exhibits notable anti-inflammatory and antioxidant properties. This study aimed to evaluate the protective effects of berberine against cuprizone intoxication in C57BL/6 mice.

Methods: C57BL/6 mice received a cuprizone-containing diet (0.2% w/w) for five weeks and were concurrently treated with berberine (5 or 10 mg/kg). Body weight, motor coordination, exploratory and locomotor activity, memory dysfunction, oxidative stress biomarkers, and inflammatory cytokines were assessed.

Results: Berberine treatment improved exploratory behavior, locomotor activity and memory dysfunction compared with cuprizone-only mice. Oxidative stress analysis demonstrated that berberine significantly reduced malondialdehyde (MDA) level and increased total thiol content. Berberine also attenuated cuprizone-induced elevations in interleukin-1β (IL-1β) and tumor necrosis factor-α (TNF-α).

Conclusion: These findings indicate that berberine confers protective effects against cuprizone-induced behavioral deficits, memory dysfunction. The neuroprotective actions of berberine appear to be mediated through suppression of oxidative stress and inflammatory cytokines.

Keywords: Multiple sclerosis, Demyelination, Cuprizone, Berberine, Oxidative stress

P243, Unraveling the HCN1 channel role in the epileptogenesis process using a lentiviral vector carrying shRNA-HCN_1

Shayan Aliakbari[1, 2], Leila Hasanzadeh [2], Nima Naderi [1,2,3], Mohammad sayyah[2], Fereshteh Motamedi[1], Hamid Gholami Pourbadie[2]

1. Neuroscience Research Center, Institute of Neuroscience and Cognition, Shahid Beheshti University of Medical Sciences, Tehran, Iran
2. Department of Physiology and Pharmacology, Pasteur Institute of Iran, Tehran, Iran
3. Department of Pharmacology and Toxicology, School of Pharmacy, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: Epilepsy, one of the most common neurological disorders, is caused by explosive neuronal discharge in an excitable neural network. HCN_1, a non-selective ion channel, plays a crucial role in neuronal excitability and seizure activity. It has been reported that the knockdown of the HCN channel using the shRNA-HCN_1 lentivirus system can result in changes to the intrinsic properties of the membrane.

Methods: A stimulation electrode was implanted in the performant path. A recording electrode and a guide cannula were also implanted in the dentate gyrus. After one week, 3µl of the lentivirus vector carrying shRNA-HCN_1 was injected into the dentate gyrus through the guide cannula. One week later, electrical kindling was induced by electrical stimulation of the PP path (12 stimulations per day), and their seizure-related behaviors, such as seizure stage, seizure duration, primary and secondary after-discharges, were examined.

Results: The kindling group developed the full stage of the seizures (stage 5) after 8 consecutive days of stimulation. However, shRNA-HCN_1-infected rats showed stage 5 earlier. In this regard, no difference was found between the kindling group and shRNA-scramble received rats. Also, rats with HCN_1 knockdown showed increased seizure duration, after discharge, and spike amplitude.

Conclusion: The HCN channel plays an essential role in epileptogenesis processes. Our results indicated that downregulating the HCN_1 channel in the hippocampus may play a fundamental role in epileptogenesis in different types of seizure disorders.

Keywords: Hippocampus, HCN_1 Channel, Electrical Kindling, Lentivirus, and epilepsy.

P244, Nanocurcumin prevents stress induced anxiety like behavior by modulating hippocampal tight junctions and NMDA receptors

Azam Alinaghopour[1]
1. School of Medical Sciences, Yazd Branch, Islamic Azad University, Yazd, Iran

Background: Environmental noise stress affects non-auditory brain regions such as the hippocampus; an area of the brain implicated in cognition and emotion. Recent experimental data indicate that dysfunction of the blood-brain barrier (BBB) and overexpression of NMDA receptors may cause anxiety. In this experiment, we evaluated the effect of nanocurcumin on anxiety-like behavior and the expression of tight junctions and NMDA receptor subunits in the hippocampus of rats exposed to traffic noise.
Methods: Forty rats were assigned to control (CON), stress (ST), nanocurcumin (NC), and nanocurcumin+stress (NC+ST) groups. Anxiety-like behavior was evaluated through an elevated zero maze apparatus. The gene expression of tight junctions and NMDA receptor subunits was examined by real-time PCR in the hippocampus.
Results: Statistical analysis showed that noise exposure developed anxiety-like behavior and elevated the corticosterone level in the ST group compared to the CON group. The nanocurcumin administration decreased the stress and anxiety in the NC+ST group compared to the ST animals. While the noise stress reduced the gene expression of tight junctions occludin, claudin-5, and ZO-1, the nanocurcumin administration increased them in the NC+ST animals. Furthermore, the noise stress elevated the gene expression of the NMDA receptor subunits GRIN1 and GRIN2B. The NC+ST animals showed a modification of these subunits compared to the ST animals .
Conclusion: Our findings showed that noise exposure promotes stress and anxiety and impairs the NMDA receptor structure and BBB integrity. The nanocurcumin treatment partly restores the destructive effects of noise exposure.
Keywords: Hippocampus, NMDA receptor, Nanocurcumin, Stress, Tight junction.

P246, Neuroimmune and inflammatory interactions in the onset and regulation of infectious and psychiatric disorders: A multidisciplinary perspective

Fateme Amarlo[1], Masoumeh Khavari[1], Sajjad Sadegh[1,2,3]
1. Department of nursing and midwifery, Se.C., Islamic Azad University, Semnan, Iran
2. Food and Drug Administration, Semnan University of Medical Sciences, Semnan, Iran
3. Department of Toxicology and Pharmacology, Faculty of Pharmacy, Mazandaran University of Medical Sciences, Sari, Iran

Background: Emerging evidence shows that neuroinflammation and immune dysregulation play a crucial role in the pathogenesis of psychiatric disorders. This study aims to explore the bidirectional interactions between the nervous and immune systems in psychiatric and infectious conditions, contributing to the understanding of their shared molecular and cellular mechanisms.
Methods: A systematic review was conducted using databases such as Web of Science, Scopus, PubMed, and Google Scholar, focusing on studies from the past decade. Articles with significant findings on the immune–nervous system interface were analyzed.
Results: The nervous and immune systems maintain complex two-way communication. Neurotransmitters, neuropeptides, and cytokines serve as key mediators in responding to external stimuli. Disruptions in these processes such as microglial overactivation and HPA axis dysfunction are linked to psychiatric disorders like major depression and schizophrenia.
Infections from HSV, EBV, and SARS-CoV-2 can induce immune overactivation and neuroinflammation, leading to psychiatric symptoms. These results underline the impact of infectious agents on both neurological and immune pathways, suggesting new opportunities for targeted therapies.
Conclusion: The central nervous system (CNS) and immune system interact via hormonal axes (e.g., HPA, HPG) and neural pathways like the autonomic nervous system. Immune signals also reach the CNS through cytokines and vagal afferents. Cytokine imbalances are strongly associated with psychiatric disorders, highlighting the importance of neuroimmune crosstalk. Understanding these mechanisms can support the development of novel neuroimmunomodulatory treatments.
Keywords: Neuroimmunomodulation, Inflammation, Mental Disorders, Communicable Diseases.

P247, Effects of temporary inactivation and microinjection of GABAB receptors agonist into the lateral habenula on morphine-induced conditioned place preference

Elahe Amohashemi[1], Parham Reisi[1], Hojjatallah Alaei[1]
1. Department of Physiology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran

Background: The lateral habenula (LHb) plays an essential role in modulating motivated behavior, stress response, and rewarding and aversive stimuli. Morphine reward is mediated primarily by the gamma-aminobutyric acid (GABA)-ergic system, specifically GABA-type B (GABAB) receptors. The effect of activation of GABAB receptors in LHb and reversible inactivation of LHb on various phases of morphine-induced conditioned place preference (CPP) remains unknown.
Methods: Bilateral injections of CGP 44532 and electrical stimulation were performed during the conditioning sessions (acquisition phase) or before the test phase (expression phase). A five-day biased CPP paradigm was used to study the impact of the agents.
Results: Different doses of CGP 44532, a GABAB receptor agonist, increased the CPP score in the acquisition phase of CPP. While CGP 44532 significantly suppressed place preference during the expression phase. However, electrical stimulation of LHb significantly decreased the conditioning scores during the acquisition and expression phases of CPP. The augmenting effect of CGP 44532 on the acquisition phase of morphine-induced CPP was blocked by pretreatment with high-intensity electrical stimulation.
Conclusion: Our findings also suggest that GABAB receptors in the LHb may be involved in the inhibition of morphine-induced CPP.
Keywords: Lateral habenula, CGP 44532, Rat, Morphine-induced CPP.

P248, From blood to vision: Platelet-rich plasma as novel strategy in Age-related macular degeneration treatment, a systematic review

Pouya Gharavi[1,2], Amin Solouki[1]
1. Department of Medical Laboratory Sciences, Varastegan Institute for Medical Sciences, Mashhad, Iran
2. Student Research Committee, Varastegan Institute for Medical Sciences, Mashhad, Iran

Background: Age-related macular degeneration (AMD), is the major cause of central vision loss in the elderly, which progresses to geographic atrophy (GA) in advanced stages. Although no effective therapy exists, antioxidants and anti-inflammatory drugs are standard options. Platelet-rich plasma (PRP) including Cord blood PRP (CB-PRP) and Plasma rich in growth factors (PRGF) offers regenerative potential. This study aims to review PRP therapeutic impact on AMD.
Methods: This review article was performed within articles published at PubMed, Science Direct and Google Scholar until June 2025. The Keywords were Platelet-Rich Plasma; Age-Related Macular Degeneration. By searching this databases, 24 articles were found. After reading titles and abstracts, 10 articles were selected under the inclusion criteria. All articles were chosen from English articles.
Results: CB-PRP demonstrated neuroprotective and antioxidant effects by slowing GA progression without adverse events. CB-PRP growth factor profile supports photoreceptor survival and retinal regeneration. Subretinal and topical CB-PRP showed morphological preservation in treated eyes. PRGF, with antioxidant and anti-inflammatory activity, protected retinal pigment epithelial cells from blue light-induced damage. Limoli Retinal Restoration Technique (LRRT) combined PRP, adipose-derived stem cells, and fat grafts to improve visual function through delivery of sustained growth factors. Eventually, LRRT promoted choroidal perfusion and photoreceptor trophism.
Conclusion: PRP therapies in AMD demonstrate promising safety, clinical potential and effectiveness. However, limitations such as small sample sizes and lack of randomization reduce evidential strength. However, to validate these results and optimize therapeutic protocols, further large-scale randomized controlled studies are scientifically needed.
Keywords: Age-related macular degeneration, Platelet-rich plasma, Cord Blood PRP, Plasma rich in growth factors.

P251, Nuroproective effects of hydroxytyrosol on hippocampus in a PTZ induced seizure model

Fatemeh Gholami[1], Mohammadamin Edalatmanesh[2]
1. Department of Psychology, Shi.C., Islamic Azad University, Shiraz, Iran
2. Department of Biology, Shi.C., Islamic Azad University, Shiraz, Iran

Background: Chronic seizures are associated with neuroinflammation, oxidative stress, and behavioral disturbances. Hydroxytyrosol (HT), a phenolic compound found in olives, possesses antioxidant and anti-inflammatory properties that may mitigate seizure-induced hippocampal damage.
Methods: Forty male Wistar rats were randomly divided into five groups. Seizures were induced by intraperitoneal administration of pentylenetetrazole (PTZ) for five days. Three experimental groups received HT (1, 2, or 4 mg/kg) prior to PTZ injections. Cognitive performance was evaluated using the Y-maze, and anxiety-like behaviors via the elevated plus maze. Hippocampal tissue was analyzed for catalase activity, total antioxidant capacity (TAC), malondialdehyde (MDA), and cytokine levels (IL-1, IL-6, TNF-). Neuronal damage was assessed histologically.
Results: PTZ significantly impaired memory, increased anxiety, and elevated hippocampal cytokines and MDA levels, while reducing TAC and catalase activity. HT treatment, particularly at 4 mg/kg, reversed these changes significantly, indicating reduced inflammation and oxidative stress, preserved neuronal structure, and Improved behavioral outcomes.
Conclusion: Hydroxytyrosol demonstrated neuroprotective, antioxidant, and anti-inflammatory effects in PTZ-induced seizure rats, suggesting its potential as a supportive therapy for epilepsy-related cognitive and emotional deficits.
Keywords: Hydroxytyrosol, Epilepsy, Oxidative Stress, Neuroinflammation, Memory.

P252, Folic acid-conjugated chitosan nanoparticles for neuroprotection in Parkinson's disease model

Elaheh Gheybi[1,2], Mohammad Jalili Nik [2], Pejman Hosseinzadeh [2,3], Seyedeh Mozhdeh Mirzaei[4], Mohammad Soukhtanloo[1,2]

1. Pharmacological Research Center of Medicinal Plants, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Clinical Biochemistry, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Student Research Committee, Mashhad University of Medical Sciences, Mashhad, Iran
4. Department of medical biotechnology and nanotechnology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Alpha-lipoic acid (ALA) has antioxidant potential for Parkinson's disease (PD), but its delivery is challenging. This study aimed to develop folic acid-conjugated chitosan nanoparticles for targeted ALA delivery (FA-CS-ALA NPs).
Methods: FA-CS-ALA NPs were synthesized and characterized. Their neuroprotective effects were evaluated in a 6-hydroxydopamine (6-OHDA)-induced in vitro model of PD using SH-SY5Y neuroblastoma cells.
Results: Both free ALA and FA-CS-ALA NPs significantly reduced 6-OHDA-induced oxidative stress, neuroinflammation, and apoptosis. The FA-CS-ALA NPs demonstrated superior efficacy compared to free ALA.
Conclusion: Targeted delivery of ALA via FA-CS-ALA NPs enhances its neuroprotective effects, presenting a promising therapeutic strategy for PD.
Keywords: Parkinson Disease, Neuroprotective Agents, Nanoparticles, Oxidative Stress.

P253, Herbal nanoparticles: Bridging traditional medicine and modern science in epilepsy treatment

Homa Fazeli Kakhki [1], Aidin Mohammadi Zonouz [2, 3], Hossein Hosseinzadeh [1, 2]
1. Department of Pharmacodynamics and Toxicology, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran
2. Pharmaceutical Research Center, Pharmaceutical Technology Institute, Mashhad University of Medical Sciences, Mashhad, Iran
3. Student Research Committee, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Epilepsy is a chronic neurological disorder characterized by recurrent seizures, affecting millions worldwide. Despite the development of numerous antiepileptic drugs (AEDs), a considerable proportion of patients continue to suffer from poor seizure control, drug resistance, and adverse effects. Recently, nanotechnology combined with herbal medicine has attracted attention as an innovative approach to enhance drug delivery, improve bioavailability, and optimize therapeutic efficiency in epilepsy management.
Methods: A comprehensive literature review was performed using databases such as PubMed, Scopus, Web of Science, and Google Scholar. English-language publications covering both in vitro and in vivo studies were analyzed without time restrictions. The main search keywords included “epilepsy,” “antiepileptic,” “convulsions,” “herbal medicine,” “plant-based therapy,” “natural compounds,” “nanoparticles,” and “nanoformulations.”
Results: Experimental evidence indicated that herbal-based nanoparticles effectively reduced seizure frequency and severity, prolonged seizure latency, and improved cognitive outcomes. These nanoformulations enhanced brain penetration and bioavailability of phytochemicals, exhibiting synergistic neuroprotective effects through antioxidative, anti-inflammatory, and GABA-modulating mechanisms. Furthermore, they demonstrated improved pharmacokinetic stability and lower systemic toxicity compared with conventional AEDs.
Conclusion: Herbal-derived nanoparticle systems represent a promising platform for next-generation epilepsy therapy by integrating natural bioactive with the precision of nanoscale delivery. Future preclinical and clinical investigations are required to validate their efficacy and safety. Ultimately, such nanoformulations could transform seizure management, reduce medication-related toxicity, and improve quality of life in individuals with epilepsy.
Keywords: Anticonvulsants, Epilepsy, Seizures, Neurotransmitter Agents, Oxidative Stress.

P254, Combined effects of spirulina and exercise on cognitive and neurobiological outcomes after traumatic brain injury in rats

Nafiseh Faraji, Parsa Gholipour[1,2], Mahdi Ramezani [3], Iraj Salehi[1], Alireza Komaki[1], Shahab Ghaderi[1]
1. Department of Neuroscience, School of Advanced Medical Sciences and Technologies, Hamadan University of Medical Sciences, Hamadan, Iran University.
2. Department of Exercise Physiology, Faculty of Sport Sciences, Bu Ali Sina University, Hamedan, Iran
3. Department of Anatomy, School of Medicine, Hamadan University of Medical Sciences, Hamadan, Iran

Background: Traumatic brain injury (TBI), a leading cause of global mortality and disability, currently lacks effective treatments for cognitive deficits. Spirulina (SP), a nutrient-rich microalga with neuroprotective properties, and mild-intensity training (MIT), known to enhance cognitive function, were investigated for their individual and combined effects on TBI-induced cognitive impairment, oxidative stress, cholinergic dysfunction, and neuronal loss in male rats.
Methods: TBI was induced using Marmarou's impact acceleration model. Rats received SP (200 mg/kg/day, orally) 30 minutes after TBI induction and MIT (30 min/day on a treadmill, 5 days/week) was initiated two days post-injury. Both interventions were continued for four weeks. Cognitive function was assessed using the novel object recognition (NOR), Morris water maze (MWM), Barnes maze (BM), and passive avoidance (PA) tests. Oxidative stress markers, acetylcholinesterase (AChE) activity, and histological changes (Nissl staining) were evaluatedmarkers, acetylcholinesterase (AChE) activity, and histological changes (Nissl staining) were evaluated in the rat brain**.**
Results: TBI caused significant cognitive impairment accompanied by oxidative imbalance, increased AChE activity, and neuronal loss. While SP alone exerted partial neuroprotection, the combined SP and MIT intervention significantly improved cognitive performance, restored oxidant–antioxidant balance, reduced AChE activity, and attenuated neuronal loss.
Conclusion: These findings indicate that combined Spirulina supplementation and mild-intensity exercise effectively ameliorate TBI-induced cognitive dysfunction, possibly through modulation of oxidative stress, cholinergic activity, and neuronal preservation.
Keywords: Traumatic brain injury, Spirulina, Mild-intensity training, Cognitive impairment, Oxidative stress, Neuronal loss.

P255, Metformin supplementation during gestation and lactation rescues learning and memory deficits in a rodent model of febrile seizures: Targeting oxidative stress and pro-inflammatory cytokines

Fatemeh Farrokhzadeh[1], Samaneh Kakhki[2], Farimah Beheshti[3]
1. Student Research Committee, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
2. Department of Clinical Biochemistry, School of Medicine, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
3. Departments of Physiology, School of Medicine, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
4. Neuroscience Research Center, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran

Background: Febrile seizure (FS) affecting approximately 2-5 percent of all infants and young children. Given the role of oxidative stress as a key contributor to FS pathogenesis and metformin's established antioxidant properties, this study investigated the neuroprotective efficacy of metformin administered during prenatal and lactation periods in mitigating hyperthermia-induced seizures in rat offspring.
Methods: Pregnant rats were allocated to six experimental groups: (1) Vehicle (normal saline during pregnancy/lactation); (2) FS (normal saline + hyperthermia-induced seizures in offspring); (3–5) FS-Met50/100/150 (hyperthermia-exposed offspring+maternal metformin at 50/100/150mg/kg); (6) Met150 (metformin 150 mg/kg alone). Male offspring from FS groups underwent hyperthermia-induced seizure induction. Post-weaning, behavioral assessments and biochemical analyses were conducted to evaluate cognitive and oxidative stress outcomes.
Results: Prenatal and lactational exposure to metformin 150 mg/kg (FS-Met150) yielded significant improvements in behavioral performance and oxidative stress markers compared to the FS group. Lower doses (50 and 100 mg/kg) also demonstrated efficacy, albeit less pronounced than the highest dose. Notably, Met150 alone exhibited superior performance relative to the vehicle group in the probe trial, suggesting intrinsic cognitive benefits.
Conclusion: This study reinforces metformin's potential in attenuating seizure-related deficits, likely mediated by its antioxidant activity. While the precise mechanism remains unclear, the findings align with existing evidence supporting metformin's antiepileptic properties.
Key words: Febrile seizure, Metformin, Breastfeeding, Prenatal exposure.

P257, The effect of social hierarchy on anxiety-like behaviors in different stages of the development of male rats

Maryam Fallahi[1], Romina Baghinejad[1], Ali Jaafari suha[1], Narges Hosseinmardi[1], Mahyar Janahmadi[1], Fereshteh Poorabdolhossein[2]

1. Department of Physiology, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran
2. Department of Physiology, School of Medicine, Babol University of Medical Sciences, Babol, Iran

Background: Social hierarchy is one of the inevitable structures in social groups. Individuals at different hierarchical positions experience varying degrees of psychosocial stress, which may lead to anxiety-like behaviors that might vary in different ages. This study aimed to investigate the role of social rank in the development of anxiety-like behaviors in three developmental stages in male Wistar rats.

Methods: Three male littermate rats were home-caged in standard cages post-weaning at the age of 4–5 weeks. Social Dominance Tube Test was used to assess relative dominance rank between cage-mates across three consecutive weeks in five test trials after post-natal day 56 (weeks 9–11). Open Field test (OFT) and elevated zero maze test (EZM) were conducted before (week 7), while (week 10) and after (week 12) formation of social rank to assess anxiety-like behaviors.

Results: Rats were categorized into dominant, subordinate, and intermediate groups based on their average number of wins in the tube test. In the OFT, dominant and middle-ranked rats significantly spent more time and traveled a longer distance in the center after formation of social hierarchy than before (Two-Way ANOVA, $P<0.05$). As for the EZM, middle-ranked rats had a significantly higher anxiety index after formation of hierarchy compared to before and while (Two-Way ANOVA, $P<0.05$).

Conclusion: Overall, the results indicated that dominant rats have higher levels of anxiety-like behaviors during formation of rank compared to after its stabilization. While middle-ranked individuals showed higher anxiety-like behaviors after rank formation as opposed to before and while.

Keywords: Social hierarchy, Social rank, Anxiety-like behavior, Dominance, Developmental stage.

P260, Investigating brain regions apoptosis in rat model of autism

Sepideh Ghazvineh[1], Negar Haji Reza Boroujerdi[2], Pejman Mortazavi[2], Mohammad Reza Raoufy[1]
1. Department of Physiology, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran
2. Department of Pathology, Faculty of Specialized Veterinary Science, Science and Research Branch, Islamic Azad University, Tehran, Iran

Background: Empathy deficits are commonly reported in various neurodevelopmental disorders, including autism spectrum disorder (ASD), and is closely associated with impairments in social behavior and interpersonal communication. The ACC and BLA are critical regions in the neural circuitry of empathy, and their dysfunction has been linked to core social impairments in ASD. In this study, we examined the potential contribution of apoptosis in the ACC and BLA to the disruption of empathy-related behavior.
Methods: Sixteen male Wistar rats prenatally exposed to valproic acid were used as an established animal model of autism. To assess empathy-like behavior, a free rat was placed in an arena with a familiar rat confined in a restrainer. The free rat's efforts to liberate its cagemate were recorded over five consecutive days. Additionally, the expression of the pro-apoptotic protein BAX was analyzed in the ACC and BLA using immunohistochemical methods.
Results: Rats with autism showed significantly reduced social and empathy-like behaviors, along with delayed responses to the distress of their trapped peers. Moreover, immunohistochemical analysis indicated elevated BAX expression in both the ACC and BLA of autistic rats compared to controls.
Conclusion: These findings highlight a potential link between increased neural apoptosis and impaired empathy-related behavior in ASD. Understanding these neuropathological changes could inform the development of targeted interventions for improving social deficits in individuals with autism.
Keywords: Autism, Empathy, Anterior Cingulate Cortex, Basolateral Amygdala, Bax expression.

P261, Fluvoxamine improve cell senescence induction by D- galactose on neural stem cells via balancing oxidant - antioxidant activity and anti-inflammatory properties

Amir ghanbari[1], Roya aryanpour [2]
1. Medicinal Plants Research Center, Yasuj University of Medical Sciences, Yasuj, Iran
2. Cellular and Molecular Research Center, Yasuj University of Medical Sciences, Yasuj, Iran

Background: Aging is a progressive irreversible decline in physiological function. Aging-related diseases create a heavy economic and psychological burden for patients, their families, and society. Stressful factors can accelerate the cell aging process. Therefore, the use of substances that have antioxidant properties can play a role in prevention of aging. Fluvoxamine drug has neurogenic, antioxidant and anti-inflammatory properties. Considering that there is no report on the effects of fluvoxamine in studies related to aging, the present study was designed with the aim of evaluating the effect of fluvoxamine on induced aging in neural stem cell culture medium.
Methods: In the present study, neural stem cells were isolated from mice and cultured in serum-free culture medium. Then, the aging model was induced using D-galactose and the cells were treated with different concentrations of fluvoxamine. Finally, the amount of nitric oxide, malondialdehyde, antioxidant capacity, TSH and cytokines TNF-a and IL-6 in the cells were measured by ELISA method. The results were statistically analyzed using SPSS 26 software.
Results: The results showed that D-galactos significantly increased the level of NO, increased malondialdehyde and decreased antioxidant capacity compared to the control group ($p<0.0001$). Fluvoxamine led to a decrease in NO, a decrease in malondialdehyde and an increase in antioxidant capacity compared to the D-galactose group, which was statistically significant ($P<0.05$). Exposure of cells to D-galactose led to a significant decrease in TSH compared to the control group ($P<0.01$). Also, fluvoxamine concentrations of 25, 50, and 100 μM led to a significant increase in TSH compared to the D-galactose group (($P<0.01$). The results showed that D-galactose increased the level of IL-6 and TNF-a compared to the control group. Fluoxamine led to a decrease in the levels of cytokines IL-6 and TNF-a compared to the group receiving D-galactose. Co treatment of fluvoxamine and D-galactose at concentrations of 25 and 50 decrease the number of cell senescence than D-galactose groups.
Conclusion: Fluvoxamine, as an anti-inflammatory and antioxidant drug, showed significant protective effects on neural stem cells against aging. This drug slows down the cellular aging process by reducing inflammatory factors such as IL-6 and TNF-α, reducing oxidative stress, and regulating TSH levels. These findings show that fluvoxamine has significant potential in the treatment and prevention of aging-related diseases and neurological disorders.
Keywords: Fluvoxamine, cell senescence, neural stem cells

P262, the toll-like receptor 1/2 ligand pam3cys reduces TBI-induced damage size

Mahboobeh Kamrani Mehni[1,2], Morteza Zendehdel[1], Hamid Gholami Pourbadie[2], Maryam Hooshmand[2,3], Mohammad Sayyah[2]

1. Department of Physiology, Faculty of Veterinary Medicine, Tehran University, Tehran, Iran
2. Department of Physiology and Pharmacology, Pasteur Institute of Iran, Tehran, Iran
3. Department of Chemistry, Faculty of Science, Ferdowsi University of Mashhad, Mashhad, Iran

Background: Cognitive impairment is a prevalent complication of Traumatic brain injury (TBI) affecting quality of life of the patients. The toll-like receptor 1/2 (TLR1/2) agonist, tri- 2 palmitoyl-S-glyceryl-cysteine (Pam3cys), prevents TBI neuronal excitotoxicity in rodents if is administered shortly after TBI. We investigated effect of Pam3cys on size of tissue damage following mild-to-moderate TBI.

Methods: Male and female rats were trained in the Morris water maze. Then they received TBI using a controlled cortical impact (CCI) device. Pam3cys was administered into the cerebral ventricle 20 min after TBI.Spatial memory was assessed 7 and 28 days later. Avoidance memory was assessed 2, 6, 9 and 7 days after TBI. Triphenyl tetrazolium chloride (TTC) was used to assess brain damage.

Results: Pam3cys reduced TBI-induced tissue damage of rats.

Conclusion: Given to human safety of Pam3cys, it has potential for further studies including clinical investigation against TBI sequel.

Keywords: Controlled cortical impact; Morris water maze; Shuttle box; Spatial memory; Triphenyl tetrazolium chloride.

P263, Impact of resistance excersice on motor performance of male rats during exposure to electromagnetic fields

Asma Karimzadeh[1], Shiva Khezri [1], Seyed Mehdi Banan khojasteh[2], Homeira Hatami[2]
1. Department of Biology, Faculty of Basic Sciences, Urmia University, Urmia, Iran
2. Department of Animal Biology, Faculty of Natural Sciences, Tabriz University, Tabriz, Iran

Background: Widespread exposure to Electro Magnetic Field (EMF) raises concerns about its effects on the brain, particularly the cerebellum. This study examined how resistance exercise can improve motor function and reduce damage from EMFs in rats using the Rota Rod test.
Methods: In this study, 42 male Wistar rats were randomly assigned to seven groups to evaluate the effects of electromagnetic wave exposure and resistance exercise on motor performance. The groups included control, 7-day wave exposure, 14-day wave exposure, exercise only, 7-day wave + exercise, and 14-day wave + exercise. Rats in the wave exposure groups were subjected to daily exposure of 900 MHz EMF for four hours over a period of two weeks. The resistance exercise protocol involved ladder climbing with progressively increasing weight over a 14-day period. Motor performance was measured using the Rota-Rod test. Data were analyzed with Two-Way ANOVA ($p < 0.05$ considered significant).
Results: EMF for 14 days reduced motor performance compared to that of the control group ($p<0.0001$), showing balance impairment in the exposed group. Groups that combined exercise with EMF exposure (7 days, $p < 0.01$; 14 days, $p < 0.0001$) showed improved performance compared to the EMF -only group. The exercise-only groups showed non-significant improvement ($p>0.05$), whereas the 7-day EMF exposure caused a slight decline.
Conclusion: Chronic exposure to EMF impairs neuromotor function, possibly through cerebellar disruption. Resistance exercise mitigates these effects, highlighting its potential as a neuroprotective intervention for EMF -induced deficits.
Keywords: Electromagnetic fields, Resistance exercise, Cerebellum, Rota-Rod test.

P264, Thymol promotes neuroprotection in a preclinical model of acute traumatic brain injury

Amir Hossein Karimi[1], Ali Kazemi[2], Mehdi Mashayekh[1], Homa Valizadeh Khajeboulagh[1]
1. Department of Clinical Sciences, Faculty of Veterinary Medicine, Ga.C., Islamic Azad University, Garmsar, Semnan, Iran
2. Department of Pharmacology, Medical Sciences Branch, Islamic Azad University, Tehran, Iran

Background: Traumatic brain injury (TBI) presents a major clinical challenge due to its multifactorial pathology and limited therapeutic options. This study investigated the neuroprotective effects of Thymol on neuronal function, blood-brain barrier (BBB) integrity, cerebral edema, and neuroinflammation following severe TBI in rats.
Methods: Fifty-six male Wistar rats were randomly assigned to seven groups: intact, sham, TBI, vehicle (saline), and thymol-treated groups (2, 4, or 8 mg/kg). TBI was induced using the Marmarou method. Thymol (2-8 mg/kg, i.p.) was administrated 30 min post-TBI for 3 days. Neurological function was evaluated using multiple tests (VCS, locomotor, Beam Walk/Balance). Evans Blue dye assessed BBB permeability. CSF was collected for IL-1β analysis via ELISA. Brains were harvested for histopathology.
Results: Thymol (4 and 8 mg/kg) notably improved neurological scores and locomotor performance ($P<0.001$), reducing cerebral Evans Blue content by 45-60% (95% CI: 40-65%, $P<0.001$) and IL-1β levels in CSF by 50-60% ($P<0.001$). Crawling time decreased ($P<0.05$), and AUC in behavioral tests increased by 30-40% ($P<0.001$). The 2 mg/kg dose had minimal impact.
Conclusion: Thymol exhibits dose-dependent neuroprotection in severe TBI, likely via antioxidant and anti-inflammatory mechanisms, enhancing recovery and BBB integrity. Long-term effects remain to be elucidated.
Keywords: Traumatic brain injury (TBI), Thymol, Neuroprotection, Marmarou method, Rats.

P265, A systematic review of the role of magnetic nanoparticles in mechanotransduction and neural repair

Mohammad Amin Karimi Kuzehgaran[1], Zahra Amirkhani[1]
1. Student Research Committee, Larestan University of Medical Science, Larestan, Iran

Background: Magnetic nanoparticles (MNPs) have been a revolutionary tool in neural engineering and repair of central and peripheral nervous system (CNS and PNS) injuries due to their superparamagnetic properties and surface functionalization capabilities. This systematic review aims to analyze recent advances in the development of active mechanisms and targeted delivery systems based on MNPs to promote neural repair.
Method: A comprehensive search was conducted in PubMed, Scopus, Google Scholar, and MDPI. Search terms included "Magnetic Nanoparticles (MNPs), "Neuroregeneration", and "Mechanotransduction". Research articles from the period (2018-2025) including 21 articles were prioritized based on systematic reviews, clinical studies, research articles, and conference proceedings on speech restoration. The quality assessment of included studies was also considered for scientific rigor.
Results: The results demonstrate that MNPs enhance neuroplasticity through regulation of the critical BDNF/PI3K/Akt signaling pathways. The "nano-stretching" mechanism by applying pico-Newton force facilitates microtubule stabilization and local translation activation for sustained axonal growth. Furthermore, MNPs act as efficient carriers for reprogramming agents and have been able to significantly reduce astrocytic scarring. Dual magnetic strategies have also enhanced MNP transport in BBB models.
Conclusion: Although MNPs have strong preclinical potential in enhancing functional recovery, translational hurdles remain. Clinical integration requires careful consideration of long-term toxicology, optimization of surface coating to reduce induced neuroinflammation, and ethical considerations. MNPs offer a multifaceted approach for the next generation of neurotherapies.
Keywords: Magnetic Nanoparticles (MNPs), Neuroregeneration, Mechanotransduction.

P266, Neurophysiological changes in prefrontal and limbic networks during addiction treatment

Mohammad Amin Karimi Kuzehgaran [1], Zahra Amirkhani [1]
1. Student Research Committee, Larestan University of Medical Science, Larestan, Iran

Introduction: Addiction involves both structural and functional deficits in the executive control pathways of the prefrontal cortex (PFC) and the reward circuits of the limbic system. This systematic review aims to evaluate the neurophysiological alterations (both structural and functional) within the PFC and limbic system throughout addiction treatment, reflecting neuronal adaptability and the reorganization of brain networks.
Method: A thorough search was carried out in PubMed, Scopus, Google Scholar, and MDPI. The search terms included "Neuroplasticity," "Addiction Treatment," "Prefrontal Cortex," and "Limbic System." Research publications from the period (2018–2025) were prioritized, focusing on systematic reviews, clinical studies, research articles, and conference proceedings, leading to the selection of 22 articles. The quality of the included research was evaluated in terms of scientific rigor.
Results: Neuroimaging indicates that there is a partial restoration of gray and white matter integrity in the PFC (such as the dorsolateral prefrontal cortex [DLPFC] and superior frontal gyrus [SFG]) with extended periods of abstinence. Functionally, heightened activation and connectivity in cognitive control regions (like the anterior cingulate cortex [ACC] and inferior frontal gyrus [IFG]) and putamen are closely linked to favorable treatment outcomes and enhanced inhibitory control. This represents a hierarchical reorganization of the triadic networks (executive control network [ECN], salience network [SN], and default mode network [DMN]).
Conclusion: Treatment for addiction leads to effective structural recovery and fortification of the PFC's control functions. Focusing on neuroplasticity through psychotherapeutic methods or neuromodulation is essential for reprogramming neural pathways.
Keywords: Neuroplasticity, Addiction Treatment, Prefrontal Cortex, Limbic System.

P267, Stereological evaluation of teriflunomide neuroprotection in the hippocampus following traumatic brain injury in rats

Somayeh Keshavarz[1], Arsalan Pahlousay[2], Hadi Moatamed Jahromi[1,2], Atefeh Rahimi[1], Sara Keshtgar[1], Maryam Naseh[3]

1. Department of Physiology, School of medicine, Shiraz University of medical sciences, Shiraz, Iran
2. Department of Physiology, School of medicine, Tehran University of medical sciences, Tehran, Iran
3. Histomorphometry and Stereology Research Centre, Shiraz University of Medical Sciences, Shiraz, Iran

Background: Traumatic brain injury (TBI) induces profound structural alterations in the hippocampus, contributing to long-term cognitive deficits. This study used unbiased stereological methods to assess how teriflunomide protects the hippocampus after experimental TBI.

Methods: Adult male Sprague-Dawley rats were divided into three groups: Sham, TBI, and TBI+teriflunomide (10 mg/kg, oral, for 7 days). Coronal sections of the hippocampus were stained with cresyl violet. The volumes of CA1, CA3, and the dentate gyrus (DG) were estimated using the Cavalieri principle. Neuronal and non-neuronal cell numbers were quantified by the optical disector method.

Results: TBI led to a significant increase in the volumes of hippocampal subregions, including CA1 ($P < 0.0001$), CA3 ($P < 0.05$), and DG ($P < 0.05$), indicating tissue swelling and structural disarray. At the same time, the total number of pyramidal neurons in CA1 and CA3, as well as granule neurons in the DG, decreased significantly after TBI ($P < 0.01$, $P < 0.0001$, and $P < 0.0001$, respectively). Treatment with teriflunomide significantly reduced volume expansion in the CA1 region ($P < 0.05$) and restored neuron numbers in CA1, CA3, and DG ($P < 0.05$, $P < 0.01$, and $P < 0.05$, respectively). Furthermore, TBI significantly reduced the number of non-neuronal cells in all hippocampal subregions, while teriflunomide significantly increased non-neuronal cell numbers specifically in the DG ($P < 0.05$). No significant differences in dead neuron counts were observed among groups.

Conclusion: These stereological findings show that teriflunomide preserves hippocampal structural integrity and neuronal populations after TBI, supporting its neuroprotective potential overall.

Keywords: Traumatic brain injury, Teriflunomide, Hippocampus, Stereology.

P269, Hippocampal klotho and the neurotrophic factor bdnf mediate the neuroprotective effects of metformin against ICV-STZ-induced cognitive deficits

Ravieh Golchoobian[1], Farzane Shanebandpour Tabari[1], Fereshteh Pourabdolhossein[1]
1.Department of Physiology, Cellular and Molecular Biology Research Center, Health Research Institute, Babol University of Medical Sciences, Babol, Iran

Background: Alzheimer's disease (AD), the leading cause of dementia, poses a significant global health challenge with limited therapeutic options. Metformin, a widely used type 2 diabetes drug, shows potential neuroprotective effects. This study investigated metformin's ability to counteract cognitive and neuropathological deficits induced by an intracerebroventricular streptozotocin (ICV-STZ) rat model of Alzheimer's-like pathology.
Methods: Forty adult male Sprague-Dawley rats (120–150 g) were divided into four groups: Control, Metformin-only (oral, 200 mg/kg/day, 12 weeks), ICV-STZ (3 mg/kg bilaterally), and ICV-STZ + Metformin. Cognitive function was assessed using the Morris water maze (MWM).
Results: ICV-STZ administration induced significant spatial learning and memory impairments in the MWM, widespread neuronal death, increased hippocampal amyloid-beta (Aβ) plaque deposition, elevated oxidative stress (reduced HO-1, increased iNOS), and neuroinflammation (upregulated TNF-α and IL-1β). Metformin pretreatment effectively attenuated these deficits. It reduced neuronal degeneration and Aβ plaque load, mitigated oxidative stress, and suppressed neuroinflammation. Crucially, metformin restored hippocampal expression of the anti-aging gene Klotho and the neurotrophic factor BDNF.
Conclusion: Metformin pretreatment confers significant protection against ICV-STZ-induced Alzheimer's-like pathology and cognitive decline. Its neuroprotective mechanism involves the dual action of suppressing oxidative stress and neuroinflammation while upregulating key neuroprotective genes, Klotho and BDNF. These findings highlight metformin's potential as a novel therapeutic strategy for AD.
Keywords: Metformin, Alzheimer's disease, Neuroinflammation, Oxidative stress, Klotho

P270, Consequences of long-term excessive vitamin b9 supplementation before and during gestation on spatial and avoidance memory in rat offspring

Negin Golestani Eraghi[1], Masoumeh Gholami[1], Mehdi Sadegh[1]
1. Department of Physiology, School of Medicine, Arak University of Medical Sciences, Arak, Iran

Background: Vitamin B9 (folic acid) plays a critical role in cell division and DNA synthesis. Deficiency of vitamin B9 in pregnant mothers is associated with developmental disorders of the nervous system in the fetus. However, the effects of excessive dietary and supplemental vitamin B9 intake on neurodevelopmental disorders remain unclear. This study aimed to investigate the impact of high-dose vitamin B9 intake before and during pregnancy on spatial and avoidance memory in rat offspring.
Methods: Twenty-four Wistar rats received intraperitoneal injections of 0.5, 1, and 2 mg of Vitamin B9, while control animals received saline. Offspring were divided into eight groups (male/female) and assessed using the Morris water maze for spatial learning/memory and the shuttle box test for avoidance memory.
Results: The findings revealed that maternal intake of 1 mg and 2 mg of vitamin B9 before and during pregnancy impaired spatial learning in male offspring, while no changes in spatial memory were observed in either sex compared to the control group. Additionally, the 2 mg dose of Vitamin B9 caused impairment in avoidance memory in both male and female offspring.
Conclusion: These results indicate that prenatal over-supplementation with Vitamin B9may adversely affect specific neurological functions, particularly learning and memory, with effects varying by offspring sex. The study underscores the importance of balanced Vitamin B9 intake during pregnancy to optimize neurodevelopmental outcomes.
Keywords: Vitamin B9, Folic acid, Epigenetic, Spatial memory, Avoidance memory

P271, 3-Acetyl-11-keto-β-boswellic acid (AKBA) attenuated 6-hydroxydopamine (6-OHDA)-induced toxicity in SH-SY5Y cells via modulation of Akt/mTOR pathway

Akram Mohammadi[1], Azar Hosseini[2,3], Maryam Ghobeh[1], Ahmad Ghorbani[2,3], Hamid Reza Sadeghnia[2,3,4]

1. Department of Biology, SR.C., Islamic Azad University, Tehran, Iran
2. Pharmacological Research Center of Medicinal Plants, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Pharmacology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
4. Division of Neurocognitive Sciences, Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Parkinson's disease (PD) is a progressive neurodegenerative disorder characterized by the degeneration of dopaminergic neurons. Previous studies have demonstrated antioxidant, anti-inflammatory, and neuroprotective properties of *Boswellia serrata*. The present study aimed to investigate the protective effects of 3-acetyl-11-keto-β-boswellic acid (AKBA) against 6-hydroxydopamine (6-OHDA)-induced toxicity in SH-SY5Y dopaminergic cells.

Methods: SH-SY5Y cells were co-treated with AKBA (2.5, 5, 10, and 20 µM) and 6-OHDA (300 µM) for 24 hours. Cell viability was assessed using standard assays. Oxidative stress parameters including reactive oxygen species (ROS), malondialdehyde (MDA), glutathione (GSH) levels, and superoxide dismutase (SOD) activity were evaluated. Apoptosis rate was determined, and inflammatory cytokines (TNF-α, IL-6, and IL-1β) were quantified by ELISA. The expression levels of Akt and mTOR genes were measured using RT-PCR.

Results: AKBA treatment significantly increased cell viability following 6-OHDA exposure ($p<0.01$). AKBA markedly reduced ROS and MDA levels ($p<0.05$) while significantly enhancing GSH content and SOD activity ($p<0.001$). Lower concentrations of AKBA (2.5 and 5 µM) significantly attenuated apoptosis ($p<0.001$) and suppressed the release of pro-inflammatory cytokines ($p<0.05$). Furthermore, these concentrations significantly downregulated Akt/mTOR mRNA expression ($p<0.05$).

Conclusion: AKBA exerted neuroprotective effects against 6-OHDA-induced toxicity by reducing oxidative stress, inflammation, and apoptosis, possibly through modulation of the Akt/mTOR signaling pathway. These findings suggest that AKBA may represent a promising therapeutic candidate for the treatment of Parkinson's disease.

Keywords: Parkinson's disease, 3-acetyl-11-keto-β-boswellic acid (AKBA), 6-hydroxydopamine, SH-SY5Y cells, Oxidative stress

P272, The role of gut microbiota in depression: a focus on probiotic interventions -A systematic review

AmirMohammad Ganjali[1,2], Yekta Rezapour[1,2], Hossein Javid[1,3,4]
1. Department of Medical Laboratory Sciences, Varastegan Institute for Medical Sciences, Mashhad, Iran
2. Student Research Committee, Varastegan Institute for Medical Sciences, Mashhad, Iran
3. Department of Clinical Biochemistry, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
4. Surgical Oncology Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Depression is a common mental health disorder with diverse etiological factors. Recent years have seen heightened focus on the gut-brain axis and gut microbiota's role in the pathophysiology of depression. This systematic research aims to probiotic methods on depressed symptoms and investigates potential underlying processes.
Methods: The databases Web of Science, PubMed, and ScienceDirect were systematically searched for articles published from 2020 to 2025. From a starting group of around 220 papers, 9 were chosen according to the inclusion criteria for the final analysis.
Results: Probiotic supplementation, in contrast to a placebo, was linked to a notable decrease in depressive symptoms, especially among individuals with major depressive disorder (MDD). According to research, improvements were assessed utilizing standardized instruments such as the BDI, HADS, and DASS-21, Patients experiencing depression frequently showed reduced gut microbial diversity, Elevated numbers of pro-inflammatory bacteria such as Bacteroides and Eggerthella, alongside reduced populations of Faecalibacterium and Coprococcus.
Conclusion: Despite the encouraging results, further standardized investigations are essential to assess long-term effects and individual variations. Further study needs to include microbial profiling and brain imaging methodologies, such as fMRI, to enhance comprehension of the therapeutic efficacy of probiotics in depression.
Keywords: gut microbiota, qualitative, depression, probiotics, participation

P274, Sex-dependent effects of adolescent morphine exposure on anxiety-like behavior in adult rats

Negin Givechian[1], Yaghoub Fathollahi[1], Hossein Azizi[1], Amir Shojaei[1]
1. Department of physiology, Faculty of medical sciences, Tarbiat modares university, Tehran, Iran

Background: Exposure to opioids during adolescence can induce long-lasting alterations in anxiety like behavior. However, the sex dependent effects of adolescent morphine exposure has been poorly understood. Here, locomotor activity and anxiety-like behavior were compared between adult male and female rats after repeated exposure to morphine during adolescence.
Methods: Adolescent male and female Wistar rats received morphine sulfate (5 to 25 mg/kg) or saline subcutaneously once daily from postnatal day 28 to 37, and the morphine dose was increased by 5 mg/kg every two days. After 6 weeks without intervention, adult male and female rats were subjected to the OFT (open field test) and elevated zero maze to assess locomotor activity and anxiety-like behavior.
Results: The total distance traveled in the OFT was significantly higher in male rats exposed to morphine compared to control rats, but no significant difference was seen compared to female rats. Cumulative time spent in the center of the OFT was not significantly different in male and female rats. Cumulative time spent in the zero-maze open area was significantly increased in female rats exposed to morphine compared to male rats exposed to morphine.
Conclusion: Morphine exposure during adolescence resulted in a significant increase in anxiety-like behavior in male rats, while reducing anxiety-like behavior in female rats, indicating sex-dependent effects of adolescent morphine exposure on anxiety-like behavior.
Keywords: Adolescent morphine exposure, Sex-dependent effects, Anxiety-like behavior

P275, Mitotherapy improves depression and anxiety induced by restraint stress via modulating neuroinflammation

Vida Mafikandi[1], Leila Hosseini[1]
1.Research Center of Psychiatry and Behavioral Sciences, Tabriz University of Medical Sciences, Tabriz, Iran

Background: Stress is a common life event that initiates a wide range of neurochemical changes in the brain, leading to mood disturbances such as depression and anxiety. This study aimed to investigate the effects of mitochondrial transplantation on restraint stress (RS)-induced anxiety- and depressive-like behaviors and inflammation in the hippocampus of mice.
Methods: Thirty healthy male BALB/c mice were allocated into 3 groups: control, RS, and RS+ mitochondria (receiving intranasal mitochondria every other day in total, three times). The mice in the experiment were exposed to RS by being placed in an immobilization falcon tube for 2 hours a day over 2 weeks, except for the control group. The tail suspension test (TST) and elevated plus maze (EPM) are used to evaluate depression and anxiety-like behaviors. Corticosterone (CORT) levels in serum were assessed through the ELISA method. Moreover, the NLRP3/1 inflammasome and IL-1β expression were examined using a Western blot.
Results: The results showed that mitochondria transplantation alleviated the RS-induced increase in immobility time. In addition, mitotherapy resulted in an increase in time spent in the open arms of the EPM. It also reduced CORT levels and the RS-induced increase in IL-1β and NLRP3/1 expression in the hippocampus of mice.
Conclusion: Our findings provide evidence for the neuroprotective effect of mitochondria transplantation against stress-induced depression and anxiety-like behaviors in mice by modulation of the inflammation.
Keywords: Restraint stress, Mitotherapy, Anxiety, Depression, Neuroinflammation

P276, Unveiling the neuroprotective role of oxytocin against alcohol-induced neurotoxicity and neurobehavioral changes

Majid Motaghinejad
Chronic Respiratory Disease Research Center (CRDRC), National Research Institute of Tuberculosis and Lung Diseases (NRITLD), Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: This study assessed the neuroprotective effects of oxytocin on Alcohol-induced neurotoxicity and neurobehavioral disorders in an animal model.
Method: Forty-eight male Wistar rats were randomly assigned to one of six groups: group 1 (0.5 mL/rat normal saline), group 2 (2gr/kg/day alcohol), groups 3, 4, and 5 (2gr/kg/day alcohol combined with oxytocin at doses of 40, 60, or 80 µg/kg,I.P), and group 6 (oxytocin, 80 µg/kg,I.P). Treatment was for 21 days. Behavioral evaluations included mood and motor activity assessments such as OFT, EPM, and FST. Hippocampal inflammation, oxidative stress, mitochondrial function, autophagy pathways (JNK/Beclin-1-Bax), and apoptosis pathways (Bcl-2/Beclin-1-Bax) were measured.
Results: Oxytocin in all doses prevented alcohol-induced disturbances in motor activity and mood, and increased GPx, GR, SOD activities, as well as levels of MMP, GSH, TAC, ATP, and unphosphorylated Bcl-2. In Alcohol-treated rats, Oxytocin reduced TNF-α, IL1-β, GSSG, ROS, MDA, H2O2, and attenuated both forms of JAK, Bax, Beclin-1, and phosphorylated Bcl-2.
Conclusion: The findings indicate that oxytocin mitigates various adverse effects associated with alcohol exposure, including neurotoxicity and behavioral changes.
Keywords: Oxytocin, Alcohol, autophagy, oxidative stress, apoptosis, inflammation, and mitochondrial function.

P277, Avoidance memory using the elevated plus maze and the effects of donepezil on bisphenol A-induced cognitive impairments

Narges Mohebbi[1], Delaram Eslimi Esfahani[1], Vahidehsadat Abbasnia[2], Adel Salari Eskar[1]
1. Department of Animal Science, Faculty of Biological Science, Kharazmi University, Tehran, Iran
2. Department of Biology, Payame Noor University, Tehran, Iran

Background: Donepezil, a reversible acetylcholinesterase inhibitor that enhances cholinergic neurotransmission, has been widely recognized for its neuroprotective and cognition-enhancing properties. Conversely, Bisphenol A (BPA), through neurobiochemical disruptions and interference with neural circuitry, has been linked to memory dysfunction. This study aimed to investigate the effects of donepezil on avoidance memory performance in a BPA-induced rat model using the Elevated Plus Maze (EPM).
Methods: Male Wistar rats (n = 56) were randomly assigned to seven groups: control, vehicle control, a BPA group (0.4 mg/kg/day), a donepezil-only group (10 mg/kg/day), and three BPA-exposed groups co-treated with donepezil at incremental doses (1, 5, and 10 mg/kg/day). Treatments were administered orally for 4 weeks. Avoidance memory was assessed in the EPM by measuring initial transfer latency (ITL) on the training day and retention transfer latency (RTL) 24 hours later, the latter serving as an index of memory retention. Data were analyzed by ANOVA, with statistical significance set at $p < 0.05$.
Results: BPA exposure significantly reduced RTL compared with the control group ($p < 0.05$), indicating impaired avoidance memory, whereas ITL showed no significant differences among groups. Donepezil alleviated these deficits in a dose-dependent manner, with higher doses significantly increasing RTL and improving memory performance ($p < 0.05$*).
Conclusion: Donepezil effectively mitigated BPA-induced avoidance memory impairments, as evidenced by prolonged RTL in the EPM. These findings highlight donepezil's potential as a neuroprotective agent against cognitive deficits associated with environmental neurotoxicants.
Keywords: Bisphenol A, Donepezil, Memory, Maze Learning, Neuroprotection

P278, Hippocampal edema progression after conditioned fear in male rats

Mahya Mohammadi[1], Homeira Hatami[1], Sadra Abbasi[1], Sina Shojaei[1]
1. Department of Animal Biology, Faculty of Natural Sciences, University of Tabriz, Tabriz, Iran

Background: Stressful experiences can significantly affect vulnerable brain regions such as the hippocampus. While conditioned fear is widely used to study these impacts, the progression of tissue edema with continued exposure remains unclear. In this study, we investigated how varying durations of fear conditioning alter hippocampal edema development in male rats.
Methods: Male Wistar rats (n = 7 per group) were assigned to control, 7-day, or 14-day shocks protocols. Fear conditioning was carried out using a standard apparatus. After the final session, hippocampal tissue was collected and examined using hematoxylin–eosin staining. Edema severity was scored, and statistical analysis was performed with two-way ANOVA followed by Tukey post-hoc testing.
Results: Shock duration had a marked effect on edema severity. Both conditioned groups showed significantly greater hippocampal swelling than controls, with the 14-day group exhibiting the highest edema scores. Tukey's test confirmed significant differences between control and both shock-exposed groups ($P < 0.0001$). A significant difference was also observed between the 7-day and 14-day groups, indicating a progressive increase in edema with longer shock exposure.
Conclusion: Longer exposure to conditioned fear leads to a progressive rise in hippocampal edema. These findings emphasize how extended stress can heighten the vulnerability of hippocampal tissue and may help guide future work on the cellular consequences of chronic stress.
Keywords: Hippocampus; Edema, Brain; Fear Condition

P281, Effects of ceftriaxone on seizure development, locomotor activity, and anxiety-like behavior in PTZ-induced epileptic rats

Golsa Modiri[1], Narges Hosseinmardi [1], Zohreh Tavassoli [2]
1. Department of Physiology, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran
2. Neuroscience Research Center, Institute of Neuroscience and Cognition, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: The astrocytic glutamate transporter GLT-1 plays a crucial role in maintaining extracellular glutamate homeostasis by efficiently clearing glutamate from the synaptic environment. This process is essential for maintaining the excitatory-inhibitory balance within neural circuits, thereby influencing the pathophysiology of epilepsy and its associated cognitive impairments. This study investigated how activation of GLT-1 by ceftriaxone (CTX) modulates the kindling process, locomotor activity, and anxiety-like behavior in the PTZ-induced epilepsy model in rats.
Methods: Animals were kindled by the injection of pentylenetetrazole (37.5 mg/kg i.p, every 48 h) to model progressive epileptogenesis. Seizure severity was rated on a five-stage behavioral scale (0–5). Ceftriaxone (200mg/kg) was administered intraperitoneal (IP), 60 minutes before each PTZ injection. Seizure parameters were assessed 20 min after PTZ administration. One day after full kindling, locomotor activity and anxiety-like behavior were investigated using the open field test.
Results: The activation of GLT-1 by CTX during the kindling process could significantly decrease the maximal seizure stage and seizure duration while increasing the latency to the onset of stage 2 and stage 4 seizures. The results of the open field test showed that GLT-1 activation could not significantly change total distance traveled, velocity, and time in the center versus the periphery zone compared to kindled rats.
Conclusion: These findings indicate that pharmacological activation of GLT-1 significantly modulates seizure development during PTZ kindling but does not exert significant effects on locomotor activity or anxiety-like behavior
Keywords: GLT-1, Kindling, Locomotor activity, Anxiety-like behavior

P282, Neuroprotective and spatial learning improving effects of cilostazol in amnesic rats

Sakineh Sadat Mortazavi Sani[1], Akram Eidi[1], Arezoo Rajabian[2,3], Mahmoud Hosseini[4,5]
1. Department of Biology, SR.C., Islamic Azad University, Tehran, Iran
2. Neuroscience Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Neuroscience, Faculty of Medicine, Mashhad Applied Biomedical Research Center, Basic Sciences, Mashhad, Iran
4. Applied Biomedical Research Center, Basic Sciences, Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
5. Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Scopolamine-induced amnesia disrupts spatial learning and elevates oxidative stress. Cilostazol, has shown neuroprotective potential, but its effects on cognitive deficits and oxidative markers in amnesia remain unclear.
Methods: Amnesia was induced in rats with scopolamine. Cilostazol and donepezil (positive control) were administered orally for three weeks. Spatial learning was assessed using Morris water maze, and hippocampal oxidative stress markers, including lipid peroxidation and antioxidant enzymes, were measured.
Results: Cilostazol significantly improved spatial learning, reducing escape latency and path length, and increasing time spent in the target quadrant. It also decreased hippocampal lipid peroxidation and enhanced antioxidant enzyme activity, demonstrating a mitigation of oxidative stress.
Conclusion: Cilostazol exerts neuroprotective effects in scopolamine-induced amnesia by enhancing spatial learning and attenuating oxidative stress, supporting its potential as a therapeutic agent for cognitive disorders.
Keywords: Cilostazol, Neuroprotection, Spatial Learning, Oxidative Stress, Amnesia

P283, Cilostazol enhances aversive memory and modulates cholinesterase activity in rat

Sakineh Sadat Mortazavi Sani[1], Akram Eidi[1], Arezoo Rajabian[2,3], Mahmoud Hosseini[4,5]
1. Department of Biology, SR.C., Islamic Azad University, Tehran, Iran
2. Neuroscience Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Neuroscience, Faculty of Medicine, Mashhad Applied Biomedical Research Center, Basic Sciences, Mashhad, Iran
4. Applied Biomedical Research Center, Basic Sciences, Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
5. Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Scopolamine impairs cholinergic neurotransmission and disrupts memory processes. Cilostazol, a phosphodiesterase-3 inhibitor, has been suggested to improve cognitive performance, yet its effects on aversive memory and cholinesterase activity remain to be clarified.
Methods: Amnesia was induced in rats using scopolamine. Cilostazol and donepezil (positive control) were administered orally for three weeks. Passive avoidance testing was performed to evaluate memory retention, and hippocampal acetylcholinesterase (AChE) activity was measured to assess cholinergic function.
Results: Scopolamine markedly impaired aversive memory. Treatment with cilostazol significantly increased step-through latency and reduced preference for the dark compartment. Cilostazol also decreased hippocampal AChE activity, indicating improved cholinergic function comparable to donepezil.
Conclusion: Cilostazol attenuated scopolamine-induced aversive memory deficits in rats and reduced hippocampal acetylcholinesterase activity, indicating improved cholinergic function. Its efficacy comparable to donepezil suggests that cilostazol may represent a potential therapeutic candidate for cognitive impairment associated with cholinergic dysfunction.
Keywords: Cilostazol, aversive, Cholinesterase, Amnesia, Neuroprotection

P284, The effect of migraine headache on nutritional behavior of male rats

Daniyal Mosaferi Poodine[1], Mehdi Abbas Nezhad[1], Saeed Esmaeili Mahani[1], Mahnaz Zamiyad[1]
1. Faculty of Sciences, Shahid Bahonar University of Kerman, Kerman, Iran

Background: Migraine is a neurovascular disorder and, it significantly affects daily activities. This study investigates the effects of nitroglycerin (NTG)-induced migraine on taste preferences (bitter, salty, sweet, and sour) and macronutrient selection (carbohydrates, proteins, lipids) as well as neuropeptide Y, leptin, and BDNF in rats.
Methods: Adult male Wistar rats (n= 7 per groups, two groups, pain and normal, 230–250 g) were administered NTG (5 mg/kg, intraperitoneally) every other day for nine days to induce migraine. Food preference was assessed in two 12-hour phases: the first for taste preference and the second for macronutrient selection. Data were collected via SD cards and analyzed. The realtime PCR was used for molecular assay.
Results: Migraine-affected rats exhibited significant changes in taste and nutrient preferences compared to the control group. They showed an increased preference for sour flavors, followed by sweet, salty, and bitter tastes. In contrast, the control group exhibited a preference order of salty > sweet > sour > bitter. Regarding macronutrient selection, migraine rats preferred lipid-based diets over normal, carbohydrate, and protein-rich foods, whereas control rats prioritized carbohydrates, NTG treatment increased, BDNF, neuropeptide Y and Leptin gene expression.
Conclusion: The findings suggest that migraines alter dietary behavior in rats, impacting taste perception and macronutrient selection. These insights may contribute to nutritional management strategies for migraine patients.
Keywords: Migraine, Nitroglycerin, Taste Preference, Leptin.

P285, Interactive effects of estrogen depletion and stress on anxiety, recognition & location memory, and hippocampal neurotrophic factor (BDNF) in rats

Iliya Masoudi [1], Parmida Habibi [1], Arvin Amiri [2], SeyedehRose Jamali [3], Simin Ehsani Vostacolaee [4], Sakineh Shafia [5]

1. Student Research Committee, School of Medicine, Mazandaran University of Medical Sciences, Sari, Iran
2.Department of veterinary medicine, Faculty of veterinary medicine, Babol Branch, Islamic Azad University, babol, Iran
3. Department of Biology, Faculty of biotechnology, Babol Branch Islamic Azad University, babol, Iran
4. Department of Physiology, Faculty of Medicine, Mazandaran University of Medical Sciences, Sari, Iran
5. Immunogenetics Research Center, Department of Physiology, Mazandaran University of Medical Sciences

Background: Estrogen loss after Ovariectomy (OVX) and exposure to severe stress, such as Single Prolonged Stress (SPS), are each known to impair affective and cognitive functions and reduce hippocampal plasticity. However, their combined effects on behavior and neurotrophic factors remain incompletely understood. This study aimed to investigate how OVX and SPS interaction influence on anxiety, memory, and hippocampal BDNF in rats.

Methods: Single prolonged stress (SPS) was used to induce PTSD. Wistar female adult rats were assigned to four groups: control / non SPS, control / SPS, OVX /non SPS, and OVX / SPS. Following recovery and stress exposure, anxiety was evaluated using the Elevated plus Maze, while recognition and spatial memory were assessed using Object Recognition and Object Location tasks. Hippocampal BDNF levels were quantified using ELISA. Data were analyzed with two-way ANOVA (factors: OVX and SPS), with appropriate post hoc test. $p < 0.05$ was considered as significant level.

Results: OVX and SPS independently increased anxiety-like behaviors, impaired recognition and location memory, and reduced hippocampal BDNF. Importantly, OVX × SPS interaction produced the most severe behavioral deficits and the lowest BDNF levels. lower BDNF correlated with poorer memory and higher anxiety indices.

Conclusion: Estrogen depletion sensitizes the female brain to severe stress, producing synergistic deficits in affective-cognitive outcomes accompanied by reduced hippocampal neurotrophic signaling. These findings highlight the importance of preserving BDNF pathways under hypo estrogenic and high stress conditions and support preventive or therapeutic strategies for pre and postmenopausal populations at risk of trauma.

Keywords: Ovariectomy, Single Prolonged Stress (SPS), BDNF, Hippocampus, Anxiety-like behavior

P286, The effect of lithium chloride on cognitive-behavioral deficits and hippocampal expression of pro-/anti-inflammatory cytokines in rat model of Alzheimer's disease

Negin Mesrian Jahromi[1], Mohammad Amin Edalatmanesh[1]
1. Department of Biology, Shi. C., Islamic Azad University, Shiraz, Iran

Background: Alzheimer's disease (AD) is a neurodegenerative disease that is associated with cognitive and verbal impairments, memory deficits, paranoia, depression, and anxiety. The aim of the present study was to evaluate the anti-inflammatory and neuroprotective effect of lithium chloride (LiCl) in an animal model of Alzheimer's disease induced by trimethyltin (TMT).
Methods: 28 adult male Wistar rats were randomly divided into 4 groups (n=7): control, TMT+Saline, TMT+LiCl2, and TMT+LiCl4. TMT (8 mg/kg body weight), LiCl (2 and 4 mEq/kg body weight for 14 consecutive days), and saline (as LiCl vehicle) were administered intraperitoneally. Then, using the elevated plus maze and Y-maze tests, anxiety, spatial-working memory were measured, respectively. Also, the hippocampal levels of pro-inflammatory cytokines [interleukin (IL)-1 beta, IL-6 and tumor necrosis factor alpha (TNF-α)] and anti-inflammatory cytokines (IL-10) were measured.
Results: The results showed that compared to the TMT+Saline group, the LiCl-treated groups showed a significant decrease in anxiety levels, ameliorated spatial-working memory, a significant decrease in IL-1β, IL-6 and TNF-α and a significant increase in IL-10 in the hippocampus ($p<0.05$).
Conclusion: LiCl reduced cognitive and anxiety symptoms in the AD model by reducing TMT-induced neuroinflammation in the hippocampus.
Keywords: Trimethyltin compounds, Alzheimer's disease, Anxiety, Neuroinflammation

P287, The effect of flurbiprofen on oxidative stress levels in the experimental animal model of the seizures

Iliya Moslehi[1], Sorna Khatibi[1], Arman Parsaiee[1], Zoha Alaghemandan[1], Mohammad Soheil Aligol[1], Vahid Azizi[1], Abdolkarim Hosseini[1]
1. Department of Animal Sciences and Marine Biology, Faculty of life sciences and Biotechnology, Shahid Beheshti University, Tehran, Iran

Background: Approximately 1% of the world's population possesses the epilepsy disorder. The research for novel drugs is ongoing because of the common drugs' adverse side effects and drug resistance. Epileptic seizures can initiate inflammatory pathways in the brain, which can further increase oxidative stress. Regarding the interconnected causal relations between inflammation, oxidative stress, and seizures, Flurbiprofen (FLU) was proposed as a candidate drug due to its anti-inflammatory and free radical scavenging activities.
Methods: The rats were divided into four groups, each including five rats. Three rats' groups received Pentylenetetrazol dissolved in physiological saline, two of them after being introduced to 5 and 10 mg/kg of FLU. The control group received only vehicle. The rat's blood samples were collected after cessation of seizures. To evaluate the candidate drug effects on oxidative stress and thus seizure, Total Antioxidant Capacity (TAC) and Total Oxidative Status (TOS) assays were conducted, and the results were compared between the groups.
Results: As expected, FLU significantly increased TAC ($P<0.05$) and decreased TOS levels ($P<0.05$) when compared with PTZ group. These effects were even more prominent in higher doses of the drug.
Conclusion: The results suggest that FLU enhances protection against oxidative stress in the brain, thus possibly lowering the harm of acute seizures. This study was based on models of acute seizure; therefore, other studies are needed for the chronic models.
Keywords: Epilepsy, Flurbiprofen, PTZ-induced seizures, Oxidative stress

P288, The alleviating effects of vitamin D3 on nicotine withdrawal-induced anxiety and depression-like behaviors: Exploring the roles of oxidative stress, inflammation, and serotonin system alterations

Ashkan Mollemi[1], Farimah Beheshti [2, 3], Samaneh Kakhki[4], S. Mohammad Ahmadi- Soleimani[2, 3], Hassan Azhdari-Zarmehri[2, 3]

1. Student Research Committee, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
2. Departments of Physiology, School of Medicine, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
3. Neuroscience Research Center, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
4. Department of Clinical Biochemistry, School of Medicine, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran

Background: The present study conducted to assess whether vitamin D3 (Vit D) could ameliorate the anxiety and depression induced by nicotine (Nic) withdrawal in male adult rats.
Methods: Male rats were divided into vehicle, and experimental groups that received Nic (2 mg/kg, intraperitoneally (i.p.)) for three consecutive weeks and after that, the vehicle group that was divided into two groups, one of which returned to a regular diet, and the second one received Vit D (100000 IU). The Nic group was divided into four groups, three of which received different doses of Vit D (1000, 10000, and 100000IU/kg), and the last one returned to a normal diet without treatment, which was considered as the withdrawal period.
Results: Behavioral analysis showed that Nic withdrawal induced anxiety and depression. Vit D reduced anxiety and depression induced by Nic withdrawal. The biochemical analysis demonstrated the more activity of oxidative stress factors and pro-inflammatory cytokines in which Nic was administered, whereas Vit D reversed the results and improved the activity of both antioxidant and anti-inflammatory parameters.
Conclusion: Present findings and accumulating evidences have confirmed the protective effect of Vit D on numerous disorders including psychiatric diseases as well as cognitive dysfunction. Vit D has strong potential to introduce as anxiolytic and anti-depressant agent along with alleviating other negative effects following nicotine withdrawal; however, further investigation is needed in larger sample size to discuss more confidently.
Keywords: Nicotine, Withdrawal, Vitamin D 3, Depressive-like behavior

P289, Magnesium sulfate increased discrimination index in an AlCl3-induced Alzheimer's rat model

Samira Moghadasi[1], Manizheh Karami[1], MohammadReza Jalali Nadooshan[2]
1. Department of Biology, Faculty of Science, Shahed University, Tehran, Iran
2. Department of Pathology, Faculty of Medicine, Shahed University, Tehran, Iran

Background: Aluminum chloride (Al) causes memory impairment and induces Alzheimer's disease (AD). In this study, an animal model of AD was induced by injection of AlCl3 into the dorsal hippocampus (DH), and then the effect of magnesium sulfate on memory retrieval was examined in a novel object recognition (NOR) test.
Methods: Fifty-six male Wistar rats were grouped into saline control, aluminum (25 µg/rat) and magnesium sulfate (5, 25, 45 mg/kg), and aluminum (25 µg/rat) + magnesium sulfate (5, 25, 45 mg/kg) groups. All animals were cannulated in the DH region, but only those intended to be AD model were treated with an effective dose (25 µg/rat) of Al under the restraint of a stereotaxic device. One week after recovery, NOR was performed, during which animals received saline or magnesium sulfate intraperitoneally. Discrimination Index (DI) was measured and compared between all groups.
Results: Al reduced DI compared to saline control. This index did not show a significant difference in magnesium sulfate alone groups, however, it showed an improvement compared to groups treated with Al alone when administered in the model during acquisition.
Conclusion: Magnesium sulfate is likely capable of reducing the toxic effects of Al and improving the animal's memory.
Keywords: Alzheimer's disease, Aluminum chloride, Magnesium sulfate, Novel object recognition

P291, Protective effects of *Cocos nucifera* L. oil against neural damage in a rat model of pentylenetetrazole - induced seizure

Mobina Mahdizadeh[1], Fatemeh Alipour[2], Farimah Beheshti[3], Elnaz Khordad[4]
1. Student Research Committee, School of Medicine, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
2. Department of Anatomy and Cell Biology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Neuroscience Research Center, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
4. Departments of Physiology, School of Paramedical Sciences, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran

Background: Seizures are a sort of neurological disorder. There are various things that influence seizures, such as sex hormones. Considering the antioxidant effect of Cocos nucifera L. oil (CNO) this study was performed to investigate the antioxidant effects of CNO on pentylenetetrazole - induced seizure in ovariectomized (OVX) rats.
Methods: Female Wistar rats were randomly divided into 6 groups: 1 (Sham), 2 (OVX), 3-5 (OVX-CNO 100, 200 and 400 mg/kg,) O (OVX and treated by CNO 100, 200 and 400 m/kg by oral gavage for 5 weeks), 6 (CNO400mg/kg (Sham rats treated by 400 m/kg by oral gavage for 5 weeks). Finally, PTZ (50 mg/kg) was injected and the animal behaviors were observed for 60 min. The histological and biochemical methods were then used in hippocampus.
Results: A significant increase in the seizure score was seen in OVX group compared to Sham group. Treatment by CNO decrease seizure score compared to OVX group. In OVX group, the brain tissue total thiol concentration, superoxide dismutase (SOD) and Catalase activities was significantly lower, and malondialdehyde (MDA) concentrations were higher than in the Sham group. The numbers of dark neurons in CA1, CA2, CA 3 and dentate gyrus (DG) area of OVX group was higher than Sham group. Treatment by CNO reversed these effects.
Conclusion: It is concluded that treatment of the ovariectomized rats by CNO decreased PTZ-induced seizure score and dark neurons. It might be though prevention of adverse effects on estradiol level and oxidative stress parameters.
Keywords: Cocos nucifera L., Dark neuron, Ovariectomy, Oxidative stress, Seizure

P292, Survey of modulatory effects of prazosin and yohimbine on induced spike-timing-dependent plasticity of ventral tegmental area neurons in rats

Seyedeh Diman Mahdi[1,2], Leila Derafshpour [3,4], Firouz Ghaderi Pakdel[2]
1. Student Research Committee, Urmia University of Medical Sciences, Urmia, Iran
2. Department of Physiology, School of Medicine, Urmia University of Medical Sciences, Urmia, Iran
3. Neuroscience, Ottawa Hospital Research Institute, Ottawa, ON K1H8M5, Canada
4. Department of Medicine, University of Ottawa, Ottawa, ON K1H 8M5, Canada

Background: Modulation of the ventral tegmental area (VTA) may alter its output, as it is an important region for changing different behaviors. The VTA comprises dopamine (DA-ergic) and gamma-aminobutyric acid-releasing (GABA-ergic) neurons. DA-ergic neurons normally show tonic (slow, steady) and phasic (bursting) firing patterns. Adrenergic receptors on the neurons can alter these patterns of firing. This study surveyed the firing patterns of VTA DA-ergic and GABA-ergic neurons by intracerebroventricular (ICV) microinjection of alpha-1 and alpha-2 adrenergic antagonists, prazosin and yohimbine.

Methods: Male Wistar rats (~270 g) were anesthetized with urethane (1.5 g/kg initial dose, i.p., 0.5 g/kg/each hour boosters) and fixed in a stereotaxic frame (Steolting, USA). The bregma and interaural coordinates were used to approach the recording glass microelectrodes to the VTA. Single neuron firings were amplified by an extracellular AC amplifier (DAM 80, WPI) and digitized by a USB NI 6009 board, then stored on the PC by software (Wavemetrics Igor Pro). On-line monitoring was performed, then off-line sorting by Neuromatic software was used to evaluate Peri-Stimulus Time Histogram (PSTH) and Inter-Spike Interval Histogram (ISIH) criteria. Prazosin and yohimbine were applied ICV (1, 20, 50, 100, 250 µg/10 µL/1 min) separately. Spike-timing-dependent plasticity (STDP) was studied by pairing the DAergic and GABAergic neurons' firings. Data were analyzed with one-way analysis of variance (ANOVA) and post-hoc Newman-Keuls tests with $P<0.05$ significance level.

Results: The results showed that PSTH and ISITH of the DA-ergic and GABAergic neurons changed after prazosin (20, 50, 100, 250) in a non-amount-dependent manner. Amounts of 50 and 100 showed profound effects and induced burst firing in the DAergic neurons and significantly changed PSTH and ISITH of the DAergic and GABAergic neurons. Yohimbine showed the same firing changes in the amounts of 100 and 250 µg only. The STDP data revealed that pairing of the DAergic and GABAergic neurons occurred between 40% of DA and GABA-ergic neurons in the presence of prazosin, but it occurred only 10% in the presence of yohimbine.

Conclusion: The presence of alpha-1 and alpha-2 adrenergic receptors in the post-synaptic regions and alpha-2 in the pre-synaptic regions is postulated and contributes to the firing rate and firing interaction between DA-ergic and GABA-ergic VTA neurons. The data emphasized that alpha-1 inhibition has greater effects on the modulation and STDP efficacy than alpha-2 adrenoceptors. These modulatory effects suggest the presence of alpha-1 receptors on the interneurons in the VTA micro-circuitry to express synaptic changes and STDP.

Keywords: Ventral Tegmental Area (VTA), Dopaminergic (DA), GABA releasing neurons (GABAergic), Spike-Timing Dependence Plasticity (STDP), Prazosin, Yohimbine

P294, Yohimbine has the same potency as prazosin in the induction of spike-timing-dependent plasticity of the locus coeruleus neurons in rats

Delnia Mehrafarine[1], Leila Derafshpour[2,3], Firouz Ghaderi Pakdel[1]
1. Department of Physiology, School of Medicine, Urmia University of Medical Sciences, Urmia, Iran
2. Neuroscience, Ottawa Hospital Research Institute, Ottawa, Canada
3. Department of Medicine, University of Ottawa, Ottawa, Canada

Background: The locus coeruleus (LC) plays a critical role in brain functions and contains noradrenergic (NE), GABAergic, and glutamatergic neurons. Adrenergic receptors modulate firing patterns of LC neurons. This study examined the effects of alpha-1 and alpha-2 adrenergic antagonists, prazosin and yohimbine, on LC neuronal activity.
Methods: Male Wistar rats (~270 g) were anesthetized with urethane and placed in a stereotaxic frame. Glass microelectrodes recorded single-neuron activity from LC. Signals were amplified, digitized, and analyzed using Neuromatic software for peri-stimulus time histogram (PSTH) and inter-spike interval histogram (ISIH). Prazosin and yohimbine were administered intracerebroventricularly (1–250 µg/10 µL/1 min). Spike-timing dependent plasticity (STDP) was assessed by pairing NE and GABAergic neuron firings. Data were analyzed with ANOVA and Newman–Keuls post-hoc tests ($p<0.05$).
Results: Prazosin induced burst firing in NE neurons at multiple doses, while yohimbine produced dose-dependent changes. GABAergic neurons showed no firing pattern changes. STDP occurred in 60% of NE–GABA pairs with prazosin and 55% with yohimbine, with no significant difference.
Conclusion: Both alpha-1 and alpha-2 adrenergic receptors modulate LC NE neuron activity and contribute equally to STDP induction. Differences in receptor density and localization influence firing patterns and connectivity of LC neurons.
Keywords: Locus coeruleus, GABAergic neurons, Spike-timing dependent plasticity, Prazosin, Yohimbine

P296, Spatial memory deficit in letrozole-induced polycystic ovary syndrome rat model

Seyedeh Sana Nasehi[1, 2], Sara Keshtgar[1], Somayeh Akbari[1], Masoud Haghani[1]
1. Department of Physiology, Shiraz Medical School, Shiraz University of Medical Sciences, Shiraz, Iran
2. Student Research Committee, Shiraz University of Medical Sciences, Shiraz, Iran

Background: Letrozole, a selective aromatase inhibitor, is commonly used to treat breast cancer tumors and induce polycystic ovary syndrome (PCOS) in laboratory animals. Letrozole blocks the conversion of testosterone to estradiol, leading to elevated testosterone levels—a hallmark of PCOS—and disrupts normal steroid hormone synthesis. Since neurons in the hippocampus express estrogen receptors that regulate cognitive processes, altered hormone levels in PCOS may increase the risk of dementia. This study investigated the impact of PCOS on spatial memory.
Methods: Thirty Sprague-Dawley rats (180-230 g) were divided into control, sham, and PCOS groups. Controls remained untreated, while sham animals received 1 ml of letrozole solvent, and PCOS rats were administered 1 mg/kg/day of letrozole orally for 60 days. On days 59–60, spatial memory was assessed using the Morris water maze.
Results: Latency in block 3 was significantly higher in the PCOS group (34.86 ± 5.15s) compared to the control (13.30 ± 3.11s) and sham (12.60 ± 4.63s) groups ($p<0.05$). During the probe trial, PCOS rats spent significantly less time in the target quadrant (18.38 ± 1.98%) than the control (26.92 ± 0.96%) and sham groups (27.63 ± 1.70%) ($p<0.01$). Swim velocity was similar across all groups.
Conclusion: Inhibition of aromatase by letrozole can impair spatial memory in PCOS rats due to altered estradiol levels, which have neuroprotective effects on the hippocampus. Similar deficits may occur in patients with PCOS or women using letrozole as a treatment for breast cancer, emphasizing the potential cognitive effects of changes in estradiol levels.
Keywords: Letrozole, Estradiol, Polycystic Ovary Syndrome, Memory, Morris Water Maze

P297, Improving the sodium butyrate neuroprotective properties using niosome nanoparticles in the cortex of ischemic rats

Nasim Naseri[1], Mohammad Reza Bigdeli[1]
1. Department of Animal Science and Marine Biology, Faculty of Life Sciences and Biotechnology, Shahid Beheshti University, Tehran, Iran

Background: Sodium butyrate (SB) is a histone deacetylase inhibitor with recognized neuroprotective properties in cerebral ischemia; however, its therapeutic application is limited by rapid degradation and poor brain penetration. This study aimed to enhance the neuroprotective effects of SB through encapsulation into niosome nanoparticles and evaluate their efficacy in the cortex following ischemic injury.
Methods: Adult male rats weighing 250–300 g were subjected to transient focal cerebral ischemia using the middle cerebral artery occlusion (MCAO) method. Animals were divided into sham, ischemia, free SB, and SB-loaded niosome treatment group (NSB). Niosomes were prepared using the thin-film hydration method and characterized for physicochemical properties. Following SB (1200 mg/kg) and NSB (400 mg/kg) i.p. injection, ischemia was induced. The animals were sacrificed, the right cortical tissues were collected, and biochemical analyses were performed. Infarct size was quantified using TTC staining, and blood–brain barrier (BBB) disruption was evaluated using Evans Blue (EB) extravasation. Additionally, mRNA expression levels of the pro-inflammatory cytokine IL-1β in cortical tissue were measured to assess inflammatory responses.
Results: Results showed that treatment with SB-niosomes significantly reduced infarct volume, decreased EB leakage, and lowered IL-1β gene expression, indicating reduced inflammation and improved BBB
Conclusion: These findings demonstrate that niosomal encapsulation effectively enhances the neuroprotective efficacy of sodium butyrate by increasing cortical delivery and mitigating ischemic injury. SB-loaded niosomes represent a promising therapeutic strategy for reducing brain damage and improving functional recovery after ischemic stroke.
Keywords: Blood-brain barrier, Inflammation, Ischemic stroke, Niosome nanoparticles, Sodium butyrate

P298, AT1 Receptor blockade selectively attenuates inflammation-induced anxiety-like behaviors in mice

Reihaneh Nazarzadeh Oghaz[1], Mahmoud Hosseini[2], Hossein Salmani[3]
1. Department of Physiology and Pharmacology, Faculty of Medicine, Sabzevar University of Medical Sciences, Mashhad, Iran
2. Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
3. Cellular and Molecular Research Center, Sabzevar University of Medical Sciences, Sabzevar, Iran

Background: Increasing evidence indicates that systemic inflammation contributes to mood disorders, including depression and anxiety. Chronic inflammatory states consistently induce long-term behavioral alterations in preclinical models. Angiotensin II, acting through the AT1 receptor, plays a key role in modulating systemic inflammation and mediating peripheral–central immune communication. This study examined whether pharmacological blockade of AT1R during chronic inflammation can mitigate long-term affective disturbances in mice.
Methods: Forty adult male mice were randomly assigned to four groups: Control–Saline, LPS–Saline, Control–Losartan, and LPS–Losartan. Chronic inflammation was induced with daily intraperitoneal (i.p.) injections of lipopolysaccharide (0.25 mg/kg) for seven days. Losartan (3 mg/kg/day) was administered for ten days, beginning three days before the first LPS injection. One week after the final LPS dose, long-term behavioral outcomes were assessed using behavioral tests: depressive-like behavior (forced swim test, FST) and anxiety-like behaviors (elevated plus maze, EPM; marble burying task).
Results: LPS exposure induced robust depressive- and anxiety-like behaviors, reflected by increased immobility in the FST, reduced open-arm exploration in the EPM, and a higher number of buried marbles. Losartan treatment significantly improved anxiety-related outcomes in LPS-treated mice, increasing open-arm time and entries in the EPM and reducing marble burying. In contrast, losartan did not attenuate LPS-induced immobility in the FST, indicating limited efficacy in preventing depressive-like behavior.
Conclusion: AT1R blockade during systemic inflammation selectively ameliorated long-term anxiety-like behaviors but did not prevent depressive-like outcomes. These findings suggest a differential modulatory role of AT1R signaling in inflammation-induced affective disturbances.
Keywords: Systemic inflammation, Depression, Anxiety, Angiotensin II, AT1 receptor blockers

P299, Neuroprotective effects of 40-hz white LED photobiomodulation in a D-galactose-induced aging rat model

Niloofar Abedi[1], Elham Ghorbani[1], Maryam Nazari[1]
1. Department of Physiology, Faculty of Medicine, Arak University of Medical Sciences, Arak, Iran

Background: Aging is a major risk factor for cognitive decline and neurodegenerative diseases, often associated with oxidative stress and neuroinflammation. Photobiomodulation therapy (PBMT)—using LEDs or lasers—has emerged as a promising non-invasive approach in several disease This study aimed to evaluate the effects of chronic 40-Hz white LED on behavioral and biochemical markers in a D-galactose-induced aging model**.**
Methods: Male Wistar rats were divided into four groups (n=10): (1) Control (saline), (2) Control+ white-LED, (3) D-galactose, and (4) D-galactose + white-LED. Aging was induced by daily intraperitoneal-injections of D-galactose (200 mg/kg) for 8-weeks. PBMT was applied three-times per week using 40-Hz white-LED light (15 min/session). Behavioral assessments included the Light/Dark test (LDT) and Novel Object Recognition (NOR). Oxidative stress and inflammatory status were evaluated by measuring superoxide-dismutase (SOD) activity, malondialdehyde (MDA) content, and levels of TNF-α and IL-1β in brain tissue.
Results: D-galactose caused a significant reduction in light compartment entries and time spend light compartment in LDT, and impaired recognition memory in NOR. These were accompanied by elevated MDA, TNF-α, IL-1β, and decreased SOD activity. PBMT significantly increased light entries and time spent in LDT, enhanced novel object exploration and discrimination index in NOR test. Also the biochemical markers showed reduced oxidative and inflammatory stress with restored antioxidant activity.
Conclusion: Chronic 40-Hz white LED PBMT ameliorated cognitive and biochemical deficits in a D-galactose-induced aging model, supporting its potential as a non-invasive intervention for age-related neuroinflammatory and oxidative stress changes. Further studies should explore underlying mechanisms.
Keywords: PBMT, LED therapy, Aging, D-galactose, Oxidative stress

P300, Deep brain stimulation: A key to blocking the effects of morphine

Marjan Nikbakhtzadeh[1], Ghorbangol Ashabi[1], Mansoor Keshavarz[1], Esmail Riahi[1]
1. Department of Physiology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran

Background: To assess the emotional component of addiction, we utilized the conditioned place preference (CPP) test. Our study aimed to prevent animals from returning to the morphine-paired compartment in CPP.
Methods: Given the emerging evidence supporting the efficacy of deep brain stimulation (DBS) in promoting rehabilitation and preventing relapse in addiction, we integrated DBS into our experimental design. DBS was applied to the Lateral Hypothalamus (LH) during morphine conditioning sessions, with a stimulation protocol consisting of a 130 Hz pulse frequency, 100 µs pulse duration, and pulse amplitudes of 200 µA.
Results: In the morphine-DBS 200 µA group, side-preference was similar in both the pre- and post-conditioning states ($P > 0.05$), and also comparable to the saline-sham DBS group ($P > 0.05$), indicating that DBS during morphine-pairing trials completely blocked the development of CPP.
In the saline-DBS group, DBS had no effect on side-preference compared to the preconditioning state ($P > 0.05$).
Conclusion: In conclusion, the development of morphine reward was influenced by LH DBS in a manner that depended on the intensity of stimulation.
Keywords: Deep brain stimulation, Lateral hypothalamus, Morphine, Conditioned place preference

P301, Effects of simvastatin on memory parameters assessed by the elevated plus maze in a bisphenol a-induced rat model

Ali Nikzad[1], Delaram Eslimi Esfahani[1], Vahidehsadat Abbasnia[2] , Adel Salari[1]
1. Department of Animal Science, Faculty of Biological Science, Kharazmi University, Tehran, Iran
2. Department of Biology, Payame Noor University, Tehran, Iran

Background: Bisphenol A (BPA), a commonly used plastic-derived compound, disrupts neurotransmission and induces neuropathological alterations, resulting in memory deficits. Simvastatin, owing to its neuroprotective and antioxidant properties, may counteract such cognitive impairments. This study aimed to investigate the effects of simvastatin on memory performance, assessed by the Elevated Plus Maze (EPM), in a BPA-induced rat model.
Methods: Male Wistar rats (n = 56) were randomly assigned to seven groups: control, vehicle control, simvastatin-only (30 mg/kg/day), BPA (0.4 mg/kg/day), and three BPA-exposed groups receiving simvastatin at 10, 20, or 30 mg/kg/day. Treatments were administered orally for 4 weeks. Memory performance was evaluated using the EPM by measuring initial transfer latency (ITL) on the training day and retention transfer latency (RTL) 24 hours later. Data were analyzed using ANOVA, with statistical significance set at $p < 0.05$.
Results: BPA significantly reduced RTL compared with the control group ($p < 0.05$), indicating impaired avoidance memory, while ITL did not differ significantly among groups. Simvastatin mitigated these impairments in a dose-dependent manner, with higher doses significantly increasing RTL ($p < 0.05$*).
Conclusion: Simvastatin alleviated BPA-induced avoidance memory deficits, as demonstrated by prolonged retention transfer latency in the EPM. These findings highlight its potential as a neuroprotective agent against cognitive dysfunction associated with environmental neurotoxins.
Keywords: Bisphenol A, Simvastatin, Memory, Maze Learning, Neuroprotection

P302, Vitamin C reduced anxiety and depression from chronic mild stress in adolescent rats by modulating oxidative balance

S. Yasamin Hashemi Baraz[1], Samaneh Kakhki[2], Farimah Beheshti[3,4]
1. Student Research Committee, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
2. Department of Clinical Biochemisrry, School of Medicine, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
3. Neuroscience Research Center, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
4. Departments of Physiology, School of Medicine, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran

Background: Stress is a natural reaction to various daily life challenges that can affect an individual physically, emotionally, or mentally. Adolescence represents a crucial phase of development involving significant physical, emotional, and social changes. This study aims to investigate whether exposure to chronic unpredictable mild stress (CUMS) during adolescence leads to anxiety and depression in adult male rats, and to assess the potential protective effects of vitamin C (Vit C) against these psychological outcomes.
Methods: To achieve this, we conducted behavioral assessments such as the open field test, elevated plus maze, and forced swim test. Furthermore, we analyzed serotonin metabolism, inflammatory markers, oxidative stress levels, and brain-derived neurotrophic factor (BDNF) concentrations in the cortical brain tissue of the animals.
Results: The findings showed that CUMS worsens mood-related behaviors by disrupting oxidative balance in the brain, triggering inflammation, and altering serotonin metabolism. However, co-administration of vitamin C with CUMS significantly alleviated these negative effects by normalizing the related biochemical markers.
Conclusion: Overall, our findings support the potential of vitamin C as a safe, low-cost, and effective approach for managing the effects of chronic unpredictable mild stress (CUMS).
Keywords: Chronic unpredictable mild stress, Vitamin C, Inflammation, Oxidative stress, Serotonin

P303, Dose-dependent effects of donepezil on working memory in the Y-maze test in a bisphenol a-induced rat model

Shaghayegh Vahedi[1], Delaram Eslimi Esfahani[1], Vahidehsadat Abbasnia[2], Adel Salari Eskar[1]
1. Department of Animal Science, Faculty of Biological Science, Kharazmi University, Tehran, Iran
2. Department of Biology, Payame Noor University, Tehran, Iran

Background: Cognitive impairments are among the most prevalent neurological disorders globally, with their incidence increasing partly due to exposure to environmental neurotoxicants. Working memory, a central component of cognitive processing, is frequently disrupted in neurodegenerative conditions. Bisphenol A (BPA), a widely used industrial chemical, is known to impair working memory through mechanisms involving oxidative stress and neurobiochemical alterations. Donepezil, a reversible acetylcholinesterase inhibitor with well-established neuroprotective properties, has the potential to counteract such deficits. This study aimed to evaluate the dose-dependent effects of donepezil on working memory in a BPA-induced rat model using the Y-maze test.

Methods: Fifty-six male Wistar rats were randomly assigned to seven groups: negative control (untreated), vehicle control, positive control (donepezil only: 10 mg/kg/day), memory impairment model (BPA: 0.4 mg/kg/day), and three treatment groups receiving BPA combined with donepezil at 1, 5, or 10 mg/kg/day. Treatments were administered orally for 4 weeks. Working memory was assessed using an 8-minute Y-maze session, and spontaneous alternation percentage (SAP) was recorded. Data were analyzed with ANOVA, with $p < 0.05$ considered statistically significant.

Results: BPA significantly reduced SAP compared to the negative control group ($p < 0.05$), confirming induction of working memory impairment. Donepezil improved SAP in a dose-dependent manner, with higher doses significantly restoring performance toward control levels ($p < 0.05$).

Conclusion: Donepezil enhanced working memory in BPA-exposed rats, suggesting its potential as a neuroprotective agent for cognitive impairments associated with environmental neurotoxicants

Keywords: Bisphenol A, Donepezil, Working Memory, Y-Maze Test, Neuroprotection

P304, The effect of piroxicam on serum oxidative stress markers in male wistar rats with PTZ-induced seizures

Ali Vesalimahmoud[1], Naser Mirazi[1], Abdolkarim Hosseini[2], Mehrnaz Boveiri[1]
1. Department of Biology, Faculty of Basic Sciences, Bu-Ali Sina University, Hamedan, Iran
2. Department of Physiology, Faculty of Sciences, Shahid Beheshti University, Tehran, Iran

Background: Epilepsy is a spontaneous neurological disorder caused by excessive neuronal activity in the brain, with seizure threshold playing a critical role in its progression. Although antiepileptic drugs (AEDs) are commonly used, most are associated with limitations and side effects. Neuroinflammatory processes are implicated in seizure development, with molecules such as prostaglandins increasing during these events. Piroxicam, a non-steroidal anti-inflammatory drug (NSAID), inhibits COX-1 and COX-2 enzymes and may have potential effects on oxidative stress, which this study aimed to investigate.
Methods: Twenty-eight adult male Wistar rats (200–250 g) were randomly assigned to four groups: healthy control, seizure control (PTZ 60 mg/kg + saline), low-dose piroxicam (5 mg/kg + PTZ), and high-dose piroxicam (10 mg/kg + PTZ). All injections were intraperitoneal and administered 30 minutes before PTZ. At the end of the experiment, blood samples were collected, and serum was separated for measurement of total antioxidant capacity (TAC) and total oxidant status (TOS). Data were analyzed using one-way ANOVA followed by Tukey's post hoc test, with $p<0.05$ considered statistically significant.
Results: High-dose piroxicam significantly increased TAC and decreased TOS compared to the PTZ group ($P<0.05$ and $P<0.001$, respectively). Low-dose piroxicam also caused a significant reduction in TOS ($P<0.001$).
Conclusion: Piroxicam exhibits notable antioxidant effects by increasing TAC and reducing TOS in PTZ-induced seizure models, indicating its potential as a therapeutic agent to mitigate oxidative stress associated with epilepsy.
Keywords: Piroxicam, TAC, TOS, Oxidative stress, Epilepsy

P305, *Pseudomonas aeruginosa* exotoxins orchestrate chronic pain: Direct neuronal sensitization and immunological priming

Omid Yadegar Khosraviyeh[1]
1. Department of Biology, Faculty of Basic Sciences, Islamic Azad University, Mashhad, Iran

Background: Chronic pain is a significant complication of persistent *Pseudomonas aeruginosa* infections. The mechanisms driving this pain extend beyond simple tissue damage, involving direct interactions between the pathogen's exotoxins and the host's nervous and immune systems.
Methods: This summary is based on a review of recent literature investigating how *P. aeruginosa* exotoxins activate pain pathways and induce long-lasting immunological changes that establish and maintain a state of chronic pain.
Results: Our analysis confirms that *P. aeruginosa* exotoxins are key drivers of pain. Exotoxin A (ExoA) directly sensitizes TRPV1 channels on nociceptors, causing spontaneous pain and heat sensitivity. Simultaneously, the pigment pyocyanin activates Toll-like Receptor 2 (TLR2) on sensory neurons, increasing their excitability and leading to mechanical allodynia (pain from light touch). Furthermore, these toxins induce a "trained immunity" in macrophages and microglia, reprogramming them into a hyper-reactive state. This leads to the sustained release of pro-inflammatory molecules, maintaining central sensitization and chronic pain even after the infection is controlled.
Conclusions: *P. aeruginosa* is a potent architect of chronic pain, using its exotoxins to directly hijack neuronal signals and create a persistent, pro-nociceptive immune phenotype. These findings call for a therapeutic paradigm shift. To achieve lasting analgesia, strategies must move beyond targeting bacterial viability to also include inhibiting specific virulence factors (like ExoA and pyocyanin) and their associated neuro-immune signaling pathways (such as TRPV1 and TLR2).
Keywords: *Pseudomonas aeruginosa*, Chronic Pain, Exotoxin A, Pyocyanin, Neuro-Immune Interaction

P306, Nitric oxide in the neural regulation of appetite: Insights from mammalian and human studies

Salaheddin Zarei[1], Ali Baghbanzadeh[1]
1. Department of Basic Sciences, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran

Background: Nitric oxide (NO), which is produced from L-arginine by the enzyme nitric oxide synthase (NOS), is an important neuromodulator in many physiological functions, including appetite control. Its function in mammalian and human eating behaviour continues to be context-dependent and associated with several neuro- transmitter systems.
Methods: We reviewed available evidence via PubMed, Scopus, and Web of Science until May 2025. Keywords were “nitric oxide,” “appetite,” “food intake,” “hypothalamus,” and their synonyms. We included experimental and clinical studies in mammals or humans studying the effect of NO and food intake. Data were collected on NO metabolism, distribution in the hypothalamus and brain stem, interaction with neuropeptides and neurotransmitters, and resultant behavior.
Results: NO mediates appetite through region-specific pathways within the hypothalamus, including the Arcuate Nucleus (ARC), Paraventricular Nucleus (PVN) and Dorsomedial Hypothalamus (DMH). It stimulates anorexigenic effects in the ARC as well as PVN by the inhibition of orexigenic neurons and activation of the satiety signals. In contrast, NO in DMH and LH can promote feeding, particularly in the presence of palatable food. NO is required for the orexigenic effects of ghrelin and orexin and is involved in the interplay between glutamate, GABA, dopamine and endocannabinoids. Strong in animal models, human studies are few and inconcluding.
Conclusion: NO have a dual role in the regulation of appetite acting at the level of feeding satiety dependent on brain region accumulation and metabolic state. It is a convergence signal in hypothalamic circuits, mediated by the cGMP pathways and neurochemical associations. Additional human studies are required to evaluate the therapeutic potential of DNA in appetite disorders.
Keywords: Nitric Oxide, Appetite Regulation, Hypothalamus, Feeding Behavior, Energy Metabolism

P307, Evaluation of atorvastatin and forskolin on neuronal survival and memory

Aliyeh Bashghareh[1]
1. Neuroscience Research Center, Shahroud University of Medical Sciences, Shahroud

Background: Global cerebral ischemia, resulting from reduced blood flow to the brain, often causes significant neuronal damage, particularly in the CA1 region of the hippocampus, which plays a crucial role in memory processing.
Methods: Seventy adult male rats were randomly assigned to seven groups (n = 10 per group): (1) control, (2) sham, (3) cerebral ischemia (CI) only, (4) CI + forskolin, (5) CI + atorvastatin, (6) CI + vehicle 1, and (7) CI + vehicle 2. Global cerebral ischemia was induced by bilateral occlusion of the common carotid arteries. Atorvastatin and forskolin were administered intraperitoneally at 4, 24, and 42 hours post-ischemia in groups 5 and 4, respectively. Nissl staining was performed to confirm the successful induction of the ischemia model. Neuronal apoptosis was assessed using the TUNEL assay, and cognitive function was evaluated via the Morris water maze test. Additionally, tumor necrosis factor-alpha (TNF-α) expression was examined using immunohistochemical analysis. Data were analyzed using one-way ANOVA.
Results: Treatment with atorvastatin and forskolin significantly reduced neuronal damage and alleviated memory impairment compared to the untreated ischemia group. Notably, rats treated with forskolin demonstrated superior performance in the Morris water maze test compared to other groups.
Conclusion: Atorvastatin and forskolin exhibited neuroprotective effects in the hippocampal CA1 region following global cerebral ischemia; however, forskolin treatment resulted in greater neuronal preservation and improved cognitive outcomes.
Keywords: Ischemia, Atorvastatin, Forskolin, Memory, Morris water maze

P308, Oxytocin and brain ischemia: pathophysiological mechanisms and therapeutic perspectives

Shahein Momenabadi[1,2], Samira Nemati[2]
1. Nursing Care Research Center, Semnan University of Medical Sciences, Semnan, Iran
2. Research Center of Physiology, Semnan University of Medical Sciences, Semnan, Iran

Background: Cerebral ischemia is a significant cause of death and neurological disability worldwide. While current therapies mainly focus on reperfusion, they fail to address the cascade of secondary injury processes such as oxidative stress, inflammation, and apoptosis. Oxytocin (OXT), a neuropeptide classically associated with reproductive functions, has recently been explored for its neuromodulatory and neuroprotective properties. This review examines preclinical evidence supporting OXT's potential therapeutic role in cerebral ischemia.
Methods: A systematic evaluation of experimental studies of cerebral ischemia in vivo and in vitro models was conducted. The analysis focused on the anti-inflammatory, antioxidant, and anti-apoptotic effects, Blood-Brain Barrier (BBB) protection, Neurogenesis, and synaptic plasticity of OXT on cerebral ischemia.
Results: pre- and post-ischemia administration of OXT has been shown to reduce infarct size, improve functional outcomes, and maintain BBB integrity. Mechanistically, OXT attenuates pro-inflammatory cytokine release, decreases reactive oxygen species, upregulates antioxidant enzymes such as Superoxide Dismutase (SOD) and catalase, and inhibits apoptotic signaling by modulating Bcl-2 and caspase activity. Furthermore, it enhances neurogenesis and synaptic plasticity, potentially through pathways involving Brain-Derived Neurotrophic Factor (BDNF) and Vascular Endothelial Growth Factor (VEGF).
Conclusion: Accumulating preclinical data indicate that OXT fosters neuroplasticity, neurogenesis, angiogenesis, and neuronal repair, underscoring its neuroprotective properties. Notably, OXT diminishes neuroinflammation and oxidative stress, key contributors to ischemic brain injury. However, translating these experimental results into clinical practice remains limited, with several pharmacokinetic and regulatory challenges yet to be addressed.
Keywords: Oxytocin, Cerebral Ischemia, Neuroprotection, Inflammation, Oxidative Stress, Apoptosis

P309, microRNA-103a (miR-103a) reverses memory and learning impairments caused by polystyrene microplastics

Leila Mohammadi[1], Tourandokht Baluchnejadmojarad[1], Mehrdad Roghani[2]
1. Department of Physiology, Faculty of Medicine, Iran University of Medical Sciences, Tehran, Iran
2. Neurophysiology Research Center, Shahed University, Tehran, Iran

Background: A pervasive environmental pollutant, microplastics (MPs) are tiny plastic particles with a diameter of less than five millimeters. They accumulate in ecosystems and enter the food chain, potentially causing physiological changes in animals and plants, and raising concerns about human health impacts such as gastrointestinal, hormonal, and neurological effects. MicroRNAs, discovered in the early 1990s, are small regulatory RNA molecules that have been found to be fundamental regulators of gene expression, with broad implications in biology and medicine. MiR-103a is a type of miRNA that is involved in neurological disorders characterized by cognitive impairments.
Methods: In this study, polystyrene microplastics (PS-MPs) were administered orally to male rats for eight weeks to induce neurotoxicity. Then, miR-103a was injected intraventricularly (ICV) into the brain for treatment. Several behavioral tests, including the Y-maze, novel object discrimination (NOD), and the Barnes test, were finally performed to evaluate memory and learning.
Results: We performed behavioral tests during the last week of PS-MPs administration. The results showed that polystyrene microplastics impair memory and learning abilities. However, ICV injection of miR-103a injection leads to recovery.
Conclusion: These results showed that miR-103a could have therapeutic potential for cognitive impairment caused by polystyrene microplastics.
Keywords: Polystyrene microplastics, miR-103a, Learning and memory

P311, Therapeutic effects of zinc oxide nanoparticles synthesized with Rosa damascene extract on spatial memory in a streptozocin-induced Alzheimer's rat model

Zahra Abutorabi[1], Abolfazl Bayrami[1], Mohammadreza Najafzadeh[1], Shima Rahimpooran[2], Ali Khodayari[3]

1. Department of Biology, Faculty of Sciences, University of Mohaghegh Ardabili, Ardabil, Iran
2. Department of Rangeland and Watershed Management, Faculty of Agriculture and Natural Resources, University of Mohaghegh Ardabili, Ardabil, Iran
3. Department of Chemistry, Faculty of Science, University of Mohaghegh Ardabili, Ardabil, Iran

Background: Alzheimer's disease (AD) is a chronic neurodegenerative disorder characterized by severe cognitive impairment, especially memory loss. A major challenge in AD treatment is delivering drugs to the central nervous system (CNS) across the blood-brain barrier (BBB). Modern research is focusing on using nanoparticles (NPs) as drug delivery vehicles to bypass this barrier. This study investigated the effectiveness of zinc oxide (ZnO) NPs and *Rosa damascena* extract on memory improvement in a streptozotocin (STZ)-induced Alzheimer's model in rats. *R. damascena* extract was used for the green synthesis (GS) of ZnO-NPs, leveraging the extract's bioactive and the NPs' antioxidant/anti-inflammatory potential.

Methods: The study involved 42 male Wistar rats divided into 7 experimental groups: Sham, STZ, ZnO (10mg/kg), extract control (15mg/kg), *R.damascena* extract (100mg/kg), Green synthesis ZnO (GS) (40mg/kg), and ZnO.extract.PVP (40mg/kg). The AD model was induced by intraventricular STZ injection, followed by a 21-dayintraperitoneal treatment period. Treatment efficacy was assessed using three behavioral tests: Morris Water Maze (spatial memory), Y-Maze (working memory), and Shuttle Box (avoidance learning).

Results: STZ significantly impaired memory. All extract-containing nanoformulations (GS and extract.PVP) provided strong memory protection.

Conclusion: This research confirms that the ZnO-*Rosa damascena* extract nanosystems offer a promising, multi-ligand drug delivery method effective in crossing the BBB to modulate cognitive deficits in Alzheimer's disease.

Keywords: Alzheimer's disease, Zinc oxide, Rosa damescna extract, Spatial memory

P312, Mitochondrial transplantation mitigates 6-OHDA-induced motor deficits in Wistar rats

Roksana Imagh[1], Pegah Javadpour Nari[2], Mohsen Rezaei[3]
1. Department of Toxicology, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran
2. Neuroscience Research Center, Institute of Neuroscience and Cognition, Shahid Beheshti University of Medical Sciences, Tehran, Iran
3. Department of Toxicology, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran

Background: Mitochondria are essential organelles that generate cellular energy and maintain neuronal function. Mitochondrial dysfunction is a key factor in Parkinson's disease (PD), a neurodegenerative disorder characterized by dopaminergic neuronal loss and motor deficits. In this study, we administered an effective dose of mitochondria to evaluate its potential in alleviating PD-related motor deficits.
Methods: This study evaluated the effects of mitochondria on motor impairments induced by 6-hydroxydopamine (6-OHDA) in Wistar rats, a well-established model of Parkinson's disease. Following a single 6-OHDA injection (20 µg/rat), rats were treated with an effective dose of mitochondria. Motor function was assessed after two weeks using the rotarod, beam walking, and apomorphine-induced rotation tests, demonstrating the potential protective role of mitochondria against 6-OHDA-induced motor deficits.
Results: Our results demonstrated that mitochondrial transplantation markedly alleviated 6-OHDA-induced motor impairments.
Conclusion: In conclusion, mitochondrial transplantation effectively mitigates motor deficits induced by 6-OHDA in Wistar rats, suggesting a potential therapeutic approach for Parkinson's disease. These findings highlight the protective role of mitochondria in neuronal function and motor behavior, warranting further investigation into their clinical applications.
Keywords: Parkinson disease, Mitochondria, 6-Hydroxydopamine

P313, Role of gut microbiota dysbiosis and metabolites in Alzheimer's pathogenesis: Personalized therapeutic approaches

Jaleh Bagheri Hamzyan Olia[1]
1. Department of Basic Medical Sciences, Khoy University of Medical Sciences, Khoy, Iran

Background: Alzheimer's disease (AD) is a progressive neurodegenerative disorder characterized by the accumulation of amyloid-β plaques, tau neurofibrillary tangles, and neuroinflammation. Dysbiosis of the gut microbiota is implicated as a key risk factor in the pathogenesis of AD through immune activation, disruption of protective barriers, and altered neuromodulatory signaling. Microbial metabolites such as short-chain fatty acids (SCFAs), indole derivatives, and bile acids have both protective and deleterious effects.
Methods: This systematic review is based on recent human studies, animal models, and molecular data (2020-2025). Key pathways included metabolic signaling (SCFAs, tryptophan, TMAO), immune activation (MAMPs, microglia), vagal neural communication, and neuroendocrine regulation were examined. Comparison with recent reviews demonstrates mechanistic depth, a multisystem framework, and a focus on precision medicine.
Results: Dysbiosis is associated with reduced microbial diversity, increased proinflammatory bacteria (e.g., Proteobacteria), and decreased SCFA producers. Metabolites influence neuroinflammation, amyloid accumulation, and BBB disruption through GPR43, AhR, FXR, and NLRP3 receptors. Interventions such as strain-specific probiotics (Clostridium butyricum), FMT, and polyphenolic diets modulate disease progression.
Conclusion: The gut microbiome is an accessible therapeutic target for AD. Precision medicine approaches based on metabolic biomarkers (IPA, TMAO) and microbiome profiles offer new perspectives for prevention and treatment. There is a need for standardized multi-omics studies and personalized clinical trials.
Keywords: Alzheimer Disease, Gastrointestinal microbiome, Gut-brain axis, Neuroinflammation, Personalized medicine

P314, Neuroimmune mechanisms and TRPV1–CB2 signaling in response to chronic stress

Jaleh Bagheri Hamzyan Olia[1]
1. Department of Basic Medical Sciences, Khoy University of Medical Sciences, Khoy, Iran

Background: Chronic stress represents a significant public health burden that stimulates hierarchical neurochemical systems that go beyond the classical hypothalamic-pituitary-adrenal (HPA) axis. Understanding the molecular integration of stress responses is essential for the development of targeted therapeutic interventions. This review article integrates contemporary evidence on the neuroimmune integration model, emphasizing the intersection of TRPV1 and CB2 receptors as critical molecular mediators linking chronic stress to neuroinflammation and neuronal dysfunction.
Methods: Comprehensive literature review of peer-reviewed publications (2015-2025) including: (1) hierarchical organization of the stress response; (2) TRPV1–CB2 receptor dynamics; (3) convergence of MAPK and CREB signaling; (4) oxidative stress-neuroinflammation connection; (5) dysregulation of the endocannabinoid system; and (6) refined pharmacological therapeutic approaches.
Results: Evidence suggests that chronic stress compromises neuronal resilience through coordinated dysregulation of TRPV1–CB2 junctions, MAPK/CREB signaling, and microglial inflammatory cascades. Refined therapies targeting these mechanisms—including CRHR1 inhibitors, SIRT1 activators, personalized neurofeedback, and pharmacogenomic profiling—are showing promising efficacy. However, significant translational barriers and disparities in access to treatments remain.
Conclusion: The neuroimmune integration model provides a comprehensive framework for understanding how stress-induced molecular dysregulation leads to behavioral dysregulation through neuroinflammation. Future research that integrates advanced molecular tools (CRISPR-Cas9 editing, single-cell RNA sequencing) with refined drug approaches is essential for the development of broadly accessible neuroprotective interventions.
Keywords: Glucocorticoids, Neurotransmitter agents, Signal transduction, Inflammation, Oxidative stress

P315, Effects of two intermittent fasting models on cognitive memory in the presence and absence of sucrose in adult male mice

Mobin Pourhamadi[1], Mahnaz Kesmati[1], Mozhgan Torabi[1]
1. Department of Biology, Faculty of Sciences, Shahid Chamran University of Ahvaz, Ahvaz, Iran

Background: High-sugar diets impair cognitive processes, and fasting has been embraced as a therapeutic approach to maintaining health. This study investigated and compared the effects of two intermittent fasting models on cognitive memory and brain biochemical factors in the presence and absence of sucrose.
Methods: Adult male mice were divided into six groups; control (normal diet), TRE (time-restricted eating) (16:8 h/h diet), PF (periodic fasting) (5:2 day/day diet), sucrose diet, TRE+ sucrose diet, and PF+ sucrose diet. In the TRE fasting diet, mice were deprived of food for 16 hours daily for a period of two weeks. In the PF diet, mice were deprived of food for two non-consecutive days/week over two constant weeks. A 10% sucrose solution was used in the diet, daily for 4–6 hours over two weeks. Cognitive memory was assessed using the novel object recognition test. Reactive oxygen species (ROS) and brain-derived neurotrophic factor (BDNF) levels were evaluated in the brain.
Results: Both TRE and PF diets significantly enhanced cognitive memory, while sucrose impaired cognitive memory. The adverse effect of sucrose decreased in the presence of the two fasting diets. Brain BDNF and ROS levels were increased and decreased, respectively, in both fasting diets, and sucrose adverse these effects in both diets.
Conclusion: Both the TRE and PF diets, as well as sucrose solution, affect memory through a common pathway in an opposite manner. Fasting could be a suitable approach to prevent the adverse effects of sucrose consumption.
Keywords: Fasting, Sucrose, Memory, BDNF, Mice

P316, Effect of concurrent exercise preconditioning on CD86 gene expression and learning performance following ischemic stroke in aged rats

Salma Sadat Tavakoli Esfahani[1], Saeid Rostami[1]
1. Department of Sport Science, Ragheb Isfahani Higher Education Institute, Isfahan, Iran

Background: Stroke is a leading cause of cognitive impairment, and neuroinflammation, particularly microglial polarization toward the pro-inflammatory M1 phenotype marked by CD86, plays a critical role in post-ischemic dysfunction. Exercise preconditioning is emerging as a non-pharmacological neuroprotective strategy. This study aimed to examine effect of concurrent exercise preconditioning on CD86 Gene expression and learning performance following ischemic stroke in aged Rats.
Methods: Fifty aged male Wistar rats (24 months) were randomly divided into sham, control (stroke-only), endurance, resistance, and concurrent training groups (n=10). Concurrent training was performed according to a combined treadmill and ladder-climbing protocol. After eight weeks, rats underwent ischemic stroke. Learning performance was assessed using the Morris Water Maze (MWM), and hippocampal CD86 expression was measured using RT-PCR.
Results: Concurrent training significantly reduced CD86 gene expression compared to the control group ($p < 0.01$), indicating lower M1 polarization. Concurrent training also improved escape latency during MWM acquisition days ($p < 0.05$) and significantly increased time spent in the target quadrant during the probe trial ($p < 0.05$).
Conclusion: Eight weeks of concurrent training attenuated post-ischemic neuroinflammation through downregulation of CD86 and improved learning performance in aged rats. These findings highlight concurrent training as a promising strategy for preconditioning against ischemic brain injury.
Keywords: Concurrent Training, CD86 Gene Expression, Cognitive Recovery after Stroke

P317, The gut-brain axis in Alzheimer's disease: From pathogenesis to microbiome-targeted therapies

Bagher Jafarvand Geiklou[1]
1. Department of Biology, Faculty of Basic Sciences, Shahed University, Tehran, Iran

Background: Alzheimer's disease (AD) is a progressive neurodegenerative disorder characterized by cognitive decline and complex etiology. The gut-brain axis, particularly the gut microbiome, is a key modulator of AD pathogenesis, influencing neuroinflammation and neuronal integrity.
Methods: This review synthesizes molecular mechanisms, preclinical and human studies, and clinical interventions targeting the gut-brain axis in AD. We analyzed gut-brain signaling, microbial metabolites, neuroinflammation, and barrier integrity using data and clinical trial.
Results: Probiotics, prebiotics, and synbiotics reduce neuroinflammation and improve cognition in preclinical and early human studies. Antibiotics disrupt microbiome balance, worsening AD-like pathology. Harmful bacteria produce neurotoxic metabolites, accelerating AD progression. The non-bacterial and oral microbiomes, epigenetic regulation, and dietary interventions (e.g., Mediterranean diet) show promise. Omics and machine learning identify AD-related microbial signatures. Immunotherapy-microbiome interactions and trials like fecal microbiota transplantation suggest potential but face challenges in efficacy and standardization.
Conclusion: The gut microbiome offers a promising therapeutic target for AD. Future research should focus on longitudinal studies, multi-omics, and large-scale trials to address translational challenges and develop personalized microbiome-based therapies.
Keywords: Gut-brain-microbiota axis, Alzheimer's disease, Microbial metabolites, Personalized therapeutics, Neuroinflammation

P319, The effect of interval training on the lactate receptor protein index (HCAR1) of the hippocampal tissue of male rats with fatty liver

Alireza Jowhari[1], Yasaman Eslami Mahdi Abadi[1], Mohammad Hassan Meshkibaf[2]
1. Department of Physical Education and Sport Sciences, Shiraz University, Shiraz, Iran
2. Department of Clinical Biochemistry, Fasa University of Medical Sciences, Fasa, Iran

Background: The aim of the present study was to investigate the effect of interval training on the lactate receptor protein index (HCAR1) of the hippocampal tissue of the brain in male rats with fatty liver.
Methods: In this study, rats aged 6 to 8 weeks were used. Initially, the rats were randomly divided into two groups: healthy (n = 16) and diseased (high-fat diet (HFD)) (n = 16). The high-fat diet continued for eight weeks until the rats developed nonalcoholic steatohepatitis (NASH). After disease induction, the diseased group was randomly divided into two groups: control-disease (n = 7), swimming-disease (n = 7), and the healthy group was randomly divided into two groups: control-healthy (n = 7), swimming-healthy (n = 7). Then, the training groups performed high-intensity intermittent swimming exercises for eight weeks according to the designed protocol. To determine the differences between the groups, one-way analysis of variance and Bonferroni post hoc test with an error of less than 0.05 were used. Data were analyzed with SPSS 27 and GraphPad Prism 10.4.0 software.
Results: The findings of the present study showed a significant increase in the level of HCAR1 protein in the hippocampal tissue in the swimming- disease group compared to the control- disease group (P=0.001). There was also a significant increase in lactate in the swimming- disease group compared to the control- disease group (P=0.001).
Conclusion: High-intensity interval training in water was able to improve biochemical factors of memory by increasing serum lactate levels and subsequently increasing the HCAR1 protein in the hippocampus of the brain. Therefore, it is recommended for therapists to prioritize high-intensity interval swimming exercises when choosing an exercise model for this group of disease. However, more research is needed in this field to reach definitive results.
Keywords: High-Intensity Interval Training, Nonalcoholic Steatohepatitis, Lactate, HCAR1 Receptor, Brain Hippocampus

P320, Increased anxiety-like behaviors following exposure to electromagnetic fields: Analysis of acute and long-term models

Vahideh Sadat Abbasnia[1], Fatemeh Chaji[2]
1. Department of Biology, Payam Noor University, Tehran, Iran
2. Department of Biology, Payam Noor University, Tehran, Iran

Background: Low-frequency electromagnetic fields (EMF) have increasingly become part of modern living environments, raising concerns about their potential effects on neural function and stress-related behaviors. This study aimed to evaluate the acute and long-term effects of exposure to a 50-Hz, 4-millitesla electromagnetic field on anxiety-like behaviors in male NMRI mice.
Methods: After an adaptation period, NMRI male mice were randomly assigned to four groups: a control group, a sham group (placed inside an inactive coil), an acute exposure group (a single 60-minute EMF session), and a long-term exposure group (daily 60-minute exposure for 28 consecutive days). Following the exposure period, anxiety-like behaviors were assessed using the Elevated Plus Maze (EPM). Behavioral indices included the time spent in open arms and the number of open-arm entries. Data were analyzed using one-way ANOVA with a significance level of $p<0.05$.
Results: Exposure to EMF resulted in a significant reduction in time spent in open arms and in the number of open-arm entries in both the acute and long-term exposure groups compared with the control group ($p<0.05$). Behavioral alterations were more pronounced in the 28-day exposure group. No significant difference was observed between the sham and control groups.
Conclusion: The results indicate that even short-term exposure to EMF can increase anxiety-like behaviors, whereas long-term exposure exerts more substantial behavioral effects. These findings highlight the need for further research into the physiological mechanisms underlying EMF-induced behavioral changes.
Keywords: Electromagnetic fields, Anxiety-like behaviors, Elevated Plus Maze, Acute exposure, NMRI mice.

P321, Investigating the effect of nanoencapsulated cuminaldehyde on catalase enzyme activity in the cerebral cortex of PTZ-induced epileptic mice

Parinaz Hajeforoosh[1], Akbar Hajizademoghadam[1], Vahid Hasantabar[1]
1. Department of Animal Science, Faculty of Science, University of Mazandaran, Babolsar, Iran

Background: Epilepsy is a chronic disorder of the central nervous system characterized by neuronal hyperactivity and can lead to cellular damage, oxidative stress, and decreased efficiency of antioxidant systems, including the enzyme catalase (CAT). Although common drugs can reduce free radicals and oxidative stress to some extent, there has been increased attention to natural compounds with antioxidant properties. Cuminaldehyde, the active ingredient of cumin, has anticonvulsant and antioxidant properties, and its nanoencapsulation can increase its stability and efficacy. This study aimed to evaluate the effect of nanoencapsulated cuminaldehyde on catalase enzyme activity in an animal model of epilepsy induced by pentylenetetrazole (PTZ).
Methods: In this experimental study, 32 male mice were divided into four groups (n=8): control group (receiving distilled water), group receiving cuminaldehyde nanoencapsulated orally, epileptic group (intraperitoneal injection of PTZ, 35 mg/kg for 21 days), and pretreatment group (receiving cuminaldehyde nanoencapsulated orally, 50 mg/kg, 30 minutes before PTZ injection for 21 days). After the end of the interventions, the animal brains were isolated, and catalase enzyme activity in the cerebral cortex was measured biochemically and analyzed by one-way ANOVA.
Results: The results showed that PTZ injection significantly reduced catalase enzyme activity compared to the control group. ($p<0.001$) Pretreatment with cuminaldehyde nanoencapsulated was able to significantly increase the level of catalase activity. ($p<0.001$) Consumption of cuminaldehyde nanoencapsulated alone showed a mild enhancing effect on catalase activity.
Conclusion: Overall, cuminaldehyde nanoencapsulated can be considered as a complementary therapeutic approach in the management of oxidative stress caused by epilepsy.
Keywords: Epilepsy, Pentylenetetrazol, Oxidative Stress, Cuminaldehyde

P322, Impact of CYP2D15 polymorphisms on opioid and antidepressant metabolism in dogs

Narges Safari[1], Zahra Dolati[1], Amirreza Khodakarami[1], Mahda Nobahari[1], Soodeh Tavakoli[2]
1. Department of Veterinary Medicine, Garmsar Branch, Islamic Azad University, Garmsar, Iran
2. Small Animal Clinical Sciences, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran

Background: Cytochrome P450 2D15 (CYP2D15) is a principal drug-metabolizing enzyme in dogs, responsible for the clearance of numerous opioids and antidepressants. Genetic polymorphisms in the CYP2D15 gene can alter enzyme activity, leading to interindividual variability in the pharmacokinetics, efficacy, and toxicity of these drugs
Methods: A systematic search of PubMed/MEDLINE, Scopus, Web of Science, and CAB Abstracts was conducted from inception to January 31, 2024, following PRISMA guidelines. Eligible studies included in vitro and in vivo studies investigating the association between CYP2D15 gene variants and pharmacokinetic or clinical parameters of relevant drugs.
Results: Of 321 studies identified, 12 met the inclusion criteria. Six major functional CYP2D15 haplotypes were identified. Evidence from in vitro and in vivo studies indicates that reduced-activity haplotypes (e.g., CYP2D15*3 and *4) impair the metabolism of key drugs like tramadol, codeine, amitriptyline, and clomipramine. Evidence from low-quality sources, primarily case reports and small observational studies, suggests a potential association between specific poor metabolizer genotypes and an increased risk of ADRs.
Conclusion: Within the constraints of the available evidence, CYP2D15 polymorphisms appear to be significant determinants of drug response in dogs. This synthesis clarifies current knowledge gaps and provides a reference point for future validation of CYP2D15-guided dosing, contributing to the development of evidence-based precision medicine in veterinary practice.
Keywords: Pharmacogenomics, Cytochrome P450, Dog, Single nucleotide polymorphism (SNP), Tramadol

P323, Preclinical evaluation of the therapeutic effects of oral astaxanthin on spinal cord injury recovery

Nassim Rastgar[1], Masoumeh Jorjani[2]
1. Department of Pharmacology, Shahid Beheshti University of Medical Sciences, Tehran, Iran
2. Department of Pharmacology, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: Spinal cord injury (SCI) triggers secondary oxidative stress, neuroinflammation, and sensory-motor impairments in compression models. Astaxanthin (AST), a potent carotenoid antioxidant, enhances locomotor function. This study examined oral AST's impact on recovery using BBB, inclined plane, and forced swimming tests.
Methods: Forty male Wistar rats (200–250 g) were randomly assigned to five groups: SCI with compression model (T8–T9), laminectomy, and SCI treated orally with olive oil (250 µL), fluoxetine (10 mg/kg), or astaxanthin (100 mg/kg), once daily starting one hour after injury for 7 days. Functional recovery was assessed using the BBB, inclined plane, and forced swimming tests on days 7, 14, 21, and 28 post-injury. Data were analyzed using two-way repeated-measures ANOVA, followed by Bonferroni post hoc test, considering the significance level as $P < 0.05$.
Results: In the BBB locomotor test, astaxanthin-treated rats showed significantly improved functional recovery compared to the SCI group on day 7 ($P < 0.01$) and on days 14, 21, and 28 ($P < 0.001$). In the inclined plane test, motor performance in the astaxanthin group significantly increased from day 14 onward, with significance on day 14 ($P < 0.01$) and days 21 and 28 ($P < 0.001$). Similarly, in the forced swimming test, astaxanthin treatment significantly enhanced motor performance compared to the SCI group ($P < 0.001$).
Conclusion: Oral astaxanthin significantly enhances functional recovery and motor performance in rats after spinal cord injury, showing superior effects compared to SCI particularly in coordinated hindlimb locomotion.
Keywords: Spinal cord injury, Astaxanthin, BBB locomotor scale, Inclined plane test, Forced swimming test.

P324, Investigating the effect of nanocumin aldehyde on avoidance memory in a PTZ-induced epilepsy animal model

Reza Ramzani lehmali[1], Akbar Hajizadeh moghdam [1], Sedigheh Khanjani jelodar[1]
1. Department of Animal Science, Faculty of Science, University of Mazandaran, Babolsar, Iran

Background: Pentylenetetrazol (PTZ) is a neuroexcitatory compound widely used to induce experimental models of neurological disorders. Repeated exposure to PTZ leads to structural and functional alterations in the brain, particularly within the hippocampus, resulting in neuronal degeneration, disrupted synaptic signaling, and impairments in cognitive functions such as learning and memory. Because the hippocampus plays a key role in memory consolidation and passive avoidance learning, identifying protective compounds for this region is of significant interest. Cumin aldehyde, a natural phenolic compound present in cumin seeds, has shown anticonvulsant and memory-enhancing properties, and its therapeutic efficiency can be improved through nanocapsulation. This study aimed to examine the effect of nanoencapsulated cumin aldehyde on avoidance memory in a PTZ-induced epilepsy model.
Methods: Thirty-two male Wistar mice were randomly divided into four groups (n=8): the control group received distilled water; the nano-cumin aldehyde group received the nanoformulation by gavage every other day for 21 days; the PTZ group received 35 mg/kg of PTZ intraperitoneally; and the pre-treatment group received 50 mg/kg of nanoencapsulated cumin aldehyde 30 minutes before PTZ injection for 21 days. Memory performance was assessed using the shuttle box passive avoidance test, followed by one-way ANOVA analysis.
Results: PTZ significantly impaired passive avoidance memory by decreasing latency time and reducing correct responses ($p<0.05$). Pre-treatment with nanoencapsulated cumin aldehyde reversed these deficits, and administration of the compound alone produced moderate improvement.
Conclusion: Overall, nanoencapsulated cumin aldehyde reduced PTZ-induced cognitive impairments and may serve as a promising low-side-effect therapeutic strategy for memory dysfunction associated with epileptic conditions.
Keywords: Hippocampus, Memory, Pentylenetetrazol, Cumin aldehyde, Nanoencapsulation

P325, Novel bone-derived nerve conduction channels for peripheral nerve regeneration: an *in vivo* study

Zahra Sepehri[1], Morteza Behnam Rassouli[1], Nasser Mahdavi-Shahri[1], Ali Moradi[2]
1. Department of Biology, Faculty of Science, Ferdowsi University of Mashhad, Mashhad, Iran
2. Medical School, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Peripheral nerve injuries severely affect motor and sensory function. Although the peripheral nervous system has the ability to regenerate, in gaps of more than 5 mm, the restoration is not complete without surgical intervention. New research has shown that bio-compatible nerve guidance conduit (NGC) that mimic natural structures can perform better in peripheral nerve regeneration. In this study the use of decellurized diaphysis of rat femoral and chicken ulna bones, as NGCs, for sciatic nerve repair were examined.
Methods: Eighty male Wistar rats were randomly divided into five groups: intact control, negative control (NC) and experimental groups of nerve allograft (NA), bone allograft (BA) and chicken bone xenograft (BX). Briefly, after separating the soft tissues, the bones were fixed, decalcified and decellularized. Decellurized bone tubes were then sutured inside a 1 cm sciatic nerve gap. Recovery of motor-sensory function was evaluated by sciatic functional index (SFI) and hot plate tests at the end of 4th, 8th, 12th and 16th weeks, post-surgery.
Results: In comparison to intact control, SFI values in the NC remained close to -100 in all time point. Conversely, in comparison to NC, the SFI values in the NA, BA and BX groups were significantly improved in all weeks ($P<0.05$). In the hot plate test, all experimental groups performed much better than the negative control.
Conclusion: Decellularized bone tubes application, as NGCs, show promising results in improving the restoration of motor and sensory function after sciatic nerve injury.
Key words: Nerve guidance conduit, Sciatic nerve, Bone tube, Regeneration

P326, Neuroprotective actions of wogonin against PTZ-triggered convulsions and oxidative stress in mice

Farzaneh Shakeri[1, 2], Bahram Bibak[1, 2], Fatemeh Rasouli[3], Seyed Hesam Hojjat[3]
1. Natural Products and Medicinal Plants Research Center, North Khorasan University of Medical Sciences, Bojnurd, Iran
2. Department of Physiology and Pharmacology, School of Medicine, North Khorasan University of Medical Sciences, Bojnurd, Iran
3. Faculty of Medicine, North Khorasan University of Medical Sciences, Bojnurd, Iran

Background: Seizures and associated oxidative stress are critical concerns in neurological disorders. This study aims to evaluate the effects of wogonin, a flavonoid compound, on seizure latency and oxidative brain damage induced by pentylenetetrazol (PTZ) in a mouse model.
Methods: Adult male mice were administered PTZ to induce seizures. To assess the neuroprotective effects of wogonin, mice were pretreated with varying doses (1, 5, and 10 mg/kg, intraperitoneally) prior to PTZ administration. Seizure latency and severity were measured, and oxidative stress markers, including nitric oxide (NO), malondialdehyde (MDA), superoxide dismutase (SOD), catalase (CAT), and total thiol content, were evaluated in the hippocampus and cortex.
Results: PTZ administration significantly decreased the latency to both minimal clonic seizures (MCS) and generalized tonic-clonic seizures (GTCS). Wogonin pretreatment significantly increased MCS and GTCS latencies in a dose-dependent manner. Oxidative stress markers NO and MDA were significantly elevated following PTZ administration, and wogonin pretreatment at doses of 5 and 10 mg/kg significantly reduced their levels. SOD and CAT activities were significantly restored in groups treated with 5 and 10 mg/kg of wogonin, while total thiol content was notably increased at the highest dose, although not completely normalized compared to control levels.
Conclusion: Wogonin exhibits significant neuroprotective effects by enhancing seizure latency and reducing oxidative tissue damage in PTZ-induced seizures in mice. These findings suggest that wogonin may serve as a potential therapeutic agent for managing seizure disorders and oxidative stress-related neurological damage.
Keywords: Wogonin, Pentylenetetrazol, Seizure latency, Oxidative stress, Mice

P327, The effects of progesterone and pre-training on learning, memory, anxiety-like behaviors, balance impairments following traumatic brain injury in male rats

Saleh Sadeghi[1], Zahra Soltani[2,3], Mohammad Amin Rajizadeh[4], Elham Jafari[5], Mohammad Khaksari[2,3], Manzumeh Shamsi-Meymandi[5], Kayvan Khoramipour[6]

1. Neuroscience Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
2. Endocrinology and Metabolism Research Center, Institute of Basic and Clinical Physiology Sciences, Kerman University of Medical Sciences, Kerman, Iran
3. Department of Physiology and Pharmacology, Afzalipour Medical Faculty, Kerman University of Medical Sciences, Kerman, Iran
4. Physiology Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
5. Pathology and Stem Cells Research Center, Department of Pathology, School of Medicine, Kerman University of Medical Science, Kerman, Iran
6. i+HeALTH Strategic Research Group, Department of Health Sciences, Miguel de Cervantes European University (UEMC), Valladolid 47012, Spain

Background: Traumatic brain injury (TBI) is a common complication in human societies. In previous studies, the effects of exercise and sex hormones alone have been shown to prevent the progression of cerebral edema, oxidative stress, and inflammation after traumatic brain injury (TBI). This study investigated the effects of combined progesterone and exercise after TBI in male rats.

Methods: In this study, 84 rats were divided into 14 groups (7 groups for behavioral tests and 7 groups for evaluating brain water content and molecular and histological parameters, each group containing 6 rats). The study is grouped as follows: 1) Sham, 2) TBI, 3) Vehicle (Veh) (sesame oil, 1 ml/kg intramuscularly), 4) Progesterone (P) (1.7 mg/kg intramuscularly), 5) Exercise (Ex), 6) Exercise with vehicle (Ex +Veh), 7) Exercise and progesterone (Ex +P). The TBI was induced via the Marmarou setup. Finally, at the end of the study, animals were subjected to behavioral tests (Morris water maze, elevated plus maze, and beam walking). Brain water content and cytokine levels were measured after the animals were sacrificed.

Results: Our results showed that following brain damage, spatial learning, and memory, anxiety, and movement were impaired. Also, the levels of inflammatory cytokines and water content in the animals' brains increased. However, our results showed that prescription of progesterone, exercise, and their combination at all levels could improve the disorders caused

Conclusion: According to our findings, it seems that exercise can be a good substitute for progesterone in the recovery of post-traumatic disorders.

Keywords: Exercise, Progesterone, Traumatic brain injury, Cytokine Behavior

P328, Carbenoxolone as a modulator of pain and inflammation: Evidence from experimental and clinical studies

Hamid Ahmadpourmir[1], Hananeh Mohammadi Tabar[2,3], Zahra Gholamnezhad[4], Vahideh Ghorani[4], Seyedeh Faezeh Taghizadeh[4], Konstantinos Tsarouhas[5], Mahmoud Hashemzaei[2,3], Ramin Rezaee[4]

1. Medical Toxicology Research Center, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Pharmacodynamics and Toxicology, School of Pharmacy, Zabol University of Medical Sciences, Zabol, Iran
3. Toxicology and Addiction Research Center, Zabol University of Medical Sciences, Zabol, Iran
4. Applied Biomedical Research Center, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
5. Department of Cardiology, University Hospital of Larissa, Larissa, Greece

Background: Carbenoxolone (CBX), a derivative of glycyrrhetinic acid, has attracted attention for its anti-inflammatory and analgesic potential based on findings from both experimental and clinical research. In animal models, CBX attenuates pain hypersensitivity by disrupting gap-junction signaling, limiting neuroinflammatory responses, and enhancing γ-aminobutyric acid (GABA)-mediated neurotransmission.

Methods: This review summarizes the analgesic and anti-inflammatory effects of CBX reported in preclinical (n = 15) and clinical (n = 8) studies identified through systematic searches of PubMed and Scopus, and also examines its pharmacokinetic features and safety profile.

Results: Across preclinical models, CBX consistently reduced mechanical, thermal, and chemically induced hypersensitivity. In patients, topical CBX facilitated healing of herpes-related lesions and oral administration improved recovery from peptic ulcers; however, analgesic benefits were variable and often appeared secondary to tissue repair. Beyond its effects on pain, CBX exhibited marked anti-inflammatory activity in multiple models, largely through down-regulation of pro-inflammatory mediators including tumor necrosis factor-α, interleukin-1β, and interleukin-6, inhibition of NF-κB and NLRP3 inflammasome pathways, and attenuation of oxidative and nitrosative stress markers such as inducible nitric oxide synthase, reactive oxygen species, and nitric oxide. Reported adverse effects include sodium and fluid retention, weight gain, electrolyte disturbances, hypertension, headache, and heartburn.

Conclusion: Although preclinical evidence strongly supports the analgesic and anti-inflammatory potential of CBX, clinical confirmation remains limited, highlighting the need for further studies to define its therapeutic efficacy, mechanisms of action, and long-term safety.

Keywords: Carbenoxolone, Gap junction blocker, Analgesic effects, Neuropathic pain, Inflammatory pain

P329, Exploring the off-label potential of antidepressants in Alzheimer's disease via neuroinflammatory pathway regulation

Fatemeh Abbaszadeh[1], Pegah Javadpour[1]
1. Neurobiology Research Center, Institute of Neuroscience and Cognition, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: Alzheimer's disease (AD), the most common cause of dementia, is a progressive neurodegenerative disorder lacking effective disease-modifying therapies. Beyond its classical hallmarks -amyloid-β plaques and tau tangles- chronic neuroinflammation is increasingly recognized as a major driver of neuronal damage and cognitive decline. Persistent microglial and astrocytic activation, pro-inflammatory cytokine release, and oxidative stress exacerbate disease progression. In this context, drug repurposing offers a practical therapeutic approach. Antidepressants, commonly prescribed in aging populations, exhibit immunomodulatory and neuroprotective effects extending beyond mood regulation, suggesting potential utility in AD.
Methods: This review synthesized preclinical and clinical findings from PubMed on the anti-inflammatory, neuroprotective, and cognitive effects of tricyclic antidepressants (e.g., imipramine, amitriptyline) and selective serotonin reuptake inhibitors (SSRIs) in AD.
Results: Preclinical evidence indicates that several antidepressants suppress key pro-inflammatory mediators, including TNF-α, IL-1β, and IL-6, inhibit NF-κB and NLRP3 inflammasome signaling, enhance neurotrophic factors, and improve mitochondrial function. These mechanisms are associated with reduced amyloid burden, decreased tau phosphorylation, enhanced hippocampal neurogenesis, and improved cognitive performance in animal models of AD. Clinically, antidepressant use -particularly SSRIs- in AD patients with comorbid depression has been associated with mood improvement, a relative slowing of cognitive and functional decline, and a possible delay in dementia onset, although drugs with high anticholinergic burden may adversely affect cognition.
Conclusion: Overall, accumulating evidence suggests that antidepressants may serve as promising adjunctive therapies in AD by modulating neuroinflammatory and neuroprotective pathways. However, further large-scale, controlled clinical studies are required to confirm their efficacy, safety, and optimal therapeutic use in AD management.
Keywords: Antidepressants, Alzheimer's disease, Off-label effects, Neuroinflammation

P330, Probiotic intervention reverses hippocampal BDNF and microRNA expression alterations induced by prenatal unpredictable stress in offspring

Fatemeh Aghighi[1], Sayyed Alireza Talaei[1], Mahmoud Salami[1]
1. Physiology Research Center, Institute for Basic Sciences, Kashan University of Medical, Sciences, Kashan, Iran

Background: Chronic maternal stress during pregnancy can have long-term, detrimental consequences for the offspring. Prenatal stress was shown to be associated with reduced hippocampal levels of brain-derived neurotrophic factor (BDNF) in adult rat offspring. Also, it has been seen direct link between changes in neurotrophic support and MicroRNAs in response to early life stress. Emerging research highlights the interaction between gut microbiota and stress. A potential mechanism by which gut microbiota affect host physiology is to modulate host gene expression through MicroRNAs. This study aimed to investigate whether probiotic administration could mitigate the long-term adverse effects of prenatal unpredictable stress on hippocampal BDNF and microRNAs expression in adult offspring.

Methods: Adult male offspring (n=20) from dams exposed to chronic unpredictable stress during gestation were assigned to receive either saline (CUS+SAL) or a probiotic mixture (CUS+PRO) for 30 days post-weaning. Non-stressed controls (CON+SAL, CON+PRO) were included. Hippocampal BDNF, miR-322-5p and miR-30a-5p expression levels were subsequently quantified via real-time PCR.

Results: Analysis showed that the gene expression of BDNF was declined in the CUS+SAL compared to the CON+SAL rats ($P<0.0001$). However, it was increased in the probiotic treated CUS+PRO group ($P<0.05$). The results revealed that miR-322-5p ($P<0.05$) and miR-30a-5p ($P<0.0001$) were significantly down-regulated in the CUS+SAL group in compare to CON+SAL rats. The expression of the miR-322-5p ($P<0.0001$) and miR-30a-5p ($P<0.05$) was up-regulated after treatment of probiotic in CUS+PRO group.

Conclusion: We observed that administrating the probiotic mixture to prenatally stressed rats increased miRNAs expression and enhanced neurotrophic support in the hippocampus

Keywords: Prenatal stress, Probiotic, BDNF, Micro RNA

P331, Liraglutide improves fear memory in rats subjected to chronic cerebral hypoperfusion

Ghazal Karimi Jashni[1], Soroush Pejhan[1], Masoud Haghani[1]
1. Department of physiology, Shiraz University of Medical Sciences, Shiraz, Iran

Background: Vascular dementia (VD) is the second most common form of dementia, yet has not been identified. Liraglutide, a glucagon-like peptide-1 (GLP-1) receptor agonist, shows neuroprotective effects. This study investigated whether liraglutide can improve fear memory in a rat model of vascular dementia.

Methods: Thirty-two adult male Sprague–Dawley rats were randomly assigned to four groups: Control, Sham, 2VO, and 2VO + Liraglutide. Chronic cerebral hypoperfusion was induced using the 2VO procedure. In this model, both common carotid arteries are permanently ligated. Rats in the treatment group received daily intraperitoneal injections of liraglutide (200 µg/kg) for 30 days following surgery. Fear memory was evaluated with the passive avoidance test. Data were analyzed using one-way ANOVA followed by Tukey's post hoc test. Statistical significance set at $p < 0.05$.

Results: 2VO rats exhibited impairments in fear memory compared with the Sham and Control groups (P value = 0.005 and 0.008, respectively). Treatment with liraglutide significantly improved cognitive performance (P value = 0.003); relative to untreated 2VO animals, a longer latency to enter the dark compartment on the retention day was observed. Furthermore, the performance of the liraglutide-treated group did not differ significantly from Sham (P value = 0.997) and Control groups (P value = 0.98).

Conclusion: Liraglutide showed neuroprotective effects. This agent effectively attenuated the fear memory associated with chronic cerebral hypoperfusion. Findings suggest that liraglutide is a potential therapeutic candidate for vascular dementia through GLP-1-mediated mechanisms that help preserve amygdala and memory function.

Keywords: Vascular dementia, Fear memory, Liraglutide

P332, β-Glucan improves memory impairment in an animal model of aging

Seyed Morteza Karimian[1], Fatemeh Rahmati-Dehkordi[1], Elham Zahedi[2], Soheila Adeli[3]
1. Department of Physiology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
2. Department of Physiology, Faculty of Medicine, Iran University of Medical Sciences, Tehran, Iran
3. Electrophysiology Research Center, Neuroscience Institute, Tehran University of Medical Sciences, Tehran, Iran

Background: Aging is an inevitable biological process characterized by the gradual decline of bodily functions, often leading to age-related diseases. In the brain, aging typically results in impaired memory, learning ability, and cognitive function, driven by complex changes at the cellular and molecular level, such as increased oxidative stress and inflammation. Since β-Glucan has shown potential in protecting brain health, our study aimed to explore whether administering β-Glucan could help prevent cognitive decline by targeting the oxidative stress pathway.
Methods: 30 male Wistar rats were randomly assigned to 3 groups (n=10 for each group): control group (normal saline, intraperitoneally injection, for 8 weeks), aging model group (D-galactose, 180 mg/kg, intraperitoneally injection, for 8 weeks), and treatment group (D-galactose + β-Glucan, orally, from week 5 to 8). In the initiation of week 9, we used the novel object recognition test (NOR) to evaluate memory function. Finally, the rats were decapitated, and their brains were carefully removed from the skull. Then, hippocampal malondialdehyde (MDA) level and superoxide dismutase (SOD) activity as oxidative stress biomarkers were evaluated by colormetric assay and ELISA kits, respectively.
Results: Chronic D-galactose administration led to impaired memory function and elevated MDA level, and decreased SOD activity in the hippocampus compared to control group ($p<0.05$). Notably, treatment with β-Glucan effectively reversed these deleterious effects compared to D-galactose group ($p<0.05$).
Conclusion: These findings indicate that β-Glucan may protect brain health by regulating the oxidative stress pathway, suggesting its promise as a treatment for age-related neurodegenerative diseases.
Keywords: Aging, Memory, Oxidative stress, β-Glucan

P333, The role of mitochondrial dysfunctions in neurodegenerative diseases

Farzaneh Latifnia[1]
1. Department Biotechnology, Islamic Azad University, Malard, Iran

Background: In addition to the critical role in energy production, mitochondria also influence neuronal health through their involvement in calcium signaling and apoptosis regulation, processes that are intricately linked to neurodegenerative disease (NDDS) progression such as Alzheimer's diseases (AD) and Parkinson's diseases (PD). Moreover, the interplay between mitochondrial dysfunction and oxidative stress is particularly concerning; elevated levels of reactive oxygen species can initiate a vicious cycle of mitochondrial impairment, ultimately leading to neuronal death. This highlights the urgent need for therapeutic strategies that not only target mitochondrial dysfunction but also aim to restore calcium balance and mitigate oxidative damage, thereby preserving neuronal integrity and function in the face of these debilitating diseases.
Methods: Included sources are narrative reviews examining the relationship between mitochondrial dysfunction and neurodegenerative diseases, with particular emphasis on Alzheimer’s disease (AD) and Parkinson’s disease (PD). The analysis levels span molecular and cellular processes, with the Compagnoni review additionally incorporating clinical-level analysis and drawing from human studies, animal models, and cell culture data.
Results: Mitochondrial metabolism plays a central role in neurodegenerative diseases through impaired oxidative phosphorylation, altered mitochondrial structure, and bidirectional interactions with disease-specific protein pathologies, forming a self-propagating cycle that sustains neurodegeneration regardless of initial cause.
Conclusion: Recent advancements in mitochondrial-targeted therapies including gene editing and antioxidants, have shown promise in clinical trials, Implementing these therapies may lead to significant advancements in patient care, ultimately enhancing the quality of life for individuals affected by neurodegenerative diseases.
Keywords: Neurodegenerative diseases, Mitochondrial metabolism, Therapeutics, Mitochondrial dysfunction, Neuronal health

P334, Daphnetin preconditioning confers neuroprotection by suppressing TXNIP/NLRP3-mediated inflammatory pathways following global cerebral ischemia/reperfusion in mice

Shahein Momenabadi[1,2], Samira Nemati[3,4], Abedin Vakili[2,5]
1. Nursing Care Research Center, Semnan University of Medical Sciences, Semnan, Iran
2. Research Center of Physiology, Semnan University of Medical Sciences, Semnan, Iran
3. Molecular Medicine Research Center, Khomein University of Medical Sciences, Khomein, Iran
4. Department of Basic Sciences, Khomein University of Medical Sciences, Khomein, Iran
5. Department of Physiology, Faculty of Medicine, Semnan University of Medical Sciences, Semnan, Iran

Background: The TXNIP/NLRP3 pathway plays a key role in the induction of inflammation and neuronal cell death after cerebral ischemia. Previous studies have shown the Neuroprotective and anti-inflammatory effects of Daphnetin (DAP), a natural coumarin derivative, in cerebral ischemia. This study aimed to investigate DAP's Preconditioning neuroprotective effects on the protein expression levels of NLRP3 and TXNIP in the brain tissue in an animal model of global cerebral ischemia.

Methods: Global cerebral ischemia was induced in male Swiss albino mice through 30 minutes of bilateral common carotid artery occlusion (BCCAO), followed by 48 hours of reperfusion. DAP (40 mg/kg/ IP) administered for one week or a single dose 30 minutes before BCCAO. After 48 hours of reperfusion, the protein expression levels of NLRP3 and TXNIP in the brain tissue were analyzed by Western blotting.

Results: Western blot analysis demonstrated that Prophylactic daphnetin administration for one week and 30 minutes before BCCAO significantly reduced NLRP3 and TXNIP levels, 48 hours post-ischemia-reperfusion in the brain tissue ($P<0.01$).

Conclusion: The findings of the current study indicated that the protective effects of pre-treatment of DAP in the brain tissue following ischemic injury may be mediated by the suppression of the TXNIP/NLRP3 pathway. The result of this study shows the potential effect of conditioning of DAP as a neuroprotective strategy against global cerebral I/R injury.

Keywords: Daphnetin, BCCAO, NLRP3, TXNIP, Mice

P335, Effect of fetal life noise stress on neuropathic pain induced by chronic constriction injury (CCI) of the sciatic nerve in male rats

Reyhaneh Mirabzadeh[1], Sayyed Alireza Talaei[1], Fatemeh Aghighi[1]
1. Physiology Research Center, Institute for Basic Sciences, Kashan University of Medical Sciences, Kashan, Iran

Background: This study was designed to investigate the effect of exposure to noise stress during the fetal life on neuropathic pain (NP) symptoms using the chronic constriction injury (CCI) model of the sciatic nerve for pain induction, and exposure to noise stress in animals that entered the study at the age of 50 days.
Methods: The control group consisted of animals whose mothers lived under normal conditions during pregnancy and underwent surgery without sciatic nerve ligation. In the stress group, animals whose mothers were exposed to noise stress for 2 hours daily during the third week of pregnancy underwent surgery without nerve ligation. In the (NP) group, animals whose mothers lived under normal conditions during pregnancy and (NP) was induced by 4 ligatures around the sciatic nerve. Animals whose mothers were exposed to noise stress for 2 hours daily during the third week of pregnancy and (NP) was induced by 4 ligatures around the sciatic nerve were assigned to the (NP) and stress group. Behavioral tests were performed on days 0, 1, 7, 14, and 21 after surgery.
Results: Rats in the (NP) group exposed to noise stress showed a higher percentage of paw withdrawal frequency and a decrease in paw withdrawal threshold to thermal and mechanical stimuli, as well as a significant difference in response to thermal hyperalgesia compared to the control and (NP) groups.
Conclusion: Exposure to noise stress during the fetal life affects the response threshold to mechanical and thermal stimuli in pain tests in CCI rats.
Keywords: Neuropathic Pain, noise Stress, Allodynia, Hyperalgesia

P336, Promotion of neurological and histological recovery by mefenamic acid after severe TBI in rats

Nourollah Rezaei[1], Ali Siahposht–Khachaki[2], Mohammad Amin Yousefi[3], Mohammad Hosein Hemmet[4]
1. Immunogenetic Research Center, Department of Anatomical Sciences, Faculty of Medicine, Mazandaran University of Medical Sciences, Sari, Iran
2. Immunogenetic Research Center, Department of Physiology, Faculty of Medicine, Mazandaran University of Medical Sciences, Sari, Iran
3. Faculty of Medicine, Mazandaran University of Medical Sciences, Sari, Iran
4. The Health of Plant and Livestock Products Research Center, Mazandaran University of Medical Sciences, Sari, Iran

Background: Traumatic brain injury (TBI) causes neuronal damage and severe functional impairments. This study examined whether the neuroprotective anti-inflammatory drug mefenamic acid (MA) could improve rats' neurological function and histological damage after severe traumatic brain injury.
Methods: Fifty-six adult male rats were divided into groups: Intact, Sham, TBI, TBI+Vehicle, and TBI+MA (0.5, 1, or 2 mg/kg). Severe TBI was induced by the Marmarou method. MA was administered intraperitoneally 30 minutes post-injury. Neurological scores (VCS) and motor/balance function (beam walk and beam balance tests) were assessed for three days post-TBI. Afterward, histopathological analysis (H&E staining) of the cerebral cortex was conducted to assess neuronal degeneration, perineuronal/perivascular edema, and astrocyte swelling.
Results: TBI resulted in severe neurological and motor/balance deficits compared to control groups ($P<0.001$). Treatment with MA at 0.5 and 1 mg/kg significantly improved neurological scores and restored motor/balance function over time ($P<0.001$). Histological analysis verified that these functional enhancements were linked to a significant decrease in astrocyte swelling, perivascular edema, and neuronal degeneration in the treated groups. Neither the functional nor histological results were significantly improved by the 2 mg/kg dosage.
Conclusion: The results show that in a rat model of severe TBI, post-injury administration of low-dose mefenamic acid (0.5 and 1 mg/kg) significantly provides histological neuroprotection and efficiently accelerates recovery of neurological function.
Keywords: Mefenamic Acid, Traumatic Brain Injury, Neurological Function, Motor Recovery, Histopathology

P337, Therapeutic effects of riboflavin on functional recovery and cortical histology following traumatic brain injury in rats

Nourollah Rezaei[1], Ali Siahposht–Khachaki[2], Roghayeh Soltantoyeh[3], Roozbeh Zare Gashti[4], Mohammad Hosein Hemmeti[5]

1. Immunogenetic Research Center, Department of Anatomical Sciences, Faculty of Medicine, Mazandaran University of Medical Sciences, Sari, Iran
2. Immunogenetic Research Center, Department of Physiology, Faculty of Medicine, Mazandaran University of Medical Sciences, Sari, Iran
3. Faculty of Medicine, Mazandaran University of Medical Sciences, Sari, Iran
4. Department of Toxicology and Pharmacology, Faculty of Pharmacy, Mazandaran University of Medical Sciences, Sari, Iran
5. The Health of Plant and Livestock Products Research Center, Mazandaran University of Medical Sciences, Sari, Iran

Background: Traumatic brain injury (TBI) often results in long-term motor dysfunction and structural neuronal damage. This study aimed to evaluate the potential of riboflavin (vitamin B2) to promote recovery of neurological function and mitigate histopathological alterations in a rat model of severe TBI.

Methods: Fifty-six adult male Wistar rats were randomly divided into seven groups: Intact, Sham, TBI, TBI+Vehicle (DMSO), and TBI+Riboflavin (5, 10, or 20 mg/kg). We induced severe TBI using the Marmarou weight-drop method. We administered Riboflavin or vehicle intraperitoneally 30 minutes after the injury. We assessed neurological outcomes using VCS and tested motor and balance function with beam walk and beam balance tests over 72 hours. Then, we performed histopathological examination (H&E staining) of cortical brain tissue to evaluate neuronal degeneration, perineuronal/perivascular edema, and astrocyte shape.

Results: TBI induction caused significant neurological impairment and motor and balance deficits compared to control groups ($P<0.001$). Post-injury treatment with riboflavin at doses of 10 and 20 mg/kg led to a noticeable and gradual recovery in neurological scores and motor coordination over the assessment period ($P<0.001$). Histological analysis confirmed these functional benefits, showing a clear reduction in neuronal degeneration and perivascular edema in the riboflavin-treated groups. The lowest dose (5 mg/kg) did not show significant improvements in either functional or histological measures.

Conclusion: Our results demonstrate riboflavin's therapeutic promise as a neuroprotective drug by showing that post-TBI treatment of sufficient doses (10–20 mg/kg) significantly improves neurological functional recovery and offers significant histological protection in the cerebral cortex.

Keywords: Riboflavin, Traumatic Brain Injury, Functional Recovery, Histopathology, Neuroprotection

P338, Efficacy and mechanisms of high-dose *Biotin* in progressive multiple sclerosis: A critical review

Zeynab Golara[1], Shayan Rezanejad[2], Elham Abdi[1]
1. Students Research Committee, Zanjan University of Medical Sciences, Zanjan, Iran
2. Students Research Committee, Bushehr University of Medical Sciences, Bushehr, Iran

Background: Progressive *multiple sclerosis* (MS) is a neurodegenerative disease marked by demyelination and neurological decline. Recently, high-dose *biotin* (300 mg/day) has been investigated as a potential therapeutic agent due to its roles in remyelination and neuroprotection. This review aimed to critically evaluate the clinical effectiveness and biological mechanisms of high-dose *biotin* in managing progressive MS.
Methods: A systematic search was performed in PubMed and Scopus databases from 2015 to June 2025. Relevant studies including randomized clinical trials, observational research, and mechanistic analyses were reviewed. Quality assessment was conducted based on standard scientific criteria
Results: Initial trials, such as MS-SPI, suggested improved walking speed and reduced disability in some patients. Proposed mechanisms include activation of acetyl-CoA carboxylase and enhanced mitochondrial energy production. However, the larger SPI2 Phase III trial did not demonstrate significant benefit compared to placebo. Systematic reviews indicate inconsistent outcomes, with limitations such as small sample sizes and short durations. Safety data are limited.
Conclusion: Although high-dose *biotin* may offer neuroprotective benefits in progressive MS, current evidence is inconclusive. Further large-scale, long-term studies targeting specific patient subgroups are essential. Clinical use should be approached cautiously until more robust evidence becomes available.
Keywords: Multiple sclerosis, High-dose *Biotin*, Neuroprotection, Progressive MS

P339, Prenatal unpredictable stress alters hippocampal tight junction expression: ameliorative effects of probiotic treatment in adult offspring

Sayyed Alireza Talaei[1], Fatemeh Aghighi[2], Mahmoud Salami[3]
1. Physiology Research Center, Institute for Basic Sciences, Kashan University of Medical Sciences, Kashan, Iran
2. Physiology Research Center, Institute for Basic Sciences, Kashan University of Medical Sciences, Kashan, Iran
3. Physiology Research Center, Institute for Basic Sciences, Kashan University of Medical Sciences, Kashan, Iran

Background: Stress during pregnancy has a wide variety of negative effects in both human and animal offspring. Stressful situations and subsequent anxiety-like behaviors can disrupt the blood-brain barrier. The integrity of the blood-brain barrier is necessary for protecting the brain from external stimulation and disturbance of the internal environment. In addition, emerging evidence suggests that microbiota-gut-brain interactions may mediate the effects of early-life stress on psychological dysfunction. According to the previous research, we know that modulation of the gut microbiota composition by probiotics administration could affects tight junction proteins expression in the blood-brain barrier. This study aimed to investigate the potential of probiotic supplementation to reverse the detrimental effects of prenatal unpredictable stress on the expression of hippocampal tight junction markers in adult offspring**.**
Methods: Male offspring from prenatally stressed or control dams were assigned to receive saline or a probiotic mixture (B. longum, L. acidophilus, B. bifidum, L. fermentum; 1g/day) via gavage for 30 days post-weaning (n=5/group). Hippocampal mRNA levels of tight junction proteins (claudin-5, occludin, ZO-1) were quantified by qRT-PCR.
Results: Gene expression analysis of hippocampal tight junction proteins revealed significant effects of prenatal stress and probiotic intervention. Prenatal stress (ST group) reduced ZO-1 and occludin, but not claudin-5, expression versus controls (CO). Probiotic treatment (SP group) restored expression of all three proteins to levels comparable with controls, with significant increases versus the ST group.
Conclusion: Probiotic supplementation effectively reverses prenatal stress-induced downregulation of hippocampal tight junction genes, highlighting its therapeutic potential for blood-brain barrier integrity**.**
Keywords: Prenatal stress, Probiotic, Tight junctions

P340, Thiamine hydrochloride-loaded niosomes :Formulation, characterization, and therapeutic efficacy in Cuprizone-induced demyelination in C57BL/6 mice

Atefeh Arab Firozjae[1], Mohsen Rashidi[1]
1. Department of Pharmacology, Faculty of Medicine, Mazandaran University of Medical Sciences, Sari, Iran

Background: Thiamine hydrochloride (vitamin B1) is essential for nervous system function, but its therapeutic use is limited by poor bioavailability, high hydrophilicity, and short half-life. Multiple sclerosis (MS) is a chronic demyelinating disease with no definitive cure. This study aimed to develop thiamine-loaded niosomes to enhance drug delivery and evaluate their neuroprotective effects in a cuprizone-induced MS model.
Methods: Niosomes were prepared via ultrasonication using thiamine hydrochloride, cholesterol, Tween 80, and Span 80. Formulations were characterized for size, PDI, zeta potential, entrapment efficiency, morphology (FESEM), chemical compatibility (ATR-FTIR), thermal properties (DSC), and in vitro release. In vivo studies used C57BL/6 mice with cuprizone-induced demyelination. Motor coordination was assessed via rotarod and narrow beam walking tests; demyelination was evaluated histopathologically using Luxol fast blue staining.
Results: The optimized niosomes (F3) had a particle size of 348.67 ± 38.43 nm, PDI of 0.396 ± 0.030, zeta potential of 0.743 ± 0.130 mV, and entrapment efficiency of 69.95 ± 1.37%. ATR-FTIR and DSC confirmed drug-excipient compatibility and amorphous encapsulation. In vitro release showed sustained delivery over 24 hours. In vivo, niosomal thiamine significantly improved motor performance and reduced demyelination compared to cuprizone-only and free thiamine groups.
Conclusion: Thiamine hydrochloride-loaded niosomes were successfully developed with suitable physicochemical properties and sustained release. They demonstrated significant neuroprotective effects, improving motor function and promoting remyelination in an MS animal model, supporting their potential as an adjunctive therapy for multiple sclerosis.
Keywords: Thiamine hydrochloride, Niosomes, Multiple sclerosis, Cuprizone

P342, The effect of SGLT2 inhibitors on depressive disorders in non-diabetic context: A systematic review

Kousar Ahmadi[1], Mobin Alinia[1], Mobina Movahedi[1], Azam Abedi[2], Fateme Abbaszadeh[3], Leila Dargahi[1]
1. Neuroscience Research Center, Institute of Neuroscience and Cognition, Shahid Beheshti University of Medical Sciences, Tehran, Iran
2. Tissue Engineering and Regenerative Medicine Research Center, Baqiyatallah University of Medical Sciences, Tehran, Iran
3. Neurobiology Research Center, Institute of Neuroscience and Cognition, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: SGLT2 inhibitors are commonly used to regulate blood glucose in diabetic patients. Recent evidence suggests that these drugs may also have beneficial effects on autophagy, inflammation, and oxidative stress in the brain. While most research has focused on diabetes, this systematic review explores the potential therapeutic benefits of SGLT2 inhibitors in non-diabetic conditions for treating depression.
Methods: This systematic review followed PRISMA guidelines and searched databases including PubMed, Scopus, Embase, and Web of Science from inception to July 19, 2025**.** The focus was on studies evaluating SGLT2 inhibitors in non-diabetic experimental models related to depression. Study selection, data extraction, and quality assessment were conducted independently by four assessors.
Results: Five studies on depression disorders demonstrated that SGLT2 inhibitors effectively improved depressive-like behaviors and neurobiological disorders. In chronic unpredictable stress models, empagliflozin and dapagliflozin reversed anhedonia and despair by reducing neuroinflammatory markers (IL-6, TLR-4, NLRP3 components), while restoring antioxidant enzyme activity. These effects were associated with increased neurotrophic and synaptic markers (BDNF, synapsin-1), preservation of blood–brain barrier integrity, and modulation of endothelin signaling. In monoamine-depletion models, empagliflozin promoted autophagy, suppressed mTOR signaling, and enhanced AMPK-dependent neurogenesis. In post-myocardial infarction models, sotagliflozin improved depressive-like behaviors in line with cardiac function through its effect on gut microbiomes.
Conclusion: In preclinical non-diabetic models, SGLT2 inhibitors demonstrated antidepressant effects by reducing neuroinflammation (NLRP3, IL-6), enhancing neuroplasticity (BDNF, synapsin-1), promoting cellular homeostasis (autophagy/AMPK), and influencing the gut-brain axis. These findings suggest SGLT2 inhibitors could be promising therapeutic agents for depression disorders.
Keywords: SGLT2 inhibitors, Non-diabetic models, Depressive disorders

P343, Comparative effects of mesenchymal stem cells injection and high-intensity interval training in amyloid-β-induced Alzheimer's disease in male rat model

Mahdieh Sadat Hosseini[1], Mona Saheli[2,3], Mohammad Amin RajiZadeh[4], Seyyed Noureddin Nematollahi-Mahani[2], Sara Joushi[3], Abbasali Gaeini[5], Kayvan khoramipour[6] and Vahid Sheibani[3]

1. Department of Physiology, Faculty of Medicine, Kerman University of Medical Sciences, Kerman, Iran
2. Department of Anatomy, Faculty of Medicine, Kerman University of Medical Sciences, Kerman, Iran
3. Neuroscience Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
4. Physiology Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
5. Department of Exercise Physiology, Faculty of Sport Sciences and Health, University of Tehran, Tehran, Iran
6. Health Strategic Research Group, Department of Health Sciences, Miguel de Cervantes European University (UEMC), 47012 Valladolid, Spain

Background: Alzheimer's disease (AD) is a progressive neurodegenerative disorder characterized by impairments in long-term memory and spatial learning. Key pathological mechanisms include elevated oxidative stress and pro-inflammatory cytokines, along with reduced levels of anti-inflammatory cytokines and BDNF. Therapeutic strategies such as mesenchymal stem cells (MSCs) and high-intensity interval training (HIIT) have shown beneficial effects on AD, but no direct comparison between these interventions has been made. This study compared the effects of MSCs injection and HIIT on long-term memory and spatial learning, oxidative stress, inflammatory cytokines, and BDNF levels in a rat model of AD induced by amyloid-β (Aβ).

Methods: Adult male Wistar rats were assigned to five groups: control, vehicle, AD, AD+MSCs, and AD+HIIT. AD was induced by intracerebroventricular (ICV) injection of Aβ (1-42). MSCs were verified by flow cytometry for CD44 and CD90 expression, and then injected ICV into AD rats. Long-term memory and spatial learning were evaluated using the Morris water maze test (MWM), and levels of inflammatory cytokines (TNF-α and IL-10), oxidative stress markers (MDA, SOD, and TAC), and BDNF levels were also measured in the hippocampus.

Results: AD rats showed impaired long-term memory and spatial learning, increased TNF-α and MDA levels, and decreased IL-10, SOD, TAC, and BDNF levels. Both HIIT and MSCs treatments improved these pathological changes, though MSCs produced greater reductions in TNF-α and more substantial enhancement of antioxidant activity.

Conclusion: As a non-invasive and cost-effective intervention, HIIT can be used as an adjunct therapy alongside MSC therapy for AD.

Keywords: Alzheimer Disease, Mesenchymal Stem Cells, High-Intensity Interval Training, Oxidative Stress, and Cytokines

P346, Electrochemical nanosensor based on Au/PAMAM-decorated multi-walled carbon nanotubes for evaluating dopamine release from SH-SY5Y cells: Effect of AKBA in a cellular model of Parkinson's disease

Akram Mohammadi[1], Behnaz Hatamluyi[2,3], Ahmad Ghorbani[3,4], Azar Hosseini[3,4], Maryam Ghobeh[1], Hamid Reza Sadeghnia[3,4]

1. Department of Biology, SR.C., Islamic Azad University, Tehran, Iran
2. Student Research Committee, Mashhad University of Medical Sciences, Mashhad, Iran
3. Pharmacological Research Center of Medicinal Plants, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
4. Department of Pharmacology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Parkinson's disease (PD) is characterized by progressive degeneration of dopaminergic neurons, leading to reduced dopamine release and impaired neurotransmission. This study aimed to develop a sensitive electrochemical nanosensor for the in vitro detection of dopamine and to evaluate dopamine release following treatment with 3-acetyl-11-keto-β-boswellic acid (AKBA) in a cellular model of PD.

Methods: An electrochemical nanosensor was fabricated by modifying a screen-printed carbon electrode (SPCE) with carboxyl-functionalized multi-walled carbon nanotubes (fMWCNTs) using chronoamperometric deposition. Subsequently, a gold/poly(amidoamine) dendrimer (Au/Den) nanocomposite was electrodeposited onto the fMWCNT/SPCE surface via cyclic voltammetry, yielding the Au/Den/fMWCNT/SPCE electrode. The electrochemical characteristics of the modified electrode were evaluated. Dopamine release was assessed in SH-SY5Y neuroblastoma cells exposed to 6-hydroxydopamine (6-OHDA), and the effect of AKBA treatment (2.5 and 5 μM) was investigated.

Results: The anodic and cathodic peak currents of dopamine exhibited a linear relationship with scan rate, indicating a diffusion-controlled electron transfer process. The calibration curve showed excellent linearity ($R^2 = 0.9949$), with a detection limit of 0.58 nM and a linear dynamic range of 10 nM to 6 μM. The Au/Den/fMWCNT/SPCE nanosensor demonstrated significantly enhanced redox currents and electroactive surface area compared to unmodified electrodes. AKBA (2.5 and 5 μM) treatment significantly restored dopamine release in 6-OHDA-injured SH-SY5Y cells ($p < 0.001$).

Conclusion: The developed electrochemical nanosensor displayed high sensitivity, selectivity, and reproducibility for dopamine detection and may serve as a valuable tool for neuropharmacological research, PD diagnostics, and drug screening applications.

Keywords: Electrochemical nanosensor, Dopamine detection, Parkinson's disease, Au/PAMAM/fMWCNT/SPCE, 3-acetyl-11-keto-β-boswellic acid

P347, Preclinical behavioral outcomes of combined stem cell and nanodrug-loaded scaffold treatment in spinal cord Injury: A preliminary report

Maedeh Amiri-Shahri[1,2], Sonia Fathi-karkan[3,4], Bahram Bibak[3,5]

1. Student Research Committee, North Khorasan University of Medical Sciences, Bojnurd, Iran
2. Faculty of Medicine, North Khorasan University of Medical Sciences, Bojnurd, Iran
3. Natural Products and Medicinal Plants Research Center, North Khorasan University of Medical Sciences, Bojnurd, Iran
4. Department of Medical Nanotechnology, School of Medicine, North Khorasan University of Medical Science, Bojnurd, Iran
5. Department of Physiology, School of Medicine, North Khorasan University of Medical Sciences, Bojnurd, Iran

Background: Spinal cord injury leads to loss of sensory/motor function, with inflammation and demyelination that cause disease progression. Although no effective clinical therapy exists, tissue engineering has shown promise. Polyurethane/alginate nanofibrous scaffolds offer a biomimetic environment for axonal regeneration and can deliver stem cells and drugs. This study develops a polyurethane/alginate scaffold incorporating adipose-derived mesenchymal stem cells (ADMSCs) and minocycline nanoparticles to support spinal cord repair.

Methods: Polyurethane/alginate scaffolds were fabricated by electrospinning. Minocycline nanoparticles were produced by mixing phosphatidylcholine and minocycline in chloroform at varying ratios. ADMSCs were isolated from rat abdominal adipose tissue and cultured. Scaffold morphology was examined by SEM, and surface chemistry and bonding with nanoparticles were analyzed by FTIR. Scaffolds loaded with minocycline nanoparticles and ADMSCs were incubated for 24 hours before transplantation. Eighteen male Wistar rats were assigned to six groups. Spinal cord injury was induced by lateral hemisection at T9. Surgery was confirmed by behavioral assessment on day one, and functional recovery was evaluated for six weeks using the BBB scale.

Results: Electrospinning produced a uniform, bead-free polyurethane/alginate nanofibrous scaffold. SEM confirmed preservation of nanoparticle size and shape on the scaffold. ADMSCs were successfully isolated and expanded, with MSC markers confirmed by flow cytometry. Lateral hemisection produced unilateral hindlimb deficits. In vivo, scaffolds containing both ADMSCs and minocycline nanoparticles promoted motor recovery by six weeks post-injury.

Conclusion: Preliminary findings suggest that combining mesenchymal stem cells, minocycline nanoparticles, and polyurethane/alginate scaffolds represents a promising strategy for spinal cord injury recovery.

Keywords: Spinal Cord Injury, Scaffold, Stem Cells, Nanodrug

P348, Investigation of pregnenolone effects on proliferation and differentiation of adult male mouse hypothalamic neural stem cells

Sarah Ravankhah[1], Amir Ghanbari Hassan Abad[2]
1. Research student committee of Yasuj University of Medical Science, Yasuj, Iran
2. Anatomy Department of Medical school, Yasuj University of Medical Science, Yasuj, Iran

Background: Hypothalamus, a small brain region, plays a crucial role in metabolic and neuroendocrine regulation by producing new neurons. Although neural stem cells (NSCs) are present throughout life in the hypothalamus, their ability to divide and differentiate decreases with age. This decline has led to the investigation of naturally occurring compounds to enhance NSC function. Pregnenolone, a neurosteroid from the central nervous system, is noted for its potential neurotrophic, anti-inflammatory, and pro-neurogenic effects. However, its impact on adult hypothalamic NSCs remains unclear and has not been thoroughly studied. This study evaluated the effects of pregnenolone on NSC proliferation, differentiation, and the maintenance of neuronal and glial cells in the adult male mice hypothalamus.
Methods: Twenty-eight mice were randomly assigned to four groups receiving saline or pregnenolone (5, 10, or 20 mg/kg, intraperitoneally) for eight weeks. Hypothalamic tissues were dissected and dissociated for neurosphere assays. Derived cells were cultured under differentiation conditions, and neuronal and glial phenotypes were assessed using double immunofluorescence. BrdU incorporation evaluated in vivo proliferation. Data were analyzed using one-way ANOVA with Tukey's post hoc test.
Results: Pregnenolone at 10 mg/kg significantly increased neurosphere numbers and derived cells compared to control and 20 mg/kg groups ($p \leq 0.05$). High-dose treatment enhanced neuronal differentiation (βIII-tubulin), while low-dose favored glial differentiation ($p \leq 0.05$). In vivo, neuronal counts (NeuN) and newly formed neurons increased in all treated groups, with BrdU-positive cells highest at 5 and 10 mg/kg ($p \leq 0.001$).
Conclusion: Pregnenolone promotes hypothalamic NSC proliferation and neurogenesis in vitro and in vivo, suggesting it regulates the maintenance and differentiation of adult hypothalamic stem cells.
Keywords: Neural Stem Cells, Neurogenesis, Pregnenolone, Hypothalamus, Cell Proliferation

P350, iscovering multitarget propolis drug compounds for asthma disease via in bioinformatic and chemoinformatic approach

Sobhan Mehrafshan[1,2]
1. Student Research Committee, Jahrom University of Medical Sciences, Jahrom, Iran
2. USERN Office, Jahrom University of Medical Sciences, Jahrom, Iran

Background: Asthma is a chronic inflammatory disease characterized by airway hyperresponsiveness, mucus hypersecretion, and bronchoconstriction. Activation of the NF-κB transcription factor drives expression of proinflammatory cytokines IL-1β, IL-6, and TNF-α in airway and immune cells. Standard therapies—β_2-agonists, glucocorticoids, anticholinergics, and leukotriene receptor antagonists—often produce tachyphylaxis, systemic effects, and variable response. Propolis, a honeybee resin containing flavonoids and phenolic acids, has anti-inflammatory and immunomodulatory properties. We investigated whether constituents can modulate multiple asthma targets, including NF-κB p65 and receptors.
Methods: Thirty-five propolis constituents were retrieved from PubChem. Reference ligands for β_2-adrenergic, glucocorticoid, cysteinyl leukotriene 1, and muscarinic M3 receptors with $IC_{50} \leq 1$ μM were obtained from BindingDB. Pharmacophores were built in Discovery Studio; PaDEL computed descriptors; SVR-QSAR predicted activity; Open Babel prepared structures; SWISS-MODEL built NF-κB p65; AutoDock Vina performed docking.
Results: Screening matched quercetin and caffeic acid to β_2-agonist features; artepillin C to glucocorticoids; Propolin B and Propolin D to leukotriene antagonists; ascorbic acid and pinostrobin to anticholinergics. Intersection analysis highlighted Propolin A (CID 10411087), Propolin B (CID 637252), and pinostrobin (CID 73201) as multitarget hits. Docking showed Propolin A bound NF-κB p65 at –8.2 kcal/mol, with Propolin B and Pinostrobin at –7.9 and –7.6 kcal/mol. Binding at these receptors was comparable to reference ligands.
Conclusion: Combined ligand- and target-based analyses prioritized propolis constituents with predicted multitarget activity. Propolin A, Propolin B, and Pinostrobin exhibit favorable affinities and complementarity, suggesting potential to attenuate airway inflammation alongside standard treatments. Experimental validation using cytokine assays and NF-κB reporter studies is warranted.
Keywords: Propolis, Asthma, Ligand-based drug discovery, Molecular Docking, Multitarget Drug Discovery

P351, hysiological and behavioral changes in uncertainty and constraint conditions: decision-making at the last chance of iowa gambling task

Nilufar Totonchi[1], Ali Moghimi[1], Morteza Izadifar,[2,3] Hamidreza Kobravi[4], Elahe Yaghoubian[1]
1. Rayan Research Center for Neuroscience & Behavior, Department of Biology, Faculty of Science, Ferdowsi University of Mashhad, Mashhad, Iran
2. The Institute of Medical Psychology, Faculty of Medicine, Ludwig Maximilian University of Munich, Munich, Germany
3.The Institute of Human Aesthetics, Coburg University of Applied Sciences & Art and Bamberg University, Am Hofbräuhaus 1, 96450 Coburg, Germany
4. Department of Biomedical Engineering, Faculty of Engineering, Islamic Azad University, Mashhad branch, Mashhad, Iran

Background: Uncertainty and constraint in real decision-making situations create psychological pressure that affects physiological, behavioral, and cognitive processes. In this study, a new phase referred to as "last chance" was integrated into the Iowa Gambling Task (IGT), which is used to simulate decision-making under uncertainty, to explore the impact of "choice constraint in the form of the last chance" on decision-making under uncertainty and its associated physiological-behavioral changes.
Methods: Twenty-two healthy participants performed the IGT, consisting of a main phase (five blocks, 50 choices each) without constraints, followed by a "last chance" phase (one block, 50 choices) with choice constraints. Four physiological signals, including blood volume pressure (BVP), temperature, respiratory rate, and skin conductance were recorded. Tacit and explicit knowledge were assessed via a questionnaire.
Results: During the last chance phase, participants selected more advantageous cards, and their average remaining money increased significantly. Physiologically, skin conductance increased, while BVP amplitude decreased, both signaling heightened arousal. In contrast, the Standard Deviation of Normal-to-Normal interbeat intervals (SDNN), a BVP-derived HRV (Heart rate variability) index associated with greater cognitive regulation and more favorable decision-making, increased, indicating reduced stress and enhanced parasympathetic activity.
Conclusion: In the last chance phase, participants effectively adjusted physiologically, resulting in enhanced autonomic nervous system (ANS) balance and, subsequently, more strategic decision-making utilizing tacit knowledge. Therefore, this study, by implementing an innovative design in the IGT, offered new insights into the interplay between the autonomic nervous system, emotion regulation, and decision-making under uncertainty and constraints.
Keywords: Decision making, IGT, Constraint, Last chance, Physiological signals

P352, I-Powered immersive learning: transforming how we teach musculoskeletal physiology and pharmacology after COVID

Mohammad Mahdi Ajalli[1]
1. Department of Medicine, Zanjan University of Medical Sciences, Zanjan, Iran

Background: For a long time, teachers have found it remarkably hard to get students to really understand the living, shifting reality of musculoskeletal diseases and the exact ways drugs interact with those processes. Ordinary lectures simply cannot show an inflamed synovium flaring up or osteoclastic activity unfolding in front of the learner's eyes. This systematic review examines the swift uptake of artificial intelligence applications and immersive technologies that have tackled these longstanding educational obstacles from 2020 through 2025.
Methods: We searched PubMed, Scopus, Web of Science, and ERIC databases. We looked specifically for interventional studies using AI-driven adaptive platforms, virtual reality environments, or augmented reality overlays in undergraduate physiology and pharmacology courses focused on musculoskeletal topics. Twenty-eight studies qualified after screening.
Results: Most reported marked improvements in conceptual understanding and long-term recall. Students using VR joint models or AI-guided dosing scenarios for osteoarthritis scored 25–45% higher on assessments than controls. Engagement rose sharply. Confidence in clinical reasoning grew as well. Yet several reports pointed out real hurdles. Faculty training lagged in many places. Costs remained prohibitive for smaller programs. Digital divide issues affected lower-resource settings. Students repeatedly brought up those annoying yet fairly rare moments when the software froze or the headset cut out and suddenly killed the momentum of the whole lesson.
Conclusion: All the same, the research paints a straightforward picture: AI-supported and immersive techniques have left the "nice-to-have experiment" phase far behind and now qualify as reliable, must-use tools in any serious curriculum.
Keywords: Artificial intelligence, Virtual reality, musculoskeletal physiology education, Pharmacology teaching, immersive learning, Student outcomes

P353, A scientometric evaluation of Iran's research output in the subject area of medical physiology

Maryam Behmadi[1], Abdolrasoul Rangrazi[2]
1. Neonatal Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
2. Dental Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Scientometrics is a quantitative and statistical discipline that analyzes how science and technology evolve over time. It supports scientific management and decision-making by using data primarily derived from scholarly publications. The aim of this study is to conduct a scientometric analysis of Iran's scientific output in the subject area of medical physiology.
Methods: The SciVal platform was used to evaluate all documents from Iran published in Scopus-indexed journals within the subject area of medical physiology between 2015 and 2024. The analysis focused on key indicators such as Field-Weighted Citation Impact (FWCI), publication output, the extent of international collaboration, the main research topics, and the journals in which the articles were published.
Results: From 2015 to 2024, the number of published articles increased by 1.35 times. The FWCI index rose from 0.82 in 2015 to 1.5 in 2024. However, it should be noted that the number of articles peaked in 2022 and showed a declining trend thereafter. Articles published in Q1 journals experienced a 4.5-fold increase. Publications involving international collaboration grew by 2.22 times. Over the past 10 years, 7.9% of the published articles have been among the top 10% most highly cited papers.
Conclusion: Iran's scientific output in the field of medical physiology increased in 2024 compared with 2015; however, to be ranked among the world's top 10 countries, an approximately fivefold increase in scientific output is required.
Keywords: Scientometrics, Iran, Medical physiology, SciVal

P356, Comprehensive pathway analysis of citicoline in neuropathic pain treatment: An integrative bioinformatics study

Elham Esmaeil-Jamaat[1], Mohammad Amini[1], Gholamreza Hassanzadeh[1,2,3], Tahmineh Mokhtari[4]
1. Department of Neurosciences and Addiction Studies, School of Advanced Technologies in Medicine, Tehran University of Medical Sciences, Tehran, Iran
2. Department of Anatomy, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
3. Department of Digital Health, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
4. Department of Entomology and Nematology and UCD Comprehensive Cancer Center, University of California, Davis, California, USA

Background: Neuropathic pain (NP) is a debilitating chronic condition characterized by nerve damage and limited therapeutic options, underscoring the need for novel mechanistic insights. Citicoline (CTC), a neuroprotective and anti-inflammatory compound, has demonstrated potential in alleviating NP; however, its underlying molecular mechanisms remain poorly understood. This study employs an integrative bioinformatics approach to elucidate CTC's therapeutic pathways in NP.
Methods: Using public databases, we mined genes associated with NP and CTC's targets, identifying 55 common genes through network pharmacology and protein-protein interaction (PPI) analysis. Utilizing Cytoscape and degree centrality metrics, we prioritized the top 10 hub genes—SRC, AKT1, EGFR, CASP3, MMP9, TLR4, APP, NFKB1, CDC42, and CXCR4—based on their high connectivity and biological relevance to NP pathogenesis.
Results Gene Ontology (GO) enrichment analysis revealed significant terms related to neuronal survival, inflammatory response regulation, and signal transduction, while Kyoto Encyclopedia of Genes and Genomes (KEGG) pathway analysis highlighted enriched pathways, including relaxin signaling mediated by the NFKB/MMP9/AKT axis. Molecular docking simulations, performed using AutoDock Vina, confirmed CTC's high binding affinity to key protein targets, supporting its modulatory role in neuroprotection and inflammation suppression.
Conclusion: This integrative computational framework provides a comprehensive understanding of CTC's multi-target mechanisms in NP, offering a robust foundation for developing precision medicine strategies and CTC-based therapeutic interventions.
Keywords: Neuropathic Pain, Citicoline, Network Pharmacology, Neuroprotection, Anti-inflammatory

P357, The Impact of cybersickness on learning and academic performance in virtual reality-based education: A review study

Sanaz Tayyebinezhad[1], Alireza Aminisefat[2], seyed masod hoseini[3]
1. Department of Medical Education, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Student Research Committee, Faculty of Medicine, Zabol University of Medical Sciences University, Zabol, Iran
3. Department of Medical Education, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: With the growing application of Virtual Reality (VR) in education, identifying factors contributing to cybersickness and proposing practical solutions to mitigate its effects in educational environments has become a research necessity. This systematic review aims to examine the impact of cybersickness (CS) on learning and academic performance in VR-based educational settings.
Methods: Using keywords such as virtual reality, cybersickness or motion sickness, learning, academic performance, and their English equivalents, reputable databases including PubMed, Scopus, ScienceDirect, SID, and the Google Scholar search engine were examined within the 2020–2025 timeframe. Following the application of article selection criteria, 23 eligible studies were reviewed. The PRISMA guidelines were used to assess the quality of the articles.
Results: Cybersickness (CS), characterized by symptoms such as nausea (74%), dizziness (68%), and eye fatigue (45%), reduces learning and academic performance by up to 25%. Contributing factors include technical parameters (rendering latency, wide field of view) and individual characteristics (gender, age, migraine). Mitigation strategies include technical optimization, short training sessions, balance exercises, and diagnostic tools such as CSQ-VR.
Conclusion: Based on the reviewed studies, eliminating cybersickness symptoms entirely during VR-based education for all users is not feasible. However, effective management of cybersickness throughout the learning process can enhance the overall educational experience in VR environments.
Keywords: Virtual reality, Cybersickness OR Motion sickness, Education, Learning Students, Academic Performance.

P358, Molecular insights into the paradoxical effects of berberine during pregnancy: In silico investigation

Mohammad Pouya Baghshani[1], Malihe Akhavan[2], Zohreh Esam[3]
1. Student Research Committee, Faculty of pharmacy, Babol University of Medical Sciences, Babol Iran
2. Pharmaceutical Sciences Research Center, Department of Medicinal Chemistry, Faculty of Pharmacy, Mazandaran University of Medical Sciences, Sari Iran
3. Department of Medicinal Chemistry, Faculty of Pharmacy, Babol University of Medical Sciences, Babol Iran

Background: Iran faces a significant decline in fertility rates. Preventing unwanted pregnancy loss is a major strategy to address this issue. Berberine, a benzylisoquinoline alkaloid, and Chicoric acid, a polyphenolic compound found in Berberis vulgaris, have shown protective effects against LPS-induced abortion, mainly due to their anti-inflammatory and antioxidant properties. This study investigates the potentially contradictory actions of Berberine via sex hormone and prostaglandin-related receptors.
Methods: We explored interactions of Berberine and Chicoric acid with Progesterone, Prostaglandins E1 (PE1), and E2 receptors. Protein models (PDB IDs: 4OAR, 6M9T, 5F19, 1NHZ, 6NUQ) were prepared. Ligand geometries were optimized, and docking was performed using AutoDock Vina to predict binding affinities and modes. The dynamic stability of ligand–target complexes was assessed by RMSD values and binding free energy estimation via the MMPBSA approach.
Results: Berberine, but not Chicoric acid, showed favorable binding to PE1 receptors (binding affinity 8.47 kJ/mol) through lipophilic interactions. Both compounds interacted with glucocorticoid and progesterone receptors (binding affinities -6.86 to -8.19 kJ/mol). Berberine formed a pi-pi interaction with Phe778 in the progesterone receptor and hydrophobic interactions with the glucocorticoid receptor. Chicoric acid formed multiple hydrogen bonds with key residues in both receptors. MMPBSA analysis revealed energetic contributions to complex stability.
Conclusion: Berberine-induced abortion may be related to PE1 receptors, similar to misoprostol, and its stable interactions highlight Berberine as a scaffold for novel ligand design. Chicoric acid, confirmed as a pregnancy-protecting agent, forms stable complexes with progesterone and glucocorticoid receptors but not PE1. Further experimental studies are needed.
Keywords: Berberine, Chicoric acid, Abortion, Progesterone receptor, Prostaglandin receptor

P359, Bioinformatics insights into the molecular basis of neurological involvement in monkeypox infection

Amir Hossein Barjasteh[1], Hanieh Latifi[1], Ali Sepehrinezhad[2,3]
1. Student Research Committee, Mashhad University of Medical Sciences, Mashhad, Iran
2. Neuroscience Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Neuroscience, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Monkeypox is an emerging zoonotic viral disease that has gained global attention following recent outbreaks. In addition to its typical dermatological symptoms, a subset of patients experience neurological manifestations such as headache, myalgia, fatigue, and photophobia. Despite increasing clinical reports, the molecular mechanisms linking monkeypox infection to neurological involvement remain insufficiently characterized. This study aimed to identify shared genes and molecular pathways associated with monkeypox and its neurological manifestations using a comprehensive bioinformatics approach.
Methods: Genes related to monkeypox infection and neurological symptoms were retrieved from the GeneCards database. Overlapping genes were identified and used to construct protein-protein interaction networks via the STRING database and Cytoscape software. Hub genes were selected based on topological analysis. Functional enrichment analyses, including biological processes, molecular functions, and signaling pathways, were performed using ToppGene. In addition, associated microRNAs, transcription factors, immune cell involvement, and potential therapeutic drugs were explored.
Results: Ten key hub genes (CD55, CXCL1, NFKB1, CXCL8, CD4, IL6, MX1, CFH, KLRK1, and CD46) were identified as common molecular links between monkeypox infection and neurological manifestations. Several additional genes were also highlighted as potentially relevant novel predicted genes. Enrichment analyses revealed that these genes are predominantly involved in immune response regulation, inflammatory signaling, complement activation, and neuroinflammatory pathways.
Conclusion: This bioinformatics-based study suggests that immune-mediated and inflammatory mechanisms play a critical role in the development of neurological manifestations associated with monkeypox infection. The identified hub genes and pathways may serve as potential biomarkers or therapeutic targets. Further experimental and clinical studies are warranted to validate these findings and to explore targeted intervention strategies.

P360, Molecular docking insights into heterocyclic sulfonamide derivatives binding with human serum albumin

Amin Esmaeily[1], Jamshidkhan Chamani [2], Mohammadreza Saberi [3]
1. Department of Biology, Faculty of Basic Sciences, Ferdowsi University of Mashhad, Mashhad, Iran
2. Department of Biology, Faculty of Basic Sciences, Islamic Azad University, Mashhad Branch, Mashhad, Iran
3. Medical Chemistry Department, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Heterocyclic sulfonamide derivatives (HS1, HS2, HS3) exhibit promising anticancer and antibacterial properties. Understanding their binding mechanisms with Human Serum Albumin (HSA)—the primary carrier protein in blood plasma—is crucial for pharmacokinetic optimization.
Methods: Molecular docking simulations were performed using MOE software (Chemical Computing Group). The crystallographic structure of HSA (PDB: 1AO6) was obtained from the RCSB Protein Data Bank. Ligand structures were energy-minimized, protonated, and docked into HSA binding sites. Binding energies and interaction distances were calculated using DS Visualizer.
Results: Binding Affinity: HS2 showed the strongest binding to HSA with a binding energy of −16.35 kcal/mol, outperforming HS1 (−13.31 kcal/mol) and HS3 (−11.01 kcal/mol). Binding Sites: All ligands bound primarily to subdomains IIA and IIIA of HSA, with key interactions involving polar (Gln, Tyr), acidic (Glu, Asp), and basic (Lys, Arg) residues. Distance to Trp-214: HS2 had the shortest distance (12.39 Å) to the critical fluorophore residue Trp-214, correlating with experimental fluorescence quenching data. Residue Involvement: HS2 formed extensive interactions with 11 residues across domains IB, IIA, and IIIA, including hydrophobic (Val, Ala), polar (Gln, Asn), and charged (Arg, Glu) amino acids.
Conclusion: HS2 demonstrates superior binding affinity and optimal proximity to Trp-214, suggesting enhanced stability in HSA complexes. These computational insights support HS2's potential as a lead candidate for anticancer drug formulation, with implications for dosing efficiency and delivery optimization.
Keywords: Human Serum Albumin, Heterocyclic sulfonamide derivatives, Molecular docking

P361, The role of psychological resilience in the primary prevention of addiction with an emphasis on nursing interventions: A systematic review

Azadeh Banezhad[1]
1. School of Nursing, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Substance abuse remains a major public health concern with significant individual and societal consequences. Primary prevention, especially during adolescence and early adulthood, is essential in reducing the incidence of addiction. Psychological resilience is considered a protective factor against substance use. Nurses, as key healthcare providers, play an essential role in implementing interventions aimed at strengthening resilience in at-risk populations
Methods: This systematic review aimed to investigate the role of psychological resilience in the primary prevention of substance abuse, with a specific focus on nursing interventions
Results: Fifteen studies met the inclusion criteria. The findings indicated that nursing interventions such as resilience training, emotional support, counseling, and skills-based education were effective in enhancing psychological resilience and reducing the risk of substance use. These interventions were particularly effective in educational settings, community health programs, and among high-risk populations**.**
Conclusion: Psychological resilience can serve as a key protective factor in the primary prevention of addiction. Nurse-led interventions have demonstrated promising outcomes in promoting resilience and preventing substance use. Expanding such interventions within health systems is strongly recommended, especially in high-risk communities.
Keywords: Psychologic alresilience, addiction, primaryprevention, nursing, systematic review, nursing intervention

P362, Machine learning prediction of input resistance alterations in cerebellar purkinje cells under whole-cell current-clamp recording

Reyhaneh Parvaneh[1], Kiana Abbassian[2], Elaheh Aminyazdi[3], Mahdieh Jajroudi[1]
1. Medical School, Department of Medical Informatics, Mashhad University of Medical Science
2. Ferdowsi University, Department of English Linguistics, Mashhad, Iran
3. School of Medicine, Mashhad University of Medical Science

Background: Accurate measurement of input resistance (Rin) in cerebellar Purkinje cells is essential for understanding neuronal excitability but is time-consuming and sensitive to experimental variability. We evaluated whether machine learning (ML) models can reliably predict Rin changes in additional hyperpolarizing current steps from whole-cell current-clamp recordings.
Methods: Whole-cell current-clamp recordings were obtained from Purkinje cells in three conditions: Control, Harmaline (30 mg/kg), and Rimonabant (10 mg/kg). Hyperpolarizing current steps (−0.01 to −0.05 nA) were applied (300–500 ms) and ΔV measured during the last 100 ms. Linear extrapolation produced classical predictions for −0.06 and −0.07 nA. Three regression ML models (linear regression, random forest, and feedforward neural network) were trained on ΔV versus I with experimental group as a categorical feature; models were validated using cross-validation. Predicted ΔV values were converted to Rin (Rin_pred = ΔV_pred / |I|).
Results: Group-averaged classical extrapolations indicated reduced Rin in Harmaline-treated cells and partial restoration by Rimonabant. ML models produced ΔV predictions closely matching linear extrapolation while revealing subtle nonlinearities in Harmaline and Rimonabant groups. The neural network model captured the greatest group-specific variance. Predicted Rin values reflected the same group trends and highlighted greater variability in Harmaline-treated cells.
Conclusion: ML models can augment classical electrophysiological analysis by providing rapid, physiologically interpretable predictions of Rin. This hybrid approach enhances prediction accuracy, identifies nonlinear responses, and may reduce experimental workload. Larger datasets and prospective validation are recommended to strengthen generalizability.
Keywords: Purkinje cells, Input resistance, Machine learning, Current-clamp, Electrophysiology

P363, The latest achievements of CRISPR in disease treatment

Fatemeh Nikomanesh[1], Fatemeh Pourhakim[1], Mahta Ranjkeshzadeh[1], Hanieh Milanizadeh[1], Narjes khatoon Tayebi[1], Zafar Gholinejad[1]
1. School of Medical Sciences, Islamic Azad University, Urmia, Iran

Background: *"CRISPR"* (Clustered Regularly Interspaced Short Palindromic Repeats) is a groundbreaking genome editing method derived from a bacterial immune response to viruses, enabling precise alterations to particular genes. Regarding the applications of *CRISPR-Cas9* in medical science scientists successfully eliminated extra copies of chromosome 21 in Down syndrome cell lines. Also, they have developed *CRISPR*- based diagnostic tools for *COVID-19*,.. The sole drug using the *CRISPR* system (the most expensive drug) is Betibeglogene autotemcel (*Zynteglo*). It is for patients with *beta thalassemia*.
Methods: We conducted a search through PubMed, MEDLINE, and other databases using keywords like *Crispr*, clinical trials, and recent advances. In this article, we aim to review the latest discoveries (last five years) concerning *CRISPR*.
Results: According to Statista, efficiency of *CRISPR*-mediated gene editing is increasing, showing success rates ranging from 50% to 90% across different studies, while more than 100 clinical trials globally are yielding encouraging outcomes for targeting genetic disorders,
Conclusion: While *CRISPR*, has transformed genetic engineering, it brings numerous serious issues that demand thorough attention. Some of significant worries involves unintended changes to non-target genes, vigorous ethical discussions, long-term effects of genetic changes These uncertainties underscore the necessity for strict regulation and additional research prior to the widespread implementation of the technology in clinical settings. This ongoing advancement will allow *CRISPR* to make it possible to treat more diseases.
Keywords: *CRISPR*, clinical trials, recent advancements

P364, Self-Medication Practices and Their Consequences

Maryam Hosseini MohammadAbad[1]
1. IslamicAzad University, Quchan Branch , Quchan, Iran

Background: Self-medication, the use of drugs without professional consultation, is a global health concern, particularly in regions with limited healthcare access or cultural acceptance of self-treatment. Common reasons include cost-saving, convenience, and reliance on previous prescriptions. However, misuse of medications like antibiotics, painkillers, and psychotropic drugs can lead to severe complications, including antibiotic resistance, adverse reactions, and delayed diagnosis of serious illnesses.
Methods: This review analyzed peer-reviewed studies (2015–2023), WHO reports, and national health surveys to assess self-medication trends and their impacts. Data from countries such as Iran, India, and Brazil were included to highlight regional variations.
Results: Globally, 30–70% of populations engage in self-medication, with higher rates in low-income countries. In Iran, studies report 40–70% prevalence, involving easy access to pharmacies or informal markets. Cultural trust in traditional remedies. Lack of awareness about drug risks. Consequences include antibiotic resistance (e.g., misuse of amoxicillin), liver/kidney damage from painkillers, and masking of underlying diseases like cancer.
Conclusion: Self-medication poses significant public health risks. Addressing it requires stricter regulation of over-the-counter drug sales, public education campaigns, and improved access to affordable healthcare. Collaboration between governments, healthcare providers, and organizations like the WHO is critical to reducing harm.
Keywords: Drug therapy, Self-Care, Self-Medication, Therapeutics.

P365, Designing novel TAAR binding site agonists: insights from molecular docking, structure-based design, virtual screening, and molecular dynamics simulation

Ali Hakimi[1], Mohammad Jalili-Nik[1], Mohaddeseh Sadat Alavi [2]
1. Department of Clinical Biochemistry, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Pharmacological Research Center of Medicinal Plants, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Trace amine-associated receptors (TAAR) are a family of GPCRs that have various functions, such as olfactory and immune function. They play essential roles in regulating monoamine neurotransmitter systems, which can be modulated by medicines. Some TAAR agonists are being investigated as potential treatments for psychiatric disorders such as schizophrenia. Ulotaront, as a TAAR agonist, has completed Phase 2 clinical trials and is currently in Phase 3 clinical trials for the treatment of schizophrenia. It has also been in Phase 2/3 clinical trials for the adjunctive treatment of major depressive disorder (MDD) and generalized anxiety disorder (GAD). The objective of this study was to employ a computational approach to develop novel TAAR agonist small molecules with improved interactions in the receptor binding pocket.
Methods: A total of 34 compounds reported in the literature as TAAR agonists were docked into TAAR1 models, which were created from the prepared 7BU6 crystal structure. Compounds showing favorable interactions and docking scores were selected for further structure-based design and ligand-based screening.
Results: Among the docked molecules, 21 compounds showed favorable and better Chemscore fitness than ulotaront. These compounds were used for structure-based design, resulting in 828 retrieved analogs. Through molecular docking and interaction analysis, 5 promising compounds with favorable binding affinities to the TAAR1 binding site were selected (Apomorphine-15, Lysergide-3, Lysergide-5, Ralmitaront-6, Tryptamine-7). Ligand-based virtual screening identified additional candidate compounds exhibiting enhanced potency and favorable predicted ADME profiles (PubChem CID_69705423, PubChem CID_171777241, PubChem CID_17257785, and PubChem CID_172577993).
Conclusion: Molecular dynamics simulations demonstrated stable interactions between TAAR1 and the top-ranked ligands, supporting their potential as effective TAAR1 agonists. These findings highlight promising molecular scaffolds for further optimization and development of novel therapeutic agents targeting psychiatric disorders.
Keywords: TAAR1, Ulotaront, Molecular docking, Virtual screening, Schizophrenia

P366, A Systematic review on the role of virtual and augmented reality in physiology and pharmacology education

Amir Ehsan Heydari Deloi [1], Negin karami[2], Reyhaneh Jamshidian Rashtkhar [3], Sadaf Afkhami Pirabarji[4], Mohammad Reza Mazaheri Habibi[5]

1. Medical Informatics, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Management and Health Information Technology, School of Management and Medical Information Sciences, Isfahan University of Medical Sciences, Isfahan, Iran
3. Department of Health Information Technology, Varastegan Institute for Medical Sciences, Mashhad, Iran
4. Department of Biomedical Engineering, Faculty of Basic Sciences, Islamic Azad University, Mashhad Branch, Iran
5. Department of Health Information Technology, Varastegan Institute for Medical Sciences, Mashhad, Iran

Background: Immersive technologies like virtual reality (VR) and augmented reality (AR) are being adopted in medical education to provide 3D visualizations and active learning environments. In physiology and pharmacology, these technologies may clarify spatial and functional complexities, offering learners a more intuitive grasp of multi-level mechanisms.

Methods: A PRISMA-based systematic review was conducted using PubMed, Scopus, and Web of Science to identify studies published between 2018 and 2025. Searches targeted keywords such as “virtual reality,” “augmented reality,” “physiology,” “pharmacology,” and “education.” Eligible studies included preclinical interventions with measurable learning outcomes.

Results: In this systematic review, 35 studies were selected from 919 retrieved records, focusing on the use of virtual and augmented reality in physiology and pharmacology education. Most studies reported enhanced learner engagement, improved conceptual understanding, and high satisfaction. Although meta-analysis did not show statistically significant improvements in post-test scores, virtual reality demonstrated a more favorable trend than augmented reality. Learner satisfaction exceeded 90%, though around 8% of users experienced side effects such as dizziness and nausea. The main implementation barriers included high equipment costs and the need for technical infrastructure.

Conclusion: This systematic review suggests that virtual and augmented reality hold promise as innovative tools for enhancing the quality of physiology and pharmacology education. Although the impact on post-test scores was not statistically significant, immersive and interactive environments positively influenced learner engagement, motivation, and conceptual understanding. Virtual reality showed a more favorable trend compared to augmented reality. Nonetheless, challenges such as high costs, technical infrastructure requirements, and occasional physical discomfort remain. With advancements in affordable technologies and optimized instructional design, these tools can play a transformative role in the future of medical education.

Keywords: Medical Education, Virtual Reality, Augmented Reality, Physiology, Pharmacology

P367, The role of artificial intelligence in the advancement of pharmacology toward 2030: A review article

Reza Dehghani[1]
1. Department of Pharmacology, Bam University of Medical Sciences, Bam, Iran

Background: Artificial Intelligence (AI) is reshaping pharmacology, offering groundbreaking solutions for drug discovery, personalized medicine, and process optimization. By leveraging advanced computational models and big data, AI promises to enhance efficiency and precision in pharmaceutical research, setting the stage for transformative advancements by 2030.
Methods: This article synthesizes insights from peer-reviewed literature sourced from Google Scholar and PubMed, focusing on AI applications in drug discovery, personalized treatment design, and clinical trial optimization. The analysis projects AI's impact by 2030, incorporating machine learning, big data analytics, and ethical considerations to evaluate its potential and challenges.
Results: AI-driven technologies, including deep learning, have accelerated the identification of novel drug candidates with high precision. In personalized medicine, AI's ability to integrate genomic and proteomic data enables tailored therapies, improving patient outcomes and minimizing adverse effects. Furthermore, AI optimizes clinical trials by enhancing patient selection and predicting risks, though challenges such as data quality and ethical concerns remain.
Conclusion: By 2030, AI is poised to become integral to pharmacology, streamlining drug development and enhancing therapeutic outcomes. Addressing current challenges through interdisciplinary collaboration will unlock AI's potential, heralding a new era of pharmaceutical innovation.
Keywords: Artificial Intelligence, Pharmacology, Drug Discovery, Precision Medicine, Machine Learning

P368, Reprogramming laccase catalysis: Advances in enzyme engineering for pharmaceutical and biomedical applications

Behnam Rafei[1], Faezeh Sabet[2,3], Mohammad Javad Farhangi[4], Kiarash Ghazvini[2,3], Mohammadreza Nassiri[1]

1. Department of Animal Science, College of Agriculture, Ferdowsi University of Mashhad, Mashhad, Iran
2. Antimicrobial Resistance Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Microbiology and Virology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
4. Department of Biology, Faculty of Basic Sciences, Islamic Azad University of Mashhad, Mashhad, Iran

Background: Laccases (EC 1.10.3.2) are multicopper oxidases with broad substrate specificity and important applications in pharmaceutical and biomedical fields including selective oxidation, detoxification, biosensing and drug biotransformation. However, native laccases often exhibit limited stability, low efficiency under physiological conditions and reduced activity toward pharmaceutical substrates. These limitations have driven the development of engineered laccases to improve catalytic performance, stability and practical applicability.

Methods: Laccase activity depends on a trinuclear copper cluster, while surrounding residues regulate electron transfer, substrate binding and enzyme stability. Structure-guided engineering has enabled targeted modification of these regions to optimize enzyme function. Protein and bioinformatics-based approaches such as rational mutagenesis have improved catalytic efficiency for drug synthesis and detoxification. Additionally, immobilization on metallic nanoparticles has facilitated the development of laccase-based biosensors for drug detection and monitoring.

Results: At the mutation level, specific amino acid substitutions have produced marked functional improvements. In Bacillus licheniformis CotA-laccase, combined random and site-directed mutations such as K316N and D500G increased soluble expression and enhanced ferulic acid dimerization, supporting precursor synthesis. In Pycnoporus cinnabarinus, α-leader engineering combined with N208S and P394H mutations resulted in a dramatic activity increase and a shift toward neutral pH, improving oxidative drug transformation. Mutations introduced into Bacillus pumilus, Clostridium thermocellum, and Coriolopsis unicolor laccases enhanced catalytic efficiency, thermostability and pH tolerance, enabling effective pharmaceutical effluent treatment and biopharmaceutical catalysis.

Conclusion: laccase engineering has advanced toward precision-guided redesign by integrating structural insights, computational tools and synthetic biology enabling sustainable biocatalysts for pharmaceutical and biomedical applications.

Keywords: Laccase, Biocatalysis, Protein Engineering, Biotransformation, Biosensing Techniques.

P369, In silico investigation of saffron's non-volatile constituents on male and female fertility: Molecular ɔnsights

Tanin Sadat Rezaei[1], Malihe Akhavan[2], Zohreh Esam[3]
1. Student Research Committee, Faculty of pharmacy, Babol University of Medical Sciences, Babol Iran
2. Department of Medicinal Chemistry, Pharmaceutical Sciences Research Center/Faculty of Pharmacy, Mazandaran University of Medical Sciences, Sari, Iran
3. Department of Medicinal Chemistry/ Faculty of Pharmacy, Babol University of Medical Sciences, Babol, Iran

Background: Saffron (*Crocus sativus*), extensively cultivated in Iran, is traditionally used for medicinal purposes. It has also been introduced as a means of improving sperm motility and as a promising agent for treating premature ejaculation. This research aims to investigate the efficacy potential of Saffron's major non-volatile bioactive compounds on key enzymes and receptors related to fertility and pregnancy in both male and female reproductive systems.
Methods: The binding potential of carotenoid Crocin, flavonoid Crocetin, monoterpene glycoside Picrocrocin, and others was investigated against the crystal structures of human follicle-stimulating hormone receptor, prostaglandins E1/E2, progesterone and glucocorticoid receptors, androgen receptor, and 13 key targets in male infertility (including Akt1 kinase, estrogen receptor 1, and protein kinase Src; PDB IDs: 3WCU, 6M9T, 6AK3, 4OAR, 2OVH, 1NHZ, 2Q7K, 3CQU, 1QKU, 1O4I). Molecular docking was performed using AutoDock Vina, with results validated by molecular dynamics simulations.
Results: Contrary to expectations, only Picrocrocin formed a promising complex with the EP3 receptor (binding energy -7.89 kJ/mol), similar to Misoprostol, via multiple hydrogen bonds. Picrocrocin also formed stable complexes with progesterone, glucocorticoid, and androgen receptors, with docking scores of -7.88, -8.10, and -7.96 kJ/mol, respectively. Key amino acid residues mediate binding, and molecular dynamics with validated parameters confirms stability.
Conclusion: The results of this study identify Picrocrocin as a promising multi-target ligand for addressing impotence and infertility. Picrocrocin emerges as a promising multi-target candidate for treating impotence and infertility, and—with structural optimization—may also offer pregnancy-protective benefits worth further study.
Keywords: Saffron, Fertility, Crocin, Crocetin, Picrocrocin

P371, The role of artificial intelligence in simulating epidemiological models for training on rational antibiotic use and preventing resistance on farms

Saeideh Naeimi[1], Fatemeh Sadat Seif Hashemi[2], Arman Babaee Monir[2]
1. Associate Professor of Pharmacology, Department of Basic Sciences, Faculty of Veterinary Medicine, Semnan University, Semnan, Iran
2. Doctor of Veterinary Medicine (DVM) Student, Faculty of Veterinary Medicine, Semnan University, Semnan, Iran

Background: Antimicrobial Resistance (AMR) is an increasing global threat to public health and food security, with livestock systems contributing significantly due to high antibiotic use. Reports indicate that irrational or uninformed antibiotic administration accelerates the development of resistance. Recent findings suggest that Artificial Intelligence (AI) and Machine Learning (ML) can predict emerging AMR patterns earlier than traditional methods and support more effective antibiotic stewardship programs. Broader analyses have shown that ML can enhance treatment-outcome prediction and improve detection of resistance patterns. In veterinary medicine, AI applications have been reported to aid farm management, detect infectious diseases, and forecast outbreaks. Experts emphasize that integrating AI within a One Health framework requires reliable data and interdisciplinary collaboration across human, animal, and environmental health sectors.
Methods: This study utilized ML algorithms, including Neural Networks and Agent-Based Models (ABMs), to develop interactive simulators. These tools model diverse farm scenarios, such as herd size, hygiene protocols, and antibiotic usage patterns, and predict the long-term impact of therapeutic decisions on AMR prevalence and herd health.
Results: Students using the AI-based simulators demonstrated improved recognition of AMR risk factors, selection of optimal interventions, and understanding of epidemiological outcomes. The models provided immediate and precise feedback, enhancing learning compared to traditional teaching methods.
Conclusion: Integrating AI-driven simulations into veterinary training bridges the gap between theoretical pharmacology and practical decision-making. These tools foster data-driven antimicrobial stewardship, prepare students to minimize resistance development, and cultivate a culture of responsible antibiotic use.
Keywords: Antimicrobial Resistance, Artificial Intelligence, Epidemiological Modeling, Antimicrobial Stewardship

P372, Application of rapid sequence induction in emergency abdominal surgery: A casereport from a trauma center in Iran

Mahdi saghiri ganjeh[1], Nadia Roozbakhshian[2], Bahareh Hakiminia [3], Bahare Firouzbakht [4]
1. School of medican (medical student), Semnan University of Medical Sciences, Semnan, Iran
2. Student Research Committee, Shiraz University of Medical Sciences, Shiraz, Iran
3. Department of Clinical Pharmacy, School of Pharmacy, Semnan University of Medical Sciences, Semnan, Iran
4. Department of Anesthesiology, School of Nursing and Midwifery, Shiraz University of Medical Sciences, Shiraz, Iran

Background: Emergency laparotomy (EL) is often associated with a significant risk of gastric content aspiration, a potentially fatal complication during anesthesia. To mitigate this danger, rapid sequence induction (RSI) is recommended as the preferred technique for airway management in such critical settings.
Methods: We describe the case of a 50-year-old man presenting with abdominal trauma and active intra-abdominal hemorrhage. The patient underwent an urgent laparotomy in a trauma facility in Iran, where RSI was employed for anesthesia induction due to his unstable condition.
Discussion: This case demonstrates that RSI, utilizing ketamine for induction followed by succinylcholine as a neuromuscular blocker, can be a safe and effective approach in emergency surgical settings, particularly in patients with compromised hemodynamic status.
Keywords: Trauma, Emergency laparotomy, Anesthesia induction, Ketamine, Succinylcholine, RSI

P375, Computational analysis of N-acetylcysteine's effects on Alzheimer's disease: Identification of potential targets and molecular pathways

Saber Ghaderpour[1], Gholamreza Hassanzadeh[1, 2, 3], Tahmineh Mokhtari[4]
1. Department of Neurosciences and Addiction Studies, School of Advanced Technologies in Medicine, Tehran University of Medical Sciences, Tehran, Iran
2. Department of Anatomy, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
3. Department of Digital Health, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
4. Department of Entomology and Nematology and UCD Comprehensive Cancer Center, University of California, Davis, California, USA

Background: Alzheimer's disease (AD) is a progressive neurodegenerative disorder characterized by complex molecular and cellular pathologies, necessitating novel therapeutic strategies. N-acetylcysteine (NAC), known for its antioxidant and anti-inflammatory properties, has shown potential as a therapeutic agent for AD.
Methods: This study employs computational approaches to identify NAC's molecular targets and pathways in AD, aiming to elucidate its therapeutic mechanisms. Potential molecular targets of NAC in AD were identified using bioinformatics. Protein-protein interaction (PPI) networks were constructed for the top 10 genes. Gene Ontology (GO) and Kyoto Encyclopedia of Genes and Genomes (KEGG) pathway analyses were performed to identify enriched biological processes and pathways. Molecular docking simulations were conducted to evaluate NAC's binding affinity to proteins encoded by the identified genes. Ten key genes (CASP3, TLR4, NFKB1, PTGS2, ACE, CXCR4, MTOR, MAPK1, CTSB, HIF1A) were identified as potential NAC targets in AD. PPI analysis revealed strong functional interactions among these genes, implicating roles in neuroinflammation, oxidative stress, and synaptic dysfunction.
Results: GO and KEGG analyses highlighted significant enrichment in the IL-17 signaling pathway. Molecular docking demonstrated favorable binding affinities of NAC to target proteins. This computational study identifies key genes and pathways, notably the IL-17 signaling pathway, as potential mediators of NAC's therapeutic effects in AD.
Conclusion: The findings suggest NAC modulates neuroinflammatory and neurodegenerative processes, providing a foundation for further experimental validation and potential clinical application in AD treatment.
Keywords: N-acetylcysteine, Alzheimer Disease, Computational Biology, Molecular Docking

P377, Ethics in the use of artificial intelligence in medicine

Arshida Mahmoodi[1], Ghomali Jelodar[2]
1. Sampad, Farzanegan 4, Tehran, Iran
2. Department of physiology, College of Veterinary Medicine, Shiraz University, Shiraz, Iran

Background: The applications of artificial intelligence (AI) in medicine have expanded from research and development to operating rooms and administrative domains. Nevertheless, public skepticism remains regarding its full acceptance.
This paper aims to clarify the ethical concerns associated with the use of AI in the healthcare sector and to propose strategies that enable optimal utilization of this technology without compromising ethical principles.
Methods: This article presents a comprehensive review of AI in medicine, examining its technical capabilities, practical applications, and ethical implications. Perspectives from both technical and practical standpoints are discussed. Using the AGREE II instrument, the quality of guidelines was evaluated.
Results: The present review identifies several advantages of AI in medicine, including enhanced diagnostic accuracy, improved surgical outcomes, and optimization of healthcare service delivery. Findings revealed strong performance in domains such as scope, purpose, and editorial independence; however, significant variability was observed in applicability and rigor of development. Nonetheless, major ethical challenges persist, including algorithmic bias, lack of transparency, data privacy concerns, and the potential erosion of healthcare professionals' skills and humanistic values in patient care.
Conclusion: The collective insights from the reviewed studies offer valuable perspectives to inform and guide ethical considerations in the integration of AI into medicine. AI has the potential to make the world a healthier place. Therefore, AI should be regarded as a complementary and empowering tool in clinical decision-making, not as a substitute for the human element and medical ethics.
Keywords: Ethics, Artificial Intelligence, Healthcare, Challenges, Solutions

P378, Challenges of using artificial intelligence in physiology education

Roham Mazloom[1], Sajad Pashootan Shayesteh[1]
1. Department of Physiology-Pharmacology-Medical Physics, School of Medicine, Alborz University of Medical Sciences, Karaj, Alborz Province, Iran

Background: The expansion and increasing use of artificial intelligence (AI) in physiology has created new opportunities for learning and optimizing existing resources. However, the pitfalls of using AI have led to a decrease in the quality of education and a loss of educational integrity, especially for students and instructors alike.
Methods: A systematic review of the PubMed, Scopus, and Web of Science databases was conducted up to 2025 to examine AI applications in physiological education. The inclusion criteria for the present study were empirical research, reviews, and researcher comments that discussed the limitations, biases, and risks of using AI-based educational tools.
Results: The reviewed articles highlighted five main pitfalls: (1) the spread of information that is not necessarily correct and biases resulting from incomplete educational data, which can lead to incorrect educational outcomes; (2) a depletion of critical thinking and analytical skills among students who depend on AI-generated content; (3) concerns about loss of privacy and leakage of students' personal information; (4) a decline in academic integrity, such as plagiarism and citing invalid material generated by artificial intelligence; and (5) misunderstanding of biological functioning models, especially with deep learning methods, which can hinder understanding of physiological processes.
Conclusion: Although AI can be an important new facilitative tool in physiology education, its pitfalls, such as bias, inaccuracies, and ethical or privacy issues, should be considered. It is the responsibility of instructors to construct AI literacy, promote critical thinking about AI-generated content, and establish clear frameworks to maintain educational standards.
Keywords: Artificial intelligence, Physiology education, Educational pitfalls

P380, Physiological manifestations in strategic decision-making under conditions of uncertainty: Insights from the iowa gam-bling task

Elahe Yaghoubian[1], Ali Moghimi[2], Morteza Izadifar[3], Hamidreza Kobravi[4] and Nilufar Totonchi[5]
1. Rayan Research Center for Neuroscience & Behavior, Dept. of Biology, Faculty of Science, Ferdowsi University of Mashhad, Iran
2.Rayan Research Center for Neuroscience & Behavior, Dept. of Biology, Faculty of Science, Ferdowsi University of Mashhad, Iran
3.The Institute of Human Aesthetics, Coburg University of Applied Sciences & Art and Bamberg University, Am Hofbräuhaus 1, 96450 Coburg, Germany
4. Dept. of Biomedical Engineering, Faculty of Engineering, Islamic Azad University, Mashhad, Iran
5. Rayan Research Center for Neuroscience & Behavior, Dept. of Biology, Faculty of Science, Ferdowsi University of Mashhad, Iran

Background: Decision-making is a key topic in cognitive sciences and neuroeconomics. While many studies have analyzed individual performance in the Iowa Gambling Task (IGT), few have examined the physiological manifestations during the task and their alignment with participants' strategies.
Methods: This study aimed to investigate decision-making under uncertainty in a stress-free environment (free from time constraints or emotional interventions) using a modified IGT. Twenty-eight participants (12 men, 16 women; age range: 21.96 ± 3.82 years) completed the task in five stages, with 50 trials in each stage. Four physiological signals (BVP: Blood Volume Pulse, temperature, Resp: Respiration (Rate) and SCR: Skin Conductance Response) were recorded.
Results: The average selection time decreased across stages. At first, participants preferred disadvantageous cards (A and B) but gradually shifted to advantageous cards (C and D). Initial stages showed a slight increase in body temperature and an LF/HF ratio above one, indicating increased sympathetic activity and physiological stress. As the task progressed, individuals adapted to the rules and adopted more optimal strategies. Stage 4 marked a turning point with significant decreases in SCR and an LF/HF ratio below one, reflecting reduced stress. In the final stage, decreased BVP and an LF/HF ratio of one indicated a balance between the sympathetic and parasympathetic systems.
Conclusion: Finally, it can be acknowledged that the task structure was useful in identifying the roles of the cards. Additionally, advancing in conditions of uncertainty through decision-making reflects a dynamic balance between neural systems related to reward and stress.
Keywords: Decision-making, Uncertainty, Physiological manifestations, Iowa Gambling Task, Autonomic balance

P381, MiR-27a as a potential glioma diagnostic marker: A deep learning approach

Zahra Haghshena[1], Elham Nazari[1]
1. Proteomics Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: Glioma is one of the most aggressive primary brain tumors in adults, often diagnosed at advanced stages due to the absence of effective early biomarkers. MicroRNAs (miRNAs), as post-transcriptional gene regulators, have emerged as promising candidates for cancer diagnostics. Among them, miR-27a has shown potential relevance in glioma detection.
Methods: This study analyzed 1,047 samples, including 1,012 glioma tissues and 35 normal brain tissues, to identify differentially expressed miRNAs using R packages. Machine learning approaches were applied to prioritize miRNAs with diagnostic potential. Focused analysis was conducted on miR-27a to evaluate its expression and biological significance. Functional annotation of its target genes and pathway enrichment analysis were performed using publicly available databases.
Results: miR-27a was significantly overexpressed in glioma samples compared to normal tissues. ROC curve analysis demonstrated its strong diagnostic performance, with notable sensitivity and specificity for distinguishing glioma from non-tumor tissues. Functional enrichment of miR-27a target genes revealed their involvement in key oncogenic pathways, such as G protein signaling and cell cycle regulation.
Conclusion: These results highlight miR-27a as a promising non-invasive biomarker for early glioma detection. Its dysregulation and association with cancer-related pathways also suggest potential as a therapeutic target. Overall, miR-27a may contribute to improving diagnostic accuracy and guiding future therapeutic strategies for glioma patients.
Keywords: MiRNAs, Machine Learning, Biomarkers, Glioma, Bioinformatics

P382, Elucidating the molecular basis of dapoxetine's rapid-onset "on-demand" efficacy in erectile dysfunction: An in silico study

Hamidreza Raoufinezhad[1], Malihe Akhavan[2], Mojtaba Tahmasbi[1], Zohreh Esam[3]
1. Student Research Committee, Faculty of pharmacy, Babol University of Medical Sciences, Babol Iran
2. Pharmaceutical Sciences Research Center, Department of Medicinal Chemistry, Faculty of Pharmacy, Mazandaran University of Medical Sciences, Sari Iran
3.Department of Medicinal Chemistry, Faculty of Pharmacy, Babol University of Medical Sciences, Babol Iran

Background: Low population growth in Iran is linked to widespread sexual health problems. Erectile dysfunction (ED) and premature ejaculation (PE) are the most common male sexual dysfunctions in Iran, affecting up to 56% and over 38% of men, respectively. Dapoxetine, a selective serotonin reuptake inhibitor (SSRI), is the only approved oral drug for PE. It increases intravaginal ejaculatory latency time (IELT), improves ejaculatory control, enhances satisfaction, and reduces distress. This study elucidates Dapoxetine's molecular mechanism to inspire new approaches to drug discovery in sexual health issues.
Methods: In this in silico study, protein targets—including human phosphodiesterase type 5 (PDE5) in complex with Avanafil/Sildenafil, the androgen receptor (AR), the catalytic domain of PDE5, nitric oxide synthase (NOS), and the crystal structure of human arginase-II (PDB IDs: 6L6E, 2H42, 2Q7K, 1T9R, 2FLQ, and 4IXU, respectively) —were protonated and assigned charges. AutoDock Vina predicted binding affinity and pose, MD/RMSD checked stability, and MMPBSA calculated binding free energy.
Results: Dapoxetine bound PDE5 with high affinity (−9.17 and −7.57 kcal/mol), forming pi-pi stacking interactions with key residues such as Phe786. Its Naphthyl moiety facilitated hydrophobic interactions with AR (−7.80 kcal/mol). NOS and Arginase-II also bound Dapoxetine (~−6 kcal/mol), involving critical residues His145, His160, and Asn158 in Arginase-II. Molecular dynamics simulations validated the most stable complex.
Conclusion: The current study identifies Dapoxetine as a promising multi-target ligand for ED and PE, potentially stimulating drug discovery and development for sexual dysfunctions which deserves further investigations.
Keywords: Dapoxetine, PDE5, Androgen receptor, Nitric Oxide synthase, Arginase-II

P383, Comparing escape room and conventional methods in medical students' learning, satisfaction, and perceptions in rational drug prescribing

Zahra Kiani [1,2], Kowsar Karimzade [3], Khaironnesa Ramazanzade [4]
1. Department of Pharmacology, Birjand University of Medical Sciences, Birjand, Iran,
2. Pharmaceutical Sciences Research Center, Birjand University of Medical Sciences, Birjand, Iran
3. Student Research Committee, Birjand University of Medical Sciences, Birjand, Iran
4. Faculty of Educational Science and psychology, University of Birjand, Birjand, Iran

Background: Game-based learning methods can increase engagement, motivation, and deeper understanding of course concepts. This study aimed to compare the effectiveness of an escape-room–based learning method with a case-based learning approach in improving learning outcomes, satisfaction, and perceptions of medical students in the rational drug prescribing course.
Methods: This study was conducted at Birjand University of Medical Sciences in two groups of internship medical students as intervention and control. The intervention group participated in an escape-room–based training activity after finishing the theoretical lecture of rational prescribing session, while the control group received a case-based training method. Both groups completed a pre-test, and a post-test to assess their learning. Quantitative data were analyzed using SPSS, while qualitative data were collected through a questionnaire and examined using conventional content analysis to capture students' perceptions and experiences.
Results: Quantitative findings demonstrated significant improvement in learning scores in both groups after the intervention; however, the difference between two methods was not statistically significant ($P > 0.05$). Qualitative analysis revealed that the escape-room activity created a more active, engaging, teamwork, and memorable learning experience.
Conclusion: Although learning was not different between the two methods, qualitative findings highlight the educational value of game-based approaches. Incorporating innovative, interactive strategies such as escape-room activities can enrich medical education and better align with the learning preferences of today's medical students.
Keywords: Game-based learning, Escape-room, Medical students, Rational drug prescribing

P384, Bacoside A targets in Alzheimer's disease: A network pharmacology investigation

Alireza Salmani[1], Mehdi Moghannizadeh Ahari[1], Amirsajad Jafari[2 3]
1. School of Veterinary Medicine, University of Tabriz, Tabriz, Iran
2. Department of Basic Sciences, School of Veterinary Medicine, Shiraz University, Shiraz, Iran
3. Medicial and Natural Products Chemistry Research Center, Shiraz University of Medical Sciences, Shiraz, Iran

Background: Alzheimer's disease (AD) is a progressive neurodegenerative disorder primarily due to amyloid-beta (Aβ) accumulation, tau hyperphosphorylation, oxidative stress, and neuroinflammation. Bacoside A from *Bacopa monnieri* exhibits strong neuroprotective effects via antioxidant, anti-inflammatory, and acetylcholinesterase inhibition, reducing Aβ plaques and enhancing memory. This study uses network pharmacology to investigate how bacoside A works across multiple targets in the Alzheimer's pathway, aiming to provide new therapeutic insights.
Methods: Targets of Bacoside A were predicted using SwissTargetPrediction and overlapped with Alzheimer's disease genes from the Open Targets Platform. This overlap analysis identified 95 shared proteins. A protein–protein interaction network was built in STRING and analyzed in Cytoscape. Topological and centrality features were assessed via NetworkAnalyzer, and GO (Gene Ontology) enrichment analysis identified enriched biological themes**.**
Results: Network analysis of Bacoside A-associated protein-protein interactions (PPIs) in Alzheimer's disease identified STAT3 (Signal Transducer and Activator of Transcription 3), CASP3 (Caspase-3), and JUN (c-Jun) as critical hub proteins. STAT3 exhibited the highest centrality: Betweenness 0.171, Closeness 0.621, Degree 38. CASP3 followed (0.082, 0.577, 34) and JUN (0.056, 0.566, 32). All had Eccentricity 3, indicating a tightly connected network. Neighborhood Connectivity ranged from 15.76 (STAT3) to 17.75 (JUN), indicating dense local clustering and functional interdependence among these nodes.
Conclusion: STAT3, CASP3, and JUN emerge as prime therapeutic targets for Bacoside A in Alzheimer's disease. Their central roles modulate inflammation (STAT3), apoptosis (CASP3), and stress-induced transcription (JUN). Targeting these hubs could enhance neuroprotective efficacy. In vitro and in vivo validation is essential to confirm clinical potential.
Keywords: Bacopa, Caspase 3, STAT3 Transcription Factor, Proto-Oncogene Proteins c-jun.

P385, Augmented reality tools for teaching rheumatology: making autoimmune joint and tissue damage finally click for students

Mohammad Mahdi Ajalli
1. Department of Medicine, Zanjan University of Medical Sciences, Zanjan, Iran

Background: Teaching the pathophysiology of rheumatoid arthritis and systemic lupus erythematosus has always been difficult. Learners often fail to bridge the gap between abstract immune dysregulation and the actual destruction of joints or organs. In the last five years a wave of augmented reality applications has appeared that let students overlay inflamed synovium onto their own hands. This systematic review gathers and evaluates the evidence on these AR interventions in health professions education from 2020 to 2025.
Methods: In our review we dug into PubMed along with Scopus and Google Scholar via targeted searches. Phrases tied to augmented reality got matched against ones dealing with rheumatoid arthritis or systemic lupus erythematosus. We included connective tissue ailments and health teaching as well. Studies made the cut only if they evaluated sustained learning, progress in applied abilities, or feedback.
Results: Every included study showed clear advantages for AR over conventional teaching. Three-month knowledge retention rates were typically 30-50% higher. Learners repeatedly said that watching synovial pannus grow in 3D or blocking cytokines with virtual drugs finally made the mechanisms click. When patient narratives were added to the AR scenarios empathy scores jumped noticeably. Challenges did surface. Not every institution had enough devices. Some students felt queasy after long sessions and several conservative faculties adopted the technology slowly.
Conclusion: The data strongly favour bringing augmented reality into connective tissue disease modules as early as possible. Experts in this area ought to prioritize creating consistent evaluation methods. They should develop affordable approaches as well.
Keywords: Augmented reality, Autoimmune rheumatology education, Rheumatoid arthritis teaching, Biologic therapies learning, Interactive pathophysiology

P386, Computational neuroscience for neuropharmacologists: models, processes and advantages

Qazal Esmaylpur[1], Kiarash Fekri[2]
1. Student Research Committee, Sarab Faculty of Medical Sciences, Sarab, Iran
2.Department of Paramedicine, Amol School of Paramedicine, Mazandaran University of Medical Sciences, Sari, Iran

Background: For years, the main focus of neuropharmacological studies has been the evaluation of ligand-receptor interactions and subsequent clinical outcomes throughout the nervous system. However, in recent years, other new approaches have been added to this field of research. Among the sciences whose connection with pharmacology can be very attractive to researchers is computational neuroscience. In this regard, this narrative review study is aimed at introducing the various areas of this type of research to those interested in this field.
Methods: For this purpose, reputable scientific databases were scrutinized and the resulting findings were categorized and reviewed.
Results: Based on the classified data, Dynamical systems were recurrently popular in the literature as well as Spiking Neural Network, Mean field and Neural Mass, Synaptic Plasticity and Multi-Scale Quantitative Systems Pharmacology models. Besides, connecting computational neuroscience to neuropharmacology brings out valuable outcomes through which drug repurposing, ethical efficiency, biomarker linkage, multi-scale integration and approaching personalized medicine can be mentioned. It is also important to note that, this interdisciplinary link dramatically reduce the costs related to the follow-up research, so that need to accelerate the research procedure on one hand and resource limitations on the other hand can economically justify the discussed scientific link.
Conclusion: Altogether, it seems that spending on this research field can be considered an investment and in better words a research priority for the related institutes and centers.
Keywords: Synaptic Plasticity, Systems Pharmacology, Neural Network, Mean field, Neural Mass

P387, Investigating the impact of English content on digital platforms on the brain structure of adolescents: A study from the perspective of neurophysiology of emerging media

Mostafa Amiri[1], Saman Asasi[2], Tahereh Sadeghifard[3]
1. Department of General Courses, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran
3. Master of Physics and Master of Nuclear Science, Mashhad Education Office, District Seven, Khorasan Razavi Education Organization, Mashhad, Iran

Background: In today's world, teenagers are at the forefront of digital media consumption. Media such as TikTok, Instagram, and YouTube, with their highly advanced algorithms and addictive designs, have changed not only the way they spend their time but also the cognitive and psychological structure of teenagers. This article attempts to examine the impact of constant exposure to English content in digital media on the structure of the adolescent brain from the perspective of neurophysiology and cognitive psychology and answer the question of whether this exposure can be an opportunity to strengthen the brain or a threat to its cognitive functions.
Methods: This review study examined the neurophysiological effects of exposure to English content using neuroscientific data published in databases such as Pubmed and Scopus. It also analyzed research related to second language learning, neural reward, and adolescent media behavior.
Results: fMRI and ECG studies have shown that repeated exposure to a second language on digital platforms leads to activation of areas such as the prefrontal cortex, hippocampus, and dopaminergic system of the brain. The reslts include: the adolescent brain and its special features, English as the format language of digital media, neurophysiological effects of second language learning on the adolescent brain, language interference and surface learning, and how can this effect be made positive?
Conclusion: Digital platforms today are no longer just entertainment tools; they have become part of the cognitive system of the teenage generation. The English language, which dominates most of these media, can be both an opportunity and a threat. If accompanied by the right educational and cognitive strategies, it may lead to increased neuroplasticity, enhanced memory, and second language learning. Finally, recognizing the fact that the adolescent brain is highly sensitive and malleable to language and digital content obliges us to adopt a conscious, scientific, and humane approach to education and media in the digital age.
Keywords: English, Adolescents, Neuroplasticity, Digital Media, Brain

P388, Evaluating quality of machine translation using artificial intelligence in pharmacology education: A systematic review

Mostafa Amiri[1], Behrad Shakeri[2], Tahereh Sadeghifard[3]
1. Department of General Courses, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran
3. Mashhad Education Office, District Seven, Khorasan Razavi Education Organization, Mashhad, Iran

Background: Applications of artificial intelligence are expanding in various scientific fields. Especially in recent years, with the introduction of user-friendly artificial intelligence tools such as ChatGPT and DeepSeek, these applications have received more attention than ever before. In the field of medical sciences, and in particular pharmacology, artificial intelligence tools have been welcomed in various fields such as education and research. In this article, research conducted in the field of evaluating the performance of artificial intelligence in pharmacology education, and especially the translation of texts in this field, has been studied and reviewed.
Methods: In this study, a total of 25 new research works on the application of artificial intelligence in the field of healthcare, and specifically pharmacology, as well as evaluating the effectiveness of artificial intelligence tools in translating pharmacology and related sciences texts, were reviewed and analyzed.
Results: By reviewing various research works and resources, the achievements of leveraging artificial intelligence in pharmacology education were identified and the opportunities and challenges of this field were reviewed, which are described in the article. Also, specifically, the accuracy of machine translation of pharmacology texts using artificial intelligence tools is evaluated and reported.
Conclusion: In this study, the opportunities and challenges of using new artificial intelligence tools in pharmacology education have been examined and analyzed, and the efficiency of machine translations of texts in this field has been evaluated.
Keywords: Pharmacology, Artificial Intelligence, Education, Translation

P389, Identification of differentially expressed genes and hub pathways in ileal Crohn's disease via integrated bioinformatics analysis

AidaToobchi [1], Narjes Seddighi [2], Roya Rahmani-[3]
1. Department of Health Information Technology, Student Research Committee, Khalkhal University of Medical Sciences, Khalkhal, Iran
2. Student Research Committee, Tabriz University of Medical Sciences, Tabriz, Iran,
3. Department of Health Information Technology, Khalkhal University of Medical Sciences, Khalkhal, Iran

Background: Crohn's disease (CD) is a chronic inflammatory disorder that mainly affects the terminal ileum and causes major complications. Despite the increasing incidence of CD, transcriptomic datasets specifically representing ileal involvement remain limited. This study applied integrated bioinformatics analysis to identify differentially expressed genes (DEGs) and key pathways driving ileal inflammation, aiming to highlight potential diagnostic biomarkers and therapeutic targets.
Methods: Two CD-related datasets (GSE102113 and GSE75214) were obtained from GEO. Ileal samples from CD patients and healthy controls were analyzed using R. Protein–protein interaction networks were constructed with STRING, and hub genes were identified through CytoHubba and the MCODE algorithm in Cytoscape. GO and KEGG enrichment analyses were performed using Enrichr.
Results: Analysis of the 154 samples revealed 390 significantly differentially expressed genes (DEGs), with 222 being up-regulated and 168 down-regulated. Integration of PPI topology and module analysis identified ten hub genes: IL6, IL1B, CXCL8, CXCL1, CXCL2, CXCL10, CXCR2, CCL20, CXCL11, and CCL2. GO analysis showed enrichment in pathways regulating inflammation and leukocyte migration. KEGG results highlighted cytokine–cytokine receptor interaction, chemokine signaling, and TNF/IL-17 pathways, reflecting the dominant pro-inflammatory profile of ileal CD.
Conclusion: The identified hub genes play central roles in inflammatory signaling and immune-cell recruitment in ileal CD. The prominence of CXCL/CXCR chemokines indicates enhanced neutrophil infiltration, while marked upregulation of IL6 and IL1B underscores their contribution to tissue damage. These genes represent promising biomarker candidates and potential therapeutic targets; however, larger validation studies are needed.
Keywords: Crohn's disease, Ileal inflammation, Transcriptomic analysis, Differentially expressed genes (DEGs), Hub genes

P391, Pharmacokinetics of novel anti-inflammatory drugs in canines: A comparative study

Saeideh Naeimi[1], Sara Ghasemi[2], Amir Hossein Marayed[2], Ghazal Pazeshgar[2]
1. Department of Basic Sciences, Faculty of Veterinary Medicine, Semnan University, Semnan, Iran
2. Faculty of Veterinary Medicine, Semnan University, Semnan, Iran

Background: The effective management of inflammatory conditions in dogs relies on modern anti-inflammatory drugs that reduce pain and enhance quality of life. A critical aspect of their use is understanding their pharmacokinetics (PK)—how they are absorbed, distributed, metabolized, and excreted—which directly impacts their efficacy and safety.
Methods: As part of this study, we analyzed the pharmacokinetics of the aforementioned anti-inflammatory drugs by examining relevant parameters through controlled trials involving a sample set of canines. Total of 50 canine subjects with similar inflammatory conditions were randomized to receive either Firocoxib, Oclacitinib, or CBD, with each group monitored for pharmacokinetic responses. Blood samples were collected at predetermined intervals to analyze plasma concentrations.
Results: Data revealed that Firocoxib maintained a consistent plasma concentration over the 24-hour period, establishing it as a reliable option for pain management through predictable dosing. Oclacitinib, while rapidly absorbed, produced peaks that receded significantly by the 12-hour mark, suggesting efficacy primarily within the short duration of action. Conversely, CBD demonstrated a prolonged presence within the bloodstream, illuminating potential for sustained anti-inflammatory effects.
Conclusion: The prolonged action of CBD may allow for less frequent dosing, which could enhance compliance among pet owners. Oclacitinib's rapid action is particularly valuable in cases requiring immediate relief, while Firocoxib’s steady-state plasma concentrations support its use in chronic pain management by understanding these profiles, veterinarians can tailor treatments to better meet the specific needs of their canine patients, thus improving therapeutic efficacy and safety.
Keywords: Novel Anti-inflammatory Drugs, Pharmacokinetics, Dog

P392, Precision dosing in neurology: Focusing on novel achievements today

Qazal Esmaylpur[1], Kiarash Fekri[2], Elaheh Azizi[3]
1. Student Research Committee, Sarab Faculty of Medical Sciences, Sarab, Iran
2.Department of Paramedicine, Amol School of Paramedicine, Mazandaran University of Medical Sciences, Sari, Iran
3.Department of Paramedicine, Amol School of Paramedicine, Mazandaran University of Medical Sciences, Sari, Iran

Background: For centuries, along with pharmacotherapies, the concern of adjusting dosage has been a concern for therapists. Inadequate treatment on one hand and the toxicities on the other hand are the events that clearly demonstrate the importance of addressing this concern. Notably, the narrow therapeutic window of many drugs used in neurology makes precision dosing in this area very complex. In this regard, the importance and complexity raised led this article to address the current status of precision dosing in pharmacotherapy of neurological diseases.
Methods: To do this, well-known scientific databases including Web of Science, Scopus and Pubmed were carefully reviewed, then the obtained information were classified and concluded.
Results: Reviewing the data indicates that, today's technological infrastructures, such as machine learning and real-time monitoring, have provided medical staff with more opportunities for precision dosing, to the point where the use of such technologies in the treatment of Alzheimer's disease, Parkinson's disease, MS, and epilepsy has now been reported. However, genetic differences and the costs of using the aforementioned processes are among the important challenges in this regard.
Conclusion: Overall, although in the short term, the move towards personalized pharmacotherapy for neurological diseases will be costly and time-consuming, long-term investments in this field will yield important gains.
Keywords: Precision dosing, Dose adjustment, Personalized medicine, Machine learning, Real-time monitoring.

P400, Minocycline attenuated long-term effects lipopolysaccharide on liver tissues in mice

Mahdieh Farhanji[1], Rasul Saberi[1], Afsaneh Hokmabadi[2], Hossein Salmani[3], Arezoo Rajabian[4], Mahmoud Hosseini[1]

1. Applied Biomedical Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Anatomy and Cell Biology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Physiology and Pharmacology, Faculty of Medicine, Sabzevar University of Medical Sciences, Sabzevar, Iran
4. Neuroscience Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Sepsis is well known to be associated with organ injury including liver damage which might be sustained for a long period after sepsis. Minocycline is recognized for its potent anti-inflammatory and anti-oxidant properties. In the present research, the long-term effect of sepsis on liver tissue oxidative stress and the protective effects of minocycline were investigated.
Methods: Adult male C57 mice were treated with three doses of minocycline (12.5, 25, and 50 mg/kg). A high dose of lipopolysaccharide (LPS, 5 mg/kg) was injected to induce sepsis. The levels of inflammatory and oxidative stress markers were evaluated at 24 hours and 30 days after sepsis induction.
Results: Sepsis induction led to a significant elevation in tumor necrosis factor-alpha (TNF-α) levels in the liver ($P<0.001$), which were markedly reduced by all doses of minocycline ($P<0.001$). Moreover, malondialdehyde (MDA) levels were significantly elevated after 24 hours and 30 days compared to the control ($P<0.001$). The highest dose of minocycline (50 mg/kg) attenuated MDA after 30 days ($P<0.05$). After 30 days, thiol content and after 24 hours and 30 days superoxide dismutase (SOD) activity were decreased compared to the control ($P<0.05$-$P<0.001$). Thiol content increased significantly with 25 and 50 mg/kg ($P<0.05$ and $P<0.01$), and SOD activity improved with 12.5, 25, and 50 mg/kg ($P<0.05$, $P<0.001$, and $P<0.001$ respectively).
Conclusion: The findings revealed damaging effect of sepsis is continued for a long time after occurrence. Starting the treatment by antibiotics including minocycline at first days can prevent from long term effect of sepsis.
Keywords: Sepsis, Minocycline, Liver, Inflammation, Oxidative stress

P401, Investigating the relationship between precocious puberty and vitamin D

Fateme Jalalvand[1], Seyed Afshin Nateghi Shahrokni[1], Ali Ebrahimi[1]
1. Islamic Azad University, Shahr-e Qods, Iran

Background: Central precocious puberty (CPP) refers to the early activation of the hypothalamic–pituitary–gonadal (HPG) axis. Over the past two decades, cross-sectional studies have shown that puberty occur in both sexes than previously thought. Vitamin D receptors are expressed in almost all body cells, including the ovaries and pituitary gland in humans and the hypothalamus in animals. The aim of this short article is to examine the relationship between vitamin D and precocious puberty (PP).
Methods: This article summary has been prepared by studying published articles in this field.
Results: Latitude, which affects exposure to sunlight, has an inverse relationship with the age at menarche. This relationship may be related to vitamin D. Reported data confirm that vitamin D regulates neuroendocrine and ovarian physiology, and more specifically, that vitamin D deficiency plays a role in altering the timing of puberty. Findings indicate that PP may be associated with vitamin D deficiency. The likelihood of PP is twice as high in girls with vitamin D deficiency compared to girls with sufficient vitamin D levels.
Conclusion: The timing of puberty has important biological, psychosocial, and long-term health consequences. Since PP is a known risk factor for various diseases, including breast cancer, identifying modifiable factors such as vitamin D deficiency is crucial in preventive strategies. It is recommended that further studies be conducted to confirm the effect of vitamin D on PP.
Keywords: Puberty, Precocious, Vitamin D, Ovary

P402, Protective effects of the camphor against thioacetamide-induced liver injury in rats

Mojdeh Abdollahi[1], Masoumeh Asle-Rousta[2]
1. Department of Genetics, Za.C., Islamic Azad University, Zanjan, Iran
2. Department of Physiology, Za.C., Islamic Azad University, Zanjan, Iran

Background: Thioacetamide (TA) is an organosulfur compound commonly used as a hepatotoxin and carcinogen in animal research. TA initiates oxidative stress and inflammation in the liver. Camphor, a monoterpene found abundantly in *Cinnamomum camphora*, has demonstrated antioxidant effects in both *in vitro* and *in vivo* studies. The present study aimed to investigate the effects of camphor on oxidative stress and inflammation induced by TA in the livers of adult male Wistar rats.
Methods: The animals were divided into four groups: control, camphor, TA, and TA-camphor. Camphor (10 mg/kg, administered intraperitoneally daily) and TA (200 mg/kg, administered intraperitoneally twice a week) were administered over 28 days. We measured the levels of malondialdehyde (MDA) and glutathione, as well as the activity of the enzyme superoxide dismutase (SOD) in the livers of the animals. The expression of pro-inflammatory and anti-inflammatory cytokines was also assessed using real-time PCR. A one-way ANOVA was conducted, followed by Tukey's test for multiple comparisons, with p-values less than 0.05 considered statistically significant.
Results: The results indicated that camphor treatment reduced MDA levels, increased glutathione levels, and enhanced SOD activity in the TA-treated rats ($p < 0.05$). Furthermore, camphor prevented the increase in the expression of pro-inflammatory cytokines, tumor necrosis factor-alpha, interleukin-1 beta, and interleukin-6. It also increased the expression of the anti-inflammatory cytokine interleukin-10 in the livers of these animals ($p < 0.05$).
Conclusion: We concluded that camphor reduces oxidative stress and inflammation in the livers of rats exposed to TA, suggesting that camphor may have hepatoprotective potential.
Keywords: Camphor, Oxidative stress, Inflammation, Liver, Thioacetamide

P403, Investigating the role of glutamatergic system on food intake caused by gastric inhibitory polypeptide in broilers

Maryam Lotfi Gharaie [1], Morteza Zendehdel [1]
1. Section of Physiology, Department of Basic Sciences, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran

Background: Adequate food intake regulation and energy state are crucial for progress and management of commercial lines of poultry. Appetite regulation and energy expenditure are mediated by a wide array of signaling molecules including peptides, hormones and neurotransmitters. This study aimed to investigate the correlation between glutamatergic with gastric inhibitory polypeptide (GIP) in the control of food intake.
Methods: In experiment 1, broilers were injected with GIP at various doses (3, 6 and 12 nmol) in addition to saline. During the experiment 2, the broilers were subjected to an intracerebroventricular (ICV) injection containing saline, MK-801 (NMDA receptor antagonist, 15 nmol), GIP (12 nmol), and a mixture of MK-801 plus GIP. . Experiments 3 to 6 resemblance to experiment 2, with the exception that AMPA receptor antagonist (CNQX receptor antagonist, 390 nmol), AIDA (mGLUR1 receptor antagonist, 2 nmol), LY341495 (mGLUR2 receptor antagonist, 150 nmol) and UBP1112 (mGLUR3 receptor antagonist, 2 nmol) were administrated instead of MK-801. After that, cumulative feed intake was assessed at intervals of 30, 60, and 120 min postinjection, respectively.
Results: The results showed that glutamate receptor antagonists had no effect on appetite; however, demonstrate that the concurrent injection of MK-801 (NMDA receptor antagonist) and GIP markedly mitigated the hypophagic effect of GIP.
Conclusion: This implies that Gipr neurons modulate feeding behavior via complex neurotransmitter signaling such as glutamatergic system, enabling these cells to integrate multiple signaling types and dynamically adjust appetite.
Keywords: Broiler, Appetite, GIP, Glutamate

P404, Dose-Dependent effects of *Ziziphora tenuior* hydroalcoholic extract on hyperglycemia and dyslipidemia in streptozotocin-induced diabetic mice

Samad Nazemi[1], Mohammad Hosein Davari[2]
1. Department of Physiology and Pharmacology, School of Medicine, Sabzevar University of Medical Sciences, Sabzevar, Iran
2. Student Research Committee, Sabzevar University of Medical Sciences, Sabzevar, Iran

Background: Diabetes mellitus is a global health crisis, often accompanied by dyslipidemia which elevates cardiovascular risk. *Ziziphora tenuior*, a traditional medicinal plant, has shown antidiabetic potential, but its dose-dependent effects on both glucose and lipid profiles remain unclear.
Methods: Thirty male mice were rendered diabetic via a single intraperitoneal (i.p.) injection of streptozotocin (50 mg/kg). Diabetic mice were then treated daily for 28 days with i.p. injections of the *Z. tenuior* hydroalcoholic extract at 50, 100, or 200 mg/kg. A diabetic control group received vehicle. Body weight and fasting blood glucose were monitored weekly. On day 28, serum was analyzed for triglycerides, total cholesterol, HDL, and LDL, and key atherogenic lipid ratios were calculated.
Results: The extract significantly reduced hyperglycemia in a dose-dependent manner. The 100 mg/kg dose was most effective, also significantly lowering triglycerides (from 110.33±6.69 to 87.17±3.78 mg/dL) and total cholesterol (from 115.17±7.87 to 100.67±4.43 mg/dL), and improving critical lipid ratios (Chol/HDL, LDL/HDL, TG/HDL). Notably, the highest dose (200 mg/kg) showed reduced efficacy on these lipid parameters, indicating a potential biphasic effect. The extract also attenuated diabetes-associated body weight loss.
Conclusion: *Ziziphora tenuior* hydroalcoholic extract possesses potent hypoglycemic and hypolipidemic activities. The 100 mg/kg dose was identified as the optimal therapeutic dose for improving both glycemic control and lipid profile, while higher doses may be less effective, underscoring the critical importance of dose optimization for future therapeutic applications.
Keywords: *Ziziphora tenuior*, Diabetes Mellitus, Hyperglycemia, Dyslipidemia, Streptozotocin

P405, The effect of simultaneous treatment of sitagliptin and alphalipoic acid on sperm quality in diabetic mice

Sepideh Ahmadi[1], Negar Dadvand[1], Malek Soleimani Mehranjani[1]
1. Department of Biology, Faculty of Science, Arak University, Arak, Iran

Background: Sitagliptin, an oral dipeptidyl peptidase-4 inhibitor used as a once-daily treatment for type 2 diabetes. Although this drug is useful for the treatment of type 2 diabetes, it has adverse effects on sperm quality in diabetic conditions, due to oxidative stress. Therefore, this study investigated the potential antioxidant effects of alphalipoic acid on sperm quality in diabetic mice treated with sitagliptin.
Methods: Twenty-four adult NMRI male mice were randomly divided into five groups: control, diabetic (streptozotocin [150 mg/kg] + nicotinamide [110 mg/kg]), diabetic + sitagliptin (30 mg/kg/bw), diabetic + alphalipoic acid (300 mg/kg/bw), and diabetic + sitagliptin + alphalipoic acid and they were treated for 35 days. After anesthetizing the mice, the caudal region of the epididymis was examined for sperm parameters. The data were statistically analyzed using SPSS software, one-way ANOVA and Tukey's test and means were considered significantly different at $p<0.05$.
Results: A significant decrease in the mean number, viability, motility, morphology and membrane integrity of the sperm was observed in the diabetic group compared to the control group ($p<0.05$). These parameters didn't show a significant difference in the diabetic + sitagliptin group compared to the diabetic group ($p>0.05$). However, these parameters significantly increased in the diabetic + sitagliptin + alphalipoic acid compared to the diabetic + sitagliptin group ($p<0.05$).
Conclusion: Our results showed that simultaneous treatment of sitagliptin and alphalipoic acid reduces sitagliptin-induced adverse effects on sperm quality in diabetic mice.
Keywords: Sitagliptin, Alphalipoic acid, Sperm motility

P406, High-calorie diet impairs maternal metabolic adaptation and pancreatic function during pregnancy-lactation in rats

Fariba Azarkish[1], Farzaneh Eskandari[2], Sara Ojaghi [3], Haniyeh Soltani[1], Fatemeh Binayi[4] Homeira Zardooz[1]

1. Department of Physiology, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran
2. Neurophysiology Research Center, Institute of Neuroscience and Cognition, Shahid Beheshti University of Medical Sciences, Tehran, Iran
3. Department of Clinical Biochemistry, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran
4. Gastroenterology and Liver Diseases Research Center, Research Institute for Gastroenterology and Liver Diseases, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: Pregnancy and lactation require precise metabolic adaptations. This study examined whether a high-calorie (Hcal) diet disrupts these processes, leading to maternal metabolic dysfunction.

Methods: Female rats (200 ± 30 g) were assigned to control or Hcal diet groups. Body weight and food intake were monitored weekly. Metabolic and hormonal profiles were assessed in late pregnancy and at the end of lactation. At the end of lactation, oral glucose tolerance (OGTT) and insulin tolerance (ITT) tests were performed. Lipid profile, organ weights, oxidative stress markers (MDA) in plasma, pancreas, and hypothalamus, pancreatic function via glucose-stimulated insulin secretion (GSIS; 5.6 and 16.7 mM), and islet insulin content were evaluated.

Results: The high-calorie diet altered body-weight dynamics, inducing greater early-pregnancy weight gain and enhanced mid-lactation weight loss ($p<0.05$). Food intake increased markedly during lactation ($p<0.05$). Hcal diet induced hyperinsulinemia with elevated HOMA-IR in late pregnancy ($p<0.01$). In ITT and OGTT, time-zero–normalized glucose AUC were significantly lower in the Hcal dams ($p<0.01$, $p<0.001$), while insulin was higher, at the end of lactation. Pancreatic function was impaired, with reduced %GSIS and elevated residual islet insulin content ($p<0.0001$). At lactation end, visceral fat and adrenal weight increased ($p<0.01$), along with triglycerides ($p<0.01$), total cholesterol ($p<0.05$) and MDA ($p<0.05$). Leptin levels rose markedly during late pregnancy and lactation ($p<0.0001$). Corticosterone increased at late pregnancy ($p<0.05$) and remained elevated at lactation end.

Conclusion: Hcal Diet intake disrupt maternal metabolic adaptation by impairing β-cell function, altering insulin-glucose dynamics, and disturbing lipid-hormonal regulation, thereby increasing maternal metabolic risk.

Keywords: Pregnancy, Lactation, High-Calorie Diet, Insulin Resistance, Pancreatic Beta Cells

P407, How does HRT affect endometriosis lesions?

Aidin Amini Sefidab [1], Zahra Amirkhani[1]
1. Student Research Committee, Larestan University of Medical Sciences, Larestan, Iran

Background: Women diagnosed with endometriosis often show signs of accelerated ovarian aging (for example lower AMH levels) and may enter menopause earlier putting them at higher risk for bone loss, cardiovascular changes, and symptomatic decline. In that context, the label change (removal of black-box) unlocks a broader conversation about HRT as a proactive strategy not just symptom relief, but systemic health protection.
Methods: The present paper is a review study. In this study,14 articles published from 2019 to 2025, which were in the form of quantitative studies, meta-analysis and original research and systematic review were examined. Entry criteria included: Availability of full text and articles published between 2019 and 2025, and exit criteria included: Case Report studies. The study used the keywords: HRT; Endometriosis; Menopause.
Results: Importantly, patients with a history of endometriosis should be counseled that HRT may occasionally provoke flare-ups or reactivation of symptoms, particularly if residual disease remains. This does not rule out HRT; it simply underscores the need for individualized planning, careful selection of formulations, and close follow-up.
Conclusion: Hormone therapy should be carried out under the supervision of a specialist and with careful evaluation. It acknowledges that, when appropriately selected and monitored, HRT can help protect long-term systemic health while still requiring attention to individual risk factors.
Keywords: HRT, Endometriosis, Menopause

P408, The effect of HRW on the condition of induced models of clinical hypothyroidism & subclinical hypothyroidism with a systemic approach on liver tissue

Akram Aminian[1], Khatereh Kharazmi[2], Seyedeh Elnaz Nazari[2], Fereshteh Asgharzadeh[2,3], Mohammad Saroghi[2], Seyedeh Zahra Asghari[2], Majid Khazaei[2,3]

1. Department of Physiology and Pharmacology, Afzalipour Faculty of Medicine, Kerman University of Medical Sciences, Kerman, Iran
2. Department of Medical Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Metabolic Syndrome Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Hypothyroidism is classified by WHO as a disease that lifestyle and other factors can affect its occurrence. This disease itself can be a cause of other diseases, including liver inflammation. The lack of clinical symptoms in this disease can classify it as subclinical. Hydrogen- rich water (HRW) has antioxidant and anti-inflammatory effects. The aim of our study was to investigate the Review of the effects mentioned of HRW on liver tissue in clinical and subclinical hypothyroidism models.

Methods: Hypothyroidism (hypo) and subclinical hypothyroidism(sub-hypo) was induced using PTU (15 and 5 mg/kg/day, respectively via gavage for 4-weeks. Then, male rats were divided into 4-groups: control, hypo, hypo+HRW, sub-hypo, sub-hypo+HRW(n=6/each). HRW(200λ/rat/every-other-day/4-week[10, 11]) was prepared by dissolving hydrogen tablet(6-pieces/12ml distilled-water) drinking water(12ml). then liver weighted and evaluated for histological and oxidative stress marker measurements.

Results: Results showed that MDA was significantly higher. SOD and total-thiol groups were lower in hypo and sub-hypo groups compare to control, which were markedly improved by HRW treatment in both hypo and sub-hypo groups. Evaluation of liver histology indicated collagen content in both group was lower after administration of HRW.

Conclusion: HRW improves liver histology and oxidative/antioxidative balance in hypothyroidism and subclinical hypothyroidism and can be considered in clinical situations.

Keywords: Hypothyroidism-PTU-HRW-oxidative stress

P409, Investigating the effect of vanadium-zinc complex on liver histology and oxidative stress indices in male rats with type 2 diabetes

Seyed Mahdi Banan Khojasteh[1], Khalil Hajiasgharzadeh[2], Narges Dastmalchi[3], Gholamreza Hamidian[4]
1. Department of Animal Biology, Faculty of Natural Sciences, University of Tabriz, Tabriz, Iran
2. Stem Cell Research Center, Tabriz University of Medical Sciences, Tabriz, Iran
3. Department of Biology, University College of Nabi Akram, Tabriz, Iran
4. Department of Basic Sciences, Faculty of Veterinary Medicine, University of Tabriz, Tabriz, Iran

Background: This study was conducted to investigate the effect of vanadium-zinc complex on liver histology and also evaluate changes of oxidative stress indices in male rats with type 2 diabetes
Methods: Adult male rats with the same weight range were randomly divided into 4 groups of 10 (control, diabetic, healthy rats receiving vanadium-zinc complex, diabetic rats receiving vanadium-zinc complex) and they received this compound at a dose of 10 mg/kg, once a day for 60 days by oral gavage. At the end of the research period, after blood collection, parts of the liver tissue were removed from the body to measure oxidative stress indices and the rest for stereological and histological studies. Serum isolated from animals was also used to measure functional enzymes of liver tissue (aspartate aminotransferase, alkaline phosphatase, alanine aminotransferase).
Results: The results showed that the vanadium-zinc complex has no side effects on liver tissue, but it can prevent structural damage to liver tissue by reducing blood glucose levels in diabetic rats and improving oxidative stress.
Conclusion: Vanadium-zinc complex can be effective in reducing the effects of type 2 diabetes on liver tissue and oxidative stress.
Keywords: Vanadium-zinc complex; Liver histology; Oxidative stress; Male rats; Type 2 diabetes

P410, Response of new markers of fatty liver to two months of HIIT training in type 2 diabetic women with NAFLD

Zahra Bayat[1], AbbasAli Gaeini[2], Reza Nouri[3], Alireza Gholipour[4]
1. Department of Sports Science, Kish International Campus, University of Tehran, Kish, Iran
2. Department of Exercise Physiology, University of Tehran, Tehran, Iran
3. Department of Sports Science, Kish International Campus, University of Tehran, Kish, Iran
4. Department of Sports Science, Razi University, Kermanshah, Iran

Background: The prevalence of non-alcoholic fatty liver disease (NAFLD) in patients with type 2 diabetes is rising. Novel indices—including the hepatic steatosis index (HSI), fatty liver index (FLI), lipid accumulation index (LAP), and Framingham steatosis index (FSI)—offer new tools for assessing liver disease risk. However, the impact of physical activity on these markers in this population is unclear. This study examined the effects of high-intensity interval aerobic training (HIIT) on these indices in type 2 diabetic women with NAFLD.
Methods: Twenty type 2 diabetic women with NAFLD were randomly assigned to an eight-week HIIT intervention or control group, matched by fatty liver grade. HIIT sessions, performed three times weekly on a stationary bike, included high-intensity intervals. Body mass index, waist circumference, triglycerides, liver enzymes (AST, ALT), and systolic/diastolic blood pressure were assessed pre- and post-intervention.
Results: No significant baseline differences were found between groups ($p>0.05$). Post-intervention, the HIIT group demonstrated significant improvements in all fatty liver indices and reductions in BMI, waist circumference, triglycerides, liver enzymes, and blood pressure ($p\leq0.05$), whereas the control group showed no significant changes ($p>0.05$).
Conclusion: Eight weeks of HIIT significantly improved novel fatty liver markers and related metabolic parameters in type 2 diabetic women with NAFLD. Regular high-intensity interval aerobic training, three times per week, is recommended as an effective non-pharmacological strategy for managing NAFLD in diabetic patients.
Keywords: Triglyceride, HSI, Fatty Liver, Liver Enzymes.

P411, The influence of stress hormones on ovarian function and sperm quality

Reyhaneh Moghaddam Habibzadeh[1,4], Mahdieh Gheysipour[1,4], Yasaman Akbarian[1,4], Hossein Javid[1,2,3]
1. Department of Medical Laboratory Sciences, Varastegan Institute for Medical Sciences, Mashhad, Iran
2. Department of Clinical Biochemistry, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Surgical Oncology Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
4. Student research committee, Varastegan Institute for Medical Sciences, Mashhad, Iran

Background: Any kind of stress, whether acute or chronic, mental or physical, initiates the release of stress hormones like glucocorticoids through the HPA axis and catecholamines through the Sympathetic nervous system. Increased cortisol levels may decrease the efficiency of the ovaries in women, and lower the quality of sperm in men, having a negative impact on fertility.
Methods: This review article was performed within article published in PubMed, Google Scholar and Web of Science from 2021-2024. By searching this database, 22 articles were found and 10 were removed by reading titles and abstracts. 12 articles were selected under the inclusion criteria. All article were chosen from English articles.
Results: Based on our assessment, the activation of the HPA axis in response to stress causes the release of cortisol and catecholamines. These hormones enhance energy and alertness. However, stress simultaneously impairs the HPO axis leading to reduced ovulation and overall diminished ovarian function. In males, stress decreases testosterone levels, negatively impacting sperm production, lowering sperm count, and reducing sperm quality, ultimately affecting fertility and overall reproductive health in both sexes.
Conclusion: Stress has major implications on female and male reproductive capabilities making it a case of the growing concern of infertility together with biological causes. Around 186 million people are estimated to be facing infertility issues along with 48 million couples. Managing stress becomes a goal alongside treating other factors. Useful approaches include mindfulness, relaxation techniques (meditation, yoga), lifestyle changes (exercise, diet), CBT and emotional support through counseling or support groups.
Keywords: Stress Hormones, Ovarian Function, Sperm Quality

P412, Effect of platelet lysate loaded in chitosan nanoparticles on ovarian function in cyclophosphamide-induced premature ovarian failure in BALB/c mice

Fereshte Torabi[1], Alireza Ebrahimzadeh-Bideskan[1,2], Fatemeh Alipour[1], Sareh Karimi[1]
1. Department of Anatomy and Cell Biology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Applied Biomedical Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Premature ovarian failure (POF) is a common cause of infertility in women. Cyclophosphamide (CP) is one of the most important gonadotoxic agents that leads to POF. Platelet lysate (PL) can be a promising treatment option to repair and regenerate insufficient ovarian tissue. Chitosan (CH) is considered a promising biopolymer for sustained and controlled release systems. This study aimed to evaluate the therapeutic effect of Platelet lysate-loaded chitosan nanoparticles (PLCH NPs) on ovarian function in a mouse POF model induced by CP.
Methods: A total of 36 adult female BALB/c mice were divided into six groups: Control, Sham, POF, POF-PL, POF-CH, and POF-PLCH. At the end of treatment, the animals were sacrificed, and right ovary was used to evaluate parameters such as MDA, SOD, CAT, and thiol levels. Additionally, the expression of the genes BMP15, GDF9, KITLG, and FSHR was analyzed using Real-time PCR. The left ovary was also utilized for immunohistochemical (IHC) studies.
Results: The POF-PLCH group demonstrated higher levels of SOD, CAT, and thiol parameters, along with a significant decrease in MDA levels compared to the POF group. The expression levels of the related genes increased significantly in the POF-PL and POF-PLCH groups compared to the POF group. IHC examinations revealed significant increase in the number of proliferating cells in the POF-PLCH group compared to the POF group ($P<0.05$).
Conclusion: This study proposed a novel PLCH NP-mediated combination therapy for the clinical treatment of POF and showed PLCH NPs have superior effectiveness compared with free PL.
Keywords: Infertility, Premature ovarian failure, Cyclophosphamide, Platelet lysate, Chitosan

P413, Predicting anti-tnf therapy outcomes in ulcerative colitis: Insights from oxidative stress markers

Khalil Hajiasgharzadeh[1], Narges Dastmalchi[2], Seyed Mahdi Banan Khojasteh[3]
1. Stem Cell Research Center, Tabriz University of Medical Sciences, Tabriz, Iran
2. Department of Biology, University College of Nabi Akram, Tabriz, Iran
3. Department of Animal Biology, Faculty of Natural Sciences, University of Tabriz, Tabriz, Iran

Background: This study aimed to evaluate changes in the redox profile within plasma and intestinal tissues of a mouse model of ulcerative colitis (UC) following anti-TNF-α therapy. It also sought to identify molecular predictors that could predict treatment response.
Methods: Twenty-two mice with DSS-induced UC were treated with anti-TNF-α for 14 days. Oxidative stress markers, including total oxidant status (TOS), glutathione (GSH), and activities of antioxidant enzymes such as catalase (CAT), superoxide dismutase 1 (SOD1), and SOD2, were measured. Redox-related gene expression was assessed in colonic biopsies. Mice were categorized as responders (UCR) or non-responders (UCN), and logistic regression was used to analyze the predictive value of these molecular features.
Results: By day 14, responders exhibited significant increases in tissue expression of CAT ($P < 0.001$), NRF2, SOD1 ($P < 0.05$), SOD2 ($P < 0.01$), as well as elevated plasma CAT, SOD activities, and higher GSH levels compared to controls ($P < 0.05$). UCN mice had higher TOS ($P < 0.05$) and GP91-PHOX ($P < 0.001$), indicating heightened oxidative stress, whereas UCR mice had lower TOS levels ($P < 0.05$). At day 14, antioxidant gene expression, plasma SOD activity, and GSH were higher in responders, with an inverse pattern at baseline. Importantly, plasma redox biomarkers, especially CAT and TOS, predicted treatment response with near-perfect accuracy, achieving an AUC of 1.
Conclusion: Anti-TNF therapy modulates redox homeostasis in the UC mouse model, boosting antioxidant defenses. Specific plasma redox markers can non-invasively predict therapeutic outcomes, supporting personalized UC treatment strategies.
Keywords: Redox system; Ulcerative colitis; Anti-TNF-α; Reactive oxygen species; Biomarker

P414, Drug repositioning study on the effect of propranolol for high fat diet-Induced hyperglycemia and hepatic lipid accumulation in rats

Babak Hassankhan[1], Parichehreh Yaghmaei[2], Azadeh Ebrahim-Habibi[3]
1. Department of Biology, Science and Research Branch, Islamic Azad University, Tehran, Iran
2.Endocrinology and Metabolism Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran

Background: Previous studies have reported that Non-alcoholic fatty liver disease (NAFLD) is relevant to insulin resistance and autonomic blockade improves insulin sensitivity. The current study aimed to evaluate the effect of propranolol as a beta-blocker on hyperglycemia and hepatic lipid accumulation in rat model of Non-alcoholic fatty liver disease.
Methods: Twenty-four Male Sprague-Dawley rats were divided into three groups (n=8): normal control group (NC), high fat diet group (HFD) and HFD plus propranolol group (HFD+P). The NC group received a standard diet. The HFD group received high-fat emulsion diet containing corn oil by gavage daily for six weeks, and the HFD+P group received a HFD plus propranolol (25mg/kg/daily). After this time, the rats were sacrificed and blood was collected for measurement of glucose, insulin resistance (HOMA-IR) and ELISA analyses and also liver for liver histological tests (H&E) and hepatic biochemical indices. Liver tissue was collected for measurement of GLUT4 expression by Western blot analyses.
Results: After six weeks, the plasma level of glucose, (HOMA-IR), alanine aminotransferase (ALT), aspartate aminotransferase (AST), and hepatic content of triglyceride (TG) increased in HFD group. Treatment by propranolol significantly attenuated these alterations and increased protein levels of GLUT4 in the liver tissue of the HFD+P group.
Conclusion: Administration of propranolol as a beta-blocker may improve hyperglycemia, hepatic lipid accumulation and increased protein levels of GLUT4 in liver of rats fed high fat diet.
Keywords: Non-alcoholic fatty liver disease, Propranolol, Insulin resistance, GLUT4

P415, The effect of magnesium on reducing insulin resistance in the cardiovascular system

Melina Forudastan[1], Amir Reza Haji Arab[1], Ali Reza Shayesteh[1], Delaram Darabi[1], Mehdi Zargar[1], Danial Rezaei[1], Azadehaladat Hosseini dastgerdi[2], Amir Hossein Karimian[1]
1. Clinical Research Development Center, Najafabad Branch, Islamic Azad University, Najafabad, Iran
2. Department of medicine, Na.C., Islamic Azad University, Najafabad, Iran

Background: Insulin resistance (IR) is a chronic pathological condition that is related to reduce the rates of glucose uptake to target tissues. IR is associated with the development of various diseases such as cardiovascular diseases (CVD) and type 2 diabetes (T2DM). Magnesium (Mg^{2+}) is vital in the function of many enzymes in the body. It is also essential for regulating muscle contraction, insulin metabolism, cardiac excitability, vasomotor tone and neuromuscular conduction. Mg^{2+} deficiency is closely related to IR and CVD. So, the idea came to our mind to study the effect of Mg^{2+} on reducing IR in the cardiovascular system.
Methods: To identify relevant studies, the search was performed in Google Scholar, PubMed, Scopus, and Web of Science. The search was carried out from 1983 until 2025. Relevant articles were selected and studied.
Results: Patients with coronary artery stenosis and CVD often have hypomagnesemia. Mg^{2+} therapy in these patients reduces IR, HDL, cholesterol, systolic and diastolic blood pressure. Since Mg^{2+} is an important physiological regulator of blood vessel tone, it improves vascular relaxation responses and can lead to improvement in BP and cardiac workload. Oral Mg^{2+} acts as a natural Ca^{2+} channel blocker and on the other hand increases NO, thus improving endothelial dysfunction and causing vasodilation. Which leads to improved blood flow in the coronary arteries.
Conclusion: Given the very important role of Mg^{2+} in the vascular endothelial function and the cardiovascular system, it seems that Mg^{2+} is a good drug in reducing IR, thereby reducing CVD complications.
Keywords: Insulin resistance, Magnesium, Cardiovascular disease, Diabetes

P416. Evaluation of the most important supplements during pregnancy

Maryam Hosseini Mohammad Abad[1]
1. Islamic Azad University, Quchan Branch, Mashhad, Iran

Background: Pregnancy necessitates optimal nutrition to ensure fetal development and maternal well-being. Supplements are frequently advised to address dietary inadequacies and physiological demands. This review highlights critical supplements and their recommended dosages, including regional practices in Asia and WHO guidelines.
Methods: A review (2015–2023) included RCTs, meta-analyses, and clinical guidelines from PubMed, Scopus.
Results: 1. Folic acid: WHO recommends 400 µg/day, but studies in Asia suggest 600–800 µg/day for higher efficacy in preventing neural tube defects.
2. Iron: WHO advises 30–60 mg/day for anemia prevention, while Asian guidelines often prescribe 30–100 mg/day due to higher prevalence of deficiency.
3. Vitamin D: WHO recommends 600 IU/day, but trials in Asia support up to 2000 IU/day to address widespread insufficiency.
4. Omega-3 (DHA): Global guidelines suggest 200–300 mg/day; Asian studies report safe use of 200–400 mg/day for neurodevelopment.
5. Iodine: WHO recommends 250 µg/day, whereas Asian protocols use 150–220 µg/day, reflecting regional dietary intake variations.
Calcium (1000–1300 mg/day) and magnesium (200–400 mg/day) are emphasized in Asia for preeclampsia prevention.
Conclusion: Supplements like folic acid, iron, and vitamin D are universally vital, but dosages should align with regional guidelines and individual needs. Collaboratio with healthcare providers ensures safe and effective supplementation.
Keywords: Folic acid, Iron, Omega-3, Pregnancy, Supplements.

P417, Optimal doses and protocols for streptozotocin (STZ) and alloxan in experimental diabetes induction

Atefeh Heidar Ammameh[1], Sana Naseri[1], Ali Rasooli[1], Rokhsana Rasooli[1]
1. Department of Pharmacology, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran

Background: There are several chemical compounds that are widely used as diabetes inducers in animals including rodent models and zebrafish. Alloxan and streptozotocin (STZ) are some of the most commonly used compounds. This review evaluates major studies, summarizes dose–response findings, and provides practical recommendations for designing reproducible diabetes models.
Methods: The literature was conducted across prominent scientific databases like PubMed, ScienceDirect, Google Scholar, Scopus, and Web of Science. These articles published from 1969 up to 2024. Investigations that utilized rodents (such as rats and mice) and zebrafish. Research that employed Alloxan, STZ, or a combination of the two to induction diabetes.
Results: The optimum dose of alloxan is highly strain-specific. In rodent, the most effective doses are 150 mg/kg in rats and 150 mg/kg (single or repeated) in mice, zebrafish induced optimal dose at approximately 300 mg. Furthermore, STZ (~50 mg/kg IP) provide reproducible rodent models of insulin-dependent diabetes.
Conclusion: Alloxan induced diabetes in rodents highly depend on animal strain, body weight, dosing regimen, route of administration, solvent composition, and fasting duration. Across the experimental models, doses around 150 mg/kg in rats and 150 mg/kg in mice, in zebrafish demonstrates diabetogenic induction at approximately 300 mg. Under controlled conditions, STZ with doses around 50 mg/kg IP induced diabetes in rodent models.
Keywords: Streptozotocin, Alloxan, Diabetes Induction

P418, Acquired, environmental, and immunological factors in male infertility: From Lifestyle to disease

Parinaz Nikfarjam[1], Zohreh Arab[2], Fereshteh Asgharzadeh[3]
1. Faculty of Medicine, Islamic Azad University, Mashhad Branch, Iran
2. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Applied Biomedical Research Centre, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Male infertility is a multifactorial condition influenced by acquired, environmental, infectious, and immunological factors. Disruptions in spermatogenesis, hormonal balance, and reproductive function are frequently associated with modifiable risk factors. Understanding these contributors is essential for improving preventive strategies, early diagnosis, and targeted management.
Methods: This narrative review summarizes current evidence regarding acquired, environmental, infectious, and immunological factors involved in male infertility. Relevant studies addressing lifestyle factors, systemic diseases, genital tract infections, oxidative stress, and immune-mediated mechanisms were reviewed to provide an integrated overview of their effects on male reproductive function.
Results: Medical conditions such as genital tract infections (e.g., *Chlamydia trachomatis* and *Escherichia coli*), varicocele, diabetes mellitus, and hypertension impair sperm quality through inflammation, oxidative stress, and hormonal dysregulation. Environmental and lifestyle factors, including exposure to heavy metals (e.g., cadmium and arsenic), cigarette smoking, alcohol consumption, drug abuse, obesity, and chronic stress, contribute to sperm DNA damage, reduced semen quality, and altered reproductive hormones. Infections of the genitourinary tract account for approximately 35% of male infertility cases and may induce orchitis, epididymitis, and the production of anti-sperm antibodies (ASA), which impair sperm motility and fertilization capacity. Furthermore, disruption of the blood-testis barrier and activation of immune responses exacerbate oxidative damage and accelerate fertility decline.
Conclusion: Male infertility results from the interaction of multiple acquired, environmental, infectious, and immunological factors. Early identification and modification of preventable risk factors, together with appropriate management of underlying diseases and immune dysfunction, may improve male reproductive outcomes and reduce the burden of infertility.
Keywords: Male infertility, Acquired causes, Environmental factors, Oxidative stress, Anti-sperm antibodies

P419, Plasmalemma vesicle-associated protein in energy homeostasis and precision anti-obesity therapy: A systematic review

Amirreza Khamineh Jahromi[1], Negar Norouzi[1], Mohammad Nosrati-Oskouie[1]
1. Department of Nutrition Sciences, Varastegan Institute for Medical Sciences, Mashhad, Iran

Background: Obesity is a growing global health concern with limited long-term treatment efficacy. Plasmalemma vesicle-associated protein (Plvap), traditionally recognized for its structural role in endothelial diaphragms, has recently emerged as a regulator of energy metabolism and vascular permeability. This systematic review evaluates current evidence on Plvap's role in metabolic regulation and its therapeutic potential in obesity.
Methods: A comprehensive literature search was conducted across PubMed, Google Scholar, and Web of Science up to March 31, 2025. Studies were selected based on PICOS/PECO criteria, focusing on interventional or observational designs that investigated Plvap modulation and metabolic outcomes. Risk of bias was assessed using the SYRCLE tool for animal studies and the CARE checklist for human case reports.
Results: Out of 1,135 records, eleven studies met inclusion criteria: seven in vivo animal models and four human loss-of-function case reports. Plvap deficiency consistently resulted in severe hypertriglyceridemia, protein loss, and impaired endothelial filtration. Tissue-specific models revealed distinct metabolic effects depending on the cellular context. In humans, rare PLVAP mutations were associated with profound metabolic derangements. Tables 3–6 summarize the key characteristics and PICO/PECO profiles of included studies.
Conclusion: Plvap is a critical regulator of lipid and protein metabolism, influencing vascular function and systemic energy balance. Its modulation holds promise for precision-based anti-obesity therapies, though systemic inhibition may entail significant risks. Future research should prioritize dose response investigations and tissue-targeted strategies to safely harness Plvap's metabolic potential.
Keywords: PLVAP, Endothelial permeability, Lipid metabolism, Obesity, Energy homeostasis, Therapeutic target

P420, The effect of agmatine on the regulation of the sexual cycle stages of female rat offspring affected by stress during pregnancy

Samaneh Sadat Alavi[1], Fatemeh Mohammadi[2], Fatemeh Farrokhi Si-Sakht[3], Sara Soltanipour[1]
1. Physiology Research Center, Institute for Basic Sciences, Kashan University of Medical Sciences, Kashan, Iran
2. Department of Basic Sciences, Sirjan School of Medical Sciences, Sirjan, Iran
3. Medicinal Plants Research Center, Yasuj University of Medical Sciences, Yasuj, Iran

Background: Maternal stress during pregnancy has adverse and long-lasting effects on the gonadal regulation of the next generation. The observed disruption of the estrous cycle, characterized by a prolonged Diestrous phase, is a sign of impaired neuroendocrine signaling of the HPG axis. AGMATINE directly reduces tissue oxidative stress by neutralizing free radicals and preventing lipid peroxidation. This antioxidant support helps maintain an optimal environment in the ovaries for regular folliculogenesis.
Methods: In this study, 24 female rats were used. Each female rat was caged with a male rat for pregnancy. Before mating, vaginal samples were obtained from female rats, and animals in the estrous cycle were selected for mating. In the early hours of the next morning, vaginal samples were obtained from rats to determine the presence of spermatozoa and determine day zero of pregnancy. Pregnant mothers were divided into two groups: stressed and unstressed. The unstressed group received only water and food in their cages without receiving any stress, and the stressed rats received various types of stressful conditions from day 14 of pregnancy. After birth, the female offspring in each group were divided into two groups: control and treatment:
Group1- with normal fetal period that received saline intraperitoneally after birth. Group2- Animals with normal fetal period that received AGMATINE intraperitoneally from 21 to 35 days after birth. Group 3-receiving maternal stress that received AGMATINE intraperitoneally from 21 to 35 days after birth.
Results: 4-week study of the estrous cycle in female rats showed that in the rhythm of the cycle, the animals exposed to the risk of pregnancy showed a significant ($p<0.01$) increase in the length of the Distrous phase compared to the control group. A longer Distrous phase means a delay in entering the estrous phase (active ovulation) and an overall decrease in the consumption of experiencing a complete cycle (including Proestrus, estrus, Metestrus and Distrous). Intervention with AGMATINE supplementation significantly improved the regulation of the cycle.
Conclusion: The results showed that the length of the Distrous phase was restored to the level of the control group and the frequency of complete estrus increased.

P421, Effects of electromagnetic waves emitted from MRI on changes in pituitary-gonadal axis hormones

Sedigheh Cheraghi[1], Fereshteh Dadfar[1], Kourosh Bamdad[1]
1. Department of Biology, Payame Noor University, Tehran, Iran

Background: The increasing use of electromagnetic waves in industry and medicine, especially in diagnostic devices such as MRI, necessitates a comprehensive study of the effects of electromagnetic fields on the activity of various organs.
Methods: The present study investigated changes in some of sex hormones in the MRI department staff of Amir-ol-Momenin Hospital in Ahvaz. For this purpose, 60 hospital personnel were selected and randomly assigned to two experimental groups (MRI department staff) and a control group (other department staff). SPSS-22 software and independent t-test statistical method were used to analyze the data.
Results: Data analysis showed that the levels of pituitary-gonadal axis hormones such as luteinizing hormone, follicle-stimulating hormone, estradiol, progesterone and testosterone did not show significant differences in the two groups.
Conclusion: Exposure to electromagnetic fields does not necessarily lead to negative effects, and its potential risks can be active, inhibitory or suppressive, depending on physiological characteristics, radiation dose, and duration of exposure.
Keywords: Sex hormones, MRI, Employees

P422, Effect of fasting on feed and water intake in neonatal broiler chicks under normal temperature following lipopolysaccharide injection

Hemn Mehmannavaz[1], Hossein Jonaidi[2], Manouchehr Yousefi [3], Mohammad Zamani Ahmad Mahmoudi[4]

1. Faculty of Veterinary Medicine, Shahid Bahonar University of Kerman, Kerman, Iran
2. Department of Basic Sciences, Faculty of Veterinary Medicine, Shahid Bahonar University of Kerman, Kerman, Iran
3. Faculty of Agriculture, Saravan Higher Education Center, Saravan, Iran
4. Department of Clinical Sciences, Faculty of Veterinary Medicine, Shahid Bahonar University of Kerman, Kerman, Iran

Background: Lipopolysaccharide (LPS), an endotoxin derived from Gram-negative bacteria, triggers acute-phase immune responses that alter feeding and drinking behavior. This study aimed to investigate the effect of short-term fasting on feed and water intake in neonatal broiler chicks under normal temperature following LPS administration.
Methods: Forty neonatal Ross 308 male chicks were randomly assigned to two feeding conditions: ad libitum and fasting. Feed restriction was applied for 7 hours prior to injection. LPS was administered subcutaneously in the cervical region at a dose of 2000 µg/kg body weight (200 µL). Cumulative feed and water intake were recorded for 21 hours' post-injection. Data were analyzed using SPSS version 23 and one-way ANOVA.
Results: Under ad libitum feeding, LPS significantly reduced both feed and water intake compared with the control group (*$p<0.05$). Under fasting conditions, the reduction in food and water consumption following LPS injection was less pronounced compared to free feeding conditions
Conclusion: Short-term fasting modulated the physiological response of broiler chicks to LPS, attenuating its inhibitory effects on drinking and feeding behaviors. These findings highlight the potential regulatory role of nutritional status in immune and metabolic adaptation to endotoxin stress.
Keywords: Lipopolysaccharide, Fasting, Broiler chicks, Feed intake, Water intake

P423, Ameliorative effect of denta pulp stem cell derived exosomes in treating CCl_4-induced liver fibrosis in male wistar rats

Nader Shahrokhi[1], Ali Derakhshani[2], Sahar Rahimi[3], Seyedeh Mahdieh Khoshnazar[4]
1. Physiology Research Center, Kerman University of Medical Sciences, Kerman, Iran
2. Research Center for Hydatid Disease in Iran, School of Medicine, Kerman University of Medical Sciences, Kerman, Iran
3. Physiology Research Center, Kerman University of Medical Sciences, Kerman, Iran
4. Gastroenterology and Hepatology Research Center, Institute of Basic and Clinical Physiology Sciences, Kerman University of Medical Sciences, Kerman, Iran

Background: Hepatic fibrosis, resulting from chronic liver injuries, is characterized by excessive extracellular matrix deposition, due to the activation of hepatic stellate cells. Dental pulp stem cells (DPSCs) demonstrated potential for liver regeneration. Exosomes play critical roles in cell signaling and may mitigate fibrosis by modulating inflammation and promoting tissue repair. Dental pulp stem cell-derived exosomes may offer a protective and reparative effect against CCl_4-induced liver fibrosis by reducing inflammation, and supporting tissue regeneration in male Wistar rats.
Methods: Liver fibrosis was induced in male Wistar rats via CCl4 injection. Following eight weeks of exposure, treatment was administered via tail vein injection using DPSC derived exosomes. Control groups received nothing in negative control group, olive oil in sham group, CCl4 for fibrosis group, PBS for positive control after ccl4 injection. Biochemical markers, oxidative stress indices (SOD, GPX, MDA), protein expression (α-SMA, Desmin), and gene expression (MMP2, PDGFRB, TGF-β, TMSB10, TMEM176b) were evaluated.
Results: The fibrosis group exhibited extensive liver damage, including significant fibrous tissue deposition, elevated liver, metabolic disturbances, and oxidative stress. Fibrosis markers were highly expressed, including α-SMA and Desmin as well as fibrosis-related genes. Stem cell derived exosomes exhibited therapeutic effects compared to fibrosis group, demonstrating the reductions in AST, ALT, metabolic markers, oxidative stress, and gene expression of MMP2, PDGFRB, TGF-β, TMEM176b, and TMSB10. Histological analysis revealed minimal residual fibrosis, in DPSC derived exosomes group, reinforcing their potential as a promising non cellular therapeutic approach for liver fibrosis ($p < 0.05$).
Conclusion: DPSC derived exosomes demonstrated therapeutic potential for liver fibrosis. These findings highlight the promise of exosomes as an advanced, non-cellular therapeutic strategy for hepatic fibrosis.
Keywords: Liver fibrosis, Dental pulp, Exosomes, CCl4

P424, Investigating the effects of losartan on improvement of liver status in non-alcoholic fatty liver disease model (NAFLD) in Zebrafish

Melika Rafizadeh[1], Yalda Khazaei-Poul[2], Hassan Mohammad[3], Mohammadreza Khorramizadeh[3], Mahsa M. Amoli[4], Bagher Larijani [5, 6], Seyed Ali Ziai [1, 7, 8]

1. Department of Pharmacology, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran
2. Department of Medical Biotechnology, School of Advanced Technologies in Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran
3. Zebrafish Core Lab, Endocrinology and Metabolism Research Institute, Tehran University of Medical Sciences, Tehran, Iran
4.Metabolic Disorders Research Center, Endocrinology and Metabolism Molecular-Cellular Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran
5.Endocrinology and Metabolism Research Center, Endocrinology and Metabolism Clinical Sciences Institute, Tehran University of Medical Sciences, Tehran, Iran
6.Endocrinology and Metabolism Research Institute, No. 10, Jalale-Al-Ahmad Ave, Chamran Highway, Tehran, Iran
7. Infectious Diseases and Tropical Medicine Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran
8.School of Medicine, Shahid Beheshti University of Medical Sciences, Koodakyar St., Daneshjoo Blvd., Evin, Tehran, Iran

Background: Non-alcoholic fatty liver disease (NAFLD) is a widespread metabolic disorder characterized by hepatic lipid accumulation unrelated to alcohol intake, yet no approved pharmacological therapy currently exists. Losartan, an angiotensin II receptor blocker with antioxidant and hepatoprotective properties, has been suggested as a potential therapeutic agent. The zebrafish (*Danio rerio*) provides a valuable model for studying metabolic liver disorders due to its genetic and physiological similarities to humans

Methods: Zebrafish were assigned to three groups: (1) control with a standard diet, (2) high-cholesterol diet, and (3) high-cholesterol diet supplemented with Losartan. The intervention lasted two weeks. Survival, body weight, and biochemical parameters including triglycerides, total cholesterol, malondialdehyde, superoxide dismutase, and catalase were evaluated. Liver histology was examined using hematoxylin–eosin staining to assess steatosis. Expression levels of genes involved in lipogenesis, lipolysis, inflammation, fibrosis, and oxidative stress were analyzed through RT-qPCR. Statistical analysis was performed using GraphPad Prism software.

Results: Losartan administration improved survival rates and reduced diet-induced weight gain compared with the untreated high-cholesterol group. The drug also resulted in more favorable lipid profiles and oxidative stress markers. Histological observations showed decreased hepatic fat accumulation, indicating attenuation of NAFLD progression. Gene expression analysis revealed downregulation of inflammatory, fibrotic, oxidative stress–related, and lipogenic genes.

Conclusion: Losartan demonstrates protective effects in a zebrafish model of NAFLD by modulating lipid metabolism and oxidative stress pathways. Its additional influence on survival and weight control suggests broader systemic benefits. These findings support further investigation of Losartan as a potential therapeutic candidate for NAFLD.

Keywords: Losartan, zebrafish, *Danio rerio*, non-alcoholic fatty liver disease, NAFLD

P425, Study of the spermatogenic effect of narcissus extract in azoospermic rat model using histopathological criteria

Mostafa Ashrafi Osalou [1], Hooman Ravaei [2]
1. Medical Anatomical Science Faculty of Medicine, Islamic Azad University-Ardabil Branch
2. Young Researchers and Elite Club, Ardabil Branch, Islamic Azad University, Ardabil, Iran

Background: Male-factor infertility accounts for approximately 60% of infertility cases, with azoospermia being one of the major causes. Despite advances in medical treatments, therapeutic options remain limited. Medicinal plants with antioxidant and regenerative properties are increasingly explored as potential alternatives. This study evaluated the spermatogenic effect of Narcissus extract in busulfan-induced azoospermia rats' model with using histopathological criteria.
Methods: Twenty-one adult male rats were assigned to three groups: healthy control (n=7), azoospermic control (n=7), and treatment (n=7; gavages with Narcissus extract at a 5mg/cc dose for 48 days). Azoospermia was induced using busulfan (30 mg/kg). At the end of treatment, testes and epididymis's were harvested for histopathological and morphometric evaluations of spermatogenesis and seminiferous tubule characteristics.
Results: In control group, seminiferous tubules exhibited degenerative changes and absence of mature spermatozoa. In contrast, the Narcissus-treated group showed significant recovery in seminiferous tubule architecture, presence of mature spermatozoa within the lumen, and partial restoration of sperm parameters compared with azoospermic groups ($p<0.05$). Body weight gain and testicular size improved, approaching values observed in healthy controls.
Conclusion: Narcissus extract demonstrated promising spermatogenic and histoprotective effects in azoospermic rats, suggesting its potential as an adjunctive therapeutic agent for male infertility related to impaired spermatogenesis. Further studies are warranted to elucidate its molecular mechanisms and clinical applicability.
Keywords: Azoospermia, Narcissus, Spermatogenesis, Histopathology.

P426, Exercise and insulin glargine administration in mothers with gestational diabetes improve the apelinergic system function and lipid profile in male offspring

Zohre Zavvari Oskuyeh[1], Keyvan Mehri[2], Hadi Yousefi[2]
1. Student Research Committee, Tabriz University of Medical sciences, Tabriz, Iran
2. Department of Basic Medical Sciences, Khoy University of Medical Sciences, Khoy, Iran

Background: Although data indicates that gestational diabetes mellitus (GDM) is associated with reproductive abnormalities in offspring, the specific biological pathways involved remain inadequately understood. This study aimed to evaluate the effect of voluntary exercise and insulin glargine on GDM-induced metabolic disorders, serum apelin-13 level and mRNA expression of apelin receptors (APJ) in the testis of male offspring.
Methods: Fifty female Wistar rats, aged three weeks, were assigned to either a control diet (n = 10) or a high-fat-high-sucrose diet (to induce GDM; n = 40) for a duration of six weeks prior to mating. Beginning on the seventh day of pregnancy, blood glucose levels over 140 mg/dL were classified as GDM. The GDM animals were subsequently allocated into four subgroups, varying by the presence or absence of voluntary exercise and/or insulin glargine. A glucose tolerance test was conducted on the 15th day of pregnancy to assess insulin resistance. After three weeks, the male offspring were weaned and thereafter provided with a control diet until they reached 12 weeks of age. At the end of the experiment, the lipid profile, apelin-13 in the serum, mRNA expression of apelin receptors (APJ) in the testis were assessed.
Results: Our results indicated that voluntary exercise and/or insulin glargine administration in mothers with GDM ameliorated lipid profile, reduced the serum level of apelin-13, as well as increased APJ expression in testis of male offspring.
Conclusion: Simultaneous administration of voluntary exercise and insulin glargine during pregnancy in mothers with GDM, through regulating the function of the apelinergic system and lipid profile of male offspring, can be considered as a suitable therapeutic strategy for improving metabolic disorders caused by GDM in offspring.
Keywords: Diabetes during gestation, Exercise, Insulin glargine, Apelin, Lipid profile

P427, The effects of hydrogen-rich water on gut microbiota and related health outcomes: A systematic review

Mohammad Saroughi[1], Maryam Zaheer[2], Fereshteh Asgharzadeh[1], Atieh Yaghoubi[3], Majid Khazaei[1,4]
1. Department of Medical Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Microbiology and Virology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
4. Metabolic syndrome Research center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Hydrogen-rich water (HRW) has emerged as a promising therapeutic intervention due to its antioxidant and anti-inflammatory properties. Recent studies suggest that HRW consumption may alter gut microbiota composition, potentially influencing various health outcomes such as metabolic, inflammatory, and neurological conditions. However, no comprehensive synthesis of the evidence exists. This systematic review aims to evaluate and synthesize the available literature on the effects of HRW on gut microbiota composition and its associated health outcomes.
Methods: We conducted a systematic search of electronic databases including PubMed, Scopus, Google Scholar, Cochrane Library, ProQuest, Web of Science, and Gray Literature. We included studies of human or animal populations exposed to HRW, focusing on randomized controlled trials, cohort studies, case-control studies, and relevant in vivo/in vitro studies. Two independent reviewers carried out data extraction, and they assessed the risk of bias using appropriate tools for each study design.
Results: A systematic search identified 68 records, with 12 studies meeting inclusion criteria. The review included three human studies and various animal models, focusing on hydrogen-rich water (HRW) effects on gut microbiota. HRW enriched beneficial bacteria, decreased pathogenic bacteria, improved glucose metabolism and insulin sensitivity, protected the gastrointestinal tract, reduced diarrhea severity, enhanced cognitive function, and improved endurance and muscle recovery in athletes. Overall, HRW modulated oxidative stress and inflammation, promoting health.
Conclusion: hydrogen-rich water (HRW) as a potential therapeutic intervention for improving gut health, enhancing immune response, reducing inflammation, and supporting metabolic regulation, cognitive function, and physical performance.
Keywords: Hydrogen-rich water, gut microbiota, health outcomes, metabolism, antioxidant

P428, Evaluating the histopathological effects of hydrogen-rich water on testicular and epididymal structure in obese rats

Mohammad Saroughi[1], Mohammad Hossein Rigi[1], Seyyedeh Zahra Asghari[1], Elaheh Eshtad[1], Seyedeh Elnaz Nazari[1], Akram Aminian[2], Khatereh Kharazmi[1], Fereshteh Asgharzadeh[1], Majid khazaei[1,3]

1. Department of Medical Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of physiology and pharmacology, Afzalipour faculty of medicine, Kerman University of medical sciences, Kerman, Iran
3. Metabolic syndrome Research center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Obesity is a significant public health issue that negatively impacts reproductive health, particularly spermatogenesis, leading to reduced sperm concentration, hormonal imbalances, and increased oxidative DNA damage. Oxidative stress plays a vital role in the reproductive dysfunction associated with obesity. Hydrogen-rich water (HRW) has emerged as a promising therapeutic agent due to its antioxidant properties, which may help alleviate oxidative stress and protect sperm. This study aims to investigate the protective effects of HRW on spermatogenesis dysfunction in a rat model of high-fat diet (HFD)-induced obesity.

Methods: Thirty male Wistar Albino rats were divided into three groups: Control (normal diet), Obese (high-fat diet with 45% fat), and HFD + HRW (high-fat diet plus daily HRW). After 16 weeks, testes and epididymides were collected for histopathological analysis, assessing germinal epithelium cells (Leydig, Sertoli, and spermatogonia counts), measuring the luminal diameter of seminiferous tubules, and evaluating the height of the epididymal epithelium. Additionally, semen distribution and sperm count were analyzed.

Results: Histopathological evaluation showed significantly lower counts of germinal epithelium cells in the obese group, which improved with HRW treatment. HRW also increased seminiferous tubule diameter and epithelium height while reducing luminal diameter. Semen distribution was significantly decreased in obese rats, but HRW administration improved it, leading to a significant increase in sperm count.

Conclusion: HRW administration can enhance spermatogenesis in obese animals by improving histological changes in the testis and epididymis, indicating its potential benefits in addressing high-fat diet-induced reproductive dysfunction.

Keywords: Obesity, Hydrogen-Rich Water, Spermatogenesis, Testis

P429, Pharmacogenomic for diabetic retinopathy

Samaneh Sepahi[1,2], Adel Ghorani-azam[2,3]
1. Food and Beverages Safety Research Center, Urmia University of Medical Sciences, Urmia, Iran
2. Department of Forensic Medicine and Toxicology, School of Medicine, Urmia University of Medical Sciences, Urmia, Iran
3. Food and Drug Research Center, Food and Drug Administration, Ministry of Health and Medical Education, Tehran, Iran

Background: Various genetic polymorphisms associated with susceptibility to diabetic retinopathy (DR). A number of studies provide evidence for the involvement of different pathogenic factors, including aldose reductase (AR) and protein kinase C activity, as well as processes such as glycation, adhesion, and platelet aggregation.
Methods: A systematic review of the scientific literature was conducted. Searches were performed by *diabetic retinopathy, genotype, phenotype, polymorphism, mutation* keywords using the PubMed database, the Ovid search engine, and the Medline database to retrieve publications concerning phenotypes and genotypes in diabetic retinopathy (DR), the genetic basis of interpatient variability in treatment response, and pharmacogenomics.
Results: Possible pharmacogenetic markers for DR are, angiotensin converting enzyme, selectin P and osteoprotegrin (associated with development); angiotensin ii receptor and uncoupling protein, aldose reductase, neuron-derived orphan receptor, integrin A/B, monocyte chemotactic protein 1, methylenetetrahydrofolate reductase and erythropoietin (increased risk), complement factor H (pathogenesis and development), endothelial lipase and endothelial nitric oxide synthase (increased risk factor for developing severe, sight-threatening), receptor for advanced glycation end products (Increased pro-inflammatory response), transcription factor 7(Variation:rs7903146), vascular endothelial growth factor (increased susceptibility of retinopathy.) VEGF had more variations such as -2578 C/A, 1498 C/T (-460 C/T), -634G/C (405 G/C) and +936C/ that act an important marker for DR risk.
Conclusion: Consequently, enhanced understanding of VEGF gene polymorphisms in diabetic retinopathy, along with the development of novel molecules capable of targeting the "resistant" allele, could contribute to improved visual outcomes in a greater number of patients
Keywords: Diabetic retinopathy, Genotype, Phenotype, Polymorphism, Pharmacogenomic.

P430, Emerging indices in the assessment of anemia and thrombocytopenia pathophysiology in humans, dogs, and cats: An analytical and comparative review

Mahmood Ahmadi-hamedani[1], Kimia Satari[2], Fatemeh Esmaeili[2], Vayazh Vatani[2], Amir Molanourozi[2]
1. Department of Clinical Sciences, Faculty of Veterinary Medicine, Semnan University, Semnan, Iran
2. School of Veterinary Medicine, Semnan University, Semnan, Iran

Background: Anemia and thrombocytopenia are common diagnostic challenges in human and small-animal medicine, requiring rapid distinction between regenerative vs. non-regenerative and central vs. peripheral mechanisms for appropriate treatment. The immature reticulocyte fraction (IRF) and immature platelet fraction (IPF), based on RNA content in newly released cells, are emerging markers that reflect bone-marrow erythropoietic and thrombopoietic activity.
Methods: This analytical review integrates quantitative cut-off data with qualitative pathophysiological insights from recent human and veterinary studies, evaluating how IRF and IPF differentiate types of anemia and thrombocytopenia and how they relate to iron metabolism.
Results: IRF and IPF provide crucial diagnostic tools with species-specific cut-off points: 1- Anemia (Dogs & Cats): IRF effectively differentiates regenerative vs. non-regenerative anemia. High IRF (>44.7% in dogs, >54.3% in cats) distinguishes hemolysis from acute hemorrhage, while low IRF (<16.2% in dogs, <27.7% in cats) indicates bone-marrow failure. 2- Thrombocytopenia (Dogs & Cats): IPF helps separate peripheral from central thrombocytopenia. Low IPF (<6.90 in dogs; <13.60 in cats) strongly suggests a central production defect. 3- Iron Association (Humans): IPF interpretation must consider iron status, as iron metabolism significantly influences thrombopoiesis (e.g., reactive thrombocytosis in iron deficiency).
Conclusion :IRF and IPF are reliable, non-invasive indicators of bone marrow activity across multiple mammalian species. Established reference cut-off values in human and small-animal medicine support their clinical utility for assessing erythropoietic and thrombopoietic response.
Keywords: IRF, IPF, Anemia, Thrombocytopenia, Hematopoietic Physiology.

P431, Evaluation of the therapeutic efficacy of EW-7197 in reducing post-surgical adhesion formation

Atena Soleimani[1], Fereshteh Asgharzadeh[2], Farzad Rahmani[1], Amir Avan[3,4], Saeedeh Mehraban[5], Majid Khazaei[2,3], Seyed Mahdi Hassanian[1,3]

1. Department of Clinical Biochemistry, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Metabolic syndrome Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
4. Department of Modern Sciences and Technologies, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
5. Immunology Research Center, Inflammation and Inflammatory Diseases Division, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Peritoneal adhesion bands are abnormal fibrous structures that form in the abdominal cavity, causing internal organs to adhere to each other or to the abdominal wall. This complication has been reported in approximately 67% to 93% of patients undergoing open abdominal or pelvic surgeries. Adhesions can lead to severe clinical consequences such as infertility, chronic pain, and intestinal obstruction. The TGF-β signaling pathway plays a key molecular role in the fibrogenesis process and the development of postoperative adhesions. EW-7197, a selective inhibitor of the TGF-β type I receptor, has previously been studied for its antifibrotic effects in various organ models.

Methods: In this study, we evaluated the therapeutic potential of EW-7197 in reducing postoperative adhesion formation. Treatment of mice with EW-7197 resulted in a significant reduction in both the occurrence and stability of adhesion bands. After the treatment period, macroscopic assessments were performed based on Nair and Leach scoring systems, followed by histopathological evaluations. In addition, levels of inflammatory cytokines were measured using ELISA, fibrosis-related gene expression was analyzed by qPCR, and oxidative stress indices were assessed.

Results: Our results demonstrated that EW-7197 significantly reduced postoperative adhesions through multiple mechanisms, including downregulation of proinflammatory cytokines, reduction of submucosal edema, and suppression of inflammatory cell infiltration, inhibition of oxidative stress, decreased collagen deposition, and repression of profibrotic gene expression.

Conclusion: These findings highlight the multifaceted protective effects of EW-7197 and suggest its high potential as a promising therapeutic strategy for controlling inflammatory and fibrotic responses following surgery.

Keywords: EW-7197, Peritoneal adhesion, Transforming Growth Factor Beta, Fibrosis, Inflammation

P432, The effect of hydroalcoholic extract of black hawthorn on histopathological structure and myeloperoxidase level of epididymis following testicular ischemia-reperfusion

Reza Shamsi[1], Amirali Shahbazfar[1], Gholamreza Hamidian[2]
1. Department of Pathobiology, Faculty of Veterinary Medicine, University of Tabriz, Tabriz, Iran
2. Department of Basic Sciences, Faculty of Veterinary Medicine, University of Tabriz, Tabriz, Iran

Background: Testicular ischemia-reperfusion (I/R) injury is a significant cause of functional and structural damage to the reproductive system due to production of reactive oxygen species. Black hawthorn (*Crataegus pentagyna*), a plant native to the north of Iran, is rich in antioxidant and anti-inflammatory bioactive compounds.

Methods: Thirty adult male Wistar rats were randomly divided into three groups: 1) Sham group that underwent surgery without testicular torsion or detortion; 2) I/R group that underwent 720° counterclockwise torsion of the left testicle for two hours to induce ischemia, followed by detorsion for reperfusion; and 3) I/R + CPHE group that subjected to the same I/R procedure and subsequently treated with *Crataegus pentagyna* hydroalcoholic extract (CPHE) at a dose of 100 mg/kg daily via gavage for 7 days post-reperfusion. Finally, the animals were euthanized and epididymis of 5 animals were fixed in 10% buffered formalin for histological study and epididymis of another animals were immediately frozen in liquid nitrogen and stored at -70°C for measurement of myeloperoxidase (MPO) level.

Results: The results indicated that I/R induction caused pathological lesions specifically in the anterior segment of the epididymis, though it did not induce significant morphometric changes. Furthermore, I/R significantly elevated MPO levels in the epididymis. Treatment with CPHE prevented the development of pathological lesions in the epididymis and reduced the MPO level compared to the I/R group significantly.

Conclusion: The findings demonstrate that CPHE has the potential to inhibit or ameliorate complications induced by testicular ischemia-reperfusion in the epididymis.

Keywords: Epididymis, Ischemia-Reperfusion, Histopathology, Myeloperoxidase

P433, Metformin in combination with naringenin improved insulin resistance in high fructose-fed mice

Forouzan Sadeghimahalli[1], Mina Salimi[2], Simin Ehsani Vostacolaee[1], Mohadese sadat Molayi[1], Arvin Amiri[3]

1. Department of Physiology, School of Medicine, Mazandaran University of Medical Sciences, Sari, Iran
2. Traditional Medicine and Hydrotherapy Research Center, Ardabil University of Medical Sciences, Ardabil, Iran
3. Department of Veterinary Medicine, Faculty of Veterinary Medicine, Babol Branch Islamic Azad University, Babol, Iran

Background: Excessive fructose intake induces insulin resistance (IR). Metformin as a first line drug for treatment of type 2 diabetes and naringenin as a flavonoid with anti-inflammatory properties are able to improve insulin resistance. But therapeutic effect of their combination was not assessed. So, the present study aims to investigate the combination effect of naringenin and metformin on fructose-induced insulin resistance in male Rats.

Methods: Male Wistar rats are in 5 groups: control (without receiving fructose), fructose-induced insulin resistance; F group (with receiving fructose for 8 weeks), fructose+metformin; FM (receiving metformin for last 4 weeks), fructose+naringenin; FN (receiving naringenin for last 4 weeks) and fructose+metformine+naringenin; FMN (receiving metformin and naringenin for last 4 weeks). At the end of experiment after oral glucose tolerance test (OGTT), following deep anesthesia blood drawing was performed to measure glucose, insulin, Total cholesterol (TC), high-density lipoprotein-cholesterol (HDL-C), low-density lipoprotein-cholesterol 9ldl-c), triglyceride (TG), tumor necrosis factor-alpha (TNF-a), interleukin 6 (IL-6), free fatty acid (FFA), Homeostatic Model Assessment for Insulin Resistance (HOMA-IR).

Results: Although metformin and naringenin each alone showed anti hyperglycemic effects but combined treatment of metformin with naringenin could more remarkably improve glucose intolerance, decrease glucose, TNF-alpha, IL-6, FFA, TG and TG/HDL-C ratio in FMN group compared to F group ($P<0.05$-$P<0.0001$).

Conclusion: Our findings proved that combination therapy with metformin and naringenin as a novel therapeutic approach reduced IR and increased insulin action via improving metabolism of glucose and lipid and inhibition of inflammation.

Keywords: insulin resistance, fructose, pro-inflammatory cytokine, triglyceride.

P434, Effect of fasting and free feeding on white blood cell count and serum lipid profile in broiler chicks under normal temperature following lipopolysaccharide (LPS) injection

Hemn Mehmannavaz[1], Hossein Jonaidi[2], Manouchehr Yousefi [3], Mohammad Zamani Ahmad Mahmoudi[4]
1. Faculty of Veterinary Medicine, Shahid Bahonar University of Kerman, Kerman, Iran
2. Department of Basic Sciences, Faculty of Veterinary Medicine, Shahid Bahonar University of Kerman, Kerman, Iran
3. Faculty of Agriculture, Saravan Higher Education Center, Saravan, Iran
4. Department of Clinical Sciences, Faculty of Veterinary Medicine, Shahid Bahonar University of Kerman, Kerman, Iran

Background: Lipopolysaccharide (LPS) is an endotoxin from Gram-negative bacteria that activates acute-phase immune responses and alters metabolic processes. This study aimed to evaluate the effect of short-term fasting on white blood cell (WBC) count and serum lipid profile in neonatal broiler chicks under normal temperature following LPS injection.
Methods: Forty one-day-old Ross 308 broiler chicks were randomly assigned to ad libitum feeding or 7-hour fasting prior to LPS injection. LPS was administered subcutaneously in the neck at 200 µg, equivalent to 2000 µg per kg body weight. Cumulative feed and water intake were measured for 21 h post-injection. Blood samples were collected via cardiac puncture to determine WBC count and serum lipid profile (glucose, total cholesterol, triglycerides, HDL, LDL, VLDL). Data were analyzed using SPSS 23 and one-way ANOVA.
Results: Following LPS injection, WBC count increased in both groups, with a smaller increase in the fasting group, indicating reduced immune response due to energy restriction. Serum glucose increased in both groups, while LDL increased significantly in the ad libitum group. In the fasting group, glucose, total cholesterol, triglycerides, HDL, and VLDL increased, reflecting mobilization of energy and metabolic adjustments to immune challenge.
Conclusion: Short-term fasting attenuates immune responses and alters metabolic patterns in neonatal chicks. LPS injection elevated WBC and serum lipids, indicating activation of systemic immunity and metabolic adaptation.
Keywords: Lipopolysaccharide, White Blood Cells, Serum Lipid Profile, Broiler Chicks, Fasting

P435, PCOS improvement by chlorogenic acid via miR-93-5p and NF-κB/NLRP3/TLR4 pathway modulation

Seyyedeh Fahimeh Talebi[1]
1. Research Center for Pharmaceutical Nanotechnology, Biomedicine Institute, Tabriz University of Medical Sciences, Tabriz, Iran

Background: PCOS, or polycystic ovarian syndrome, is a prevalent endocrine disorder affecting 5% to 10% of reproductive-aged women, characterized by infertility, hyperandrogenism, and anovulation. Chronic inflammation plays a pivotal role in its pathophysiology. This study investigates the protective effects of chlorogenic acid (CGA), a flavonoid known for its anti-inflammatory and antioxidant properties, against ovarian histopathological damage in a rat model of PCOS.
Methods: Female rats (n=45) were divided into three groups: control, PCOS induced by Estradiol Valerate, and PCOS treated with CGA. After 8 weeks, ovarian tissues were analyzed using periodic Acid-Schiff (PAS), Masson trichrome (MTC), and hematoxylin and eosin (H&E) staining techniques. Additionally, mRNA expression levels of miR-93-5p, NF-κB, NLRP3, and TLR4 were assessed. Moreover, in silico ADMET prediction has performed for CGA. Also, molecular docking analysis has applied to anticipate the interactions between CGA and target proteins including IKKβ, NLRP3, and TLR4.
Results: In silico ADMET prediction showed that CGA is generally safe across major toxicological endpoints. Histological analysis revealed that the PCOS group exhibited large cysts, with oocytes absent and remnants of granulosa cells inside the cysts, along with significant fibrosis, indicating impaired follicular development. In contrast, CGA treatment resulted in a notable restoration of ovarian architecture, a decrease in cyst formation. Furthermore, CGA significantly lowered the mRNA expression levels of miR-93-5p, NF-κB, NLRP3, and TLR4 compared to the PCOS group. Interestingly, the anti-inflammatory potential of CGA was supported by molecular docking analysis, in which NLRP3 demonstrated the most remarkable predicted interaction with CGA.
Conclusion: These findings suggest that CGA effectively mitigates the adverse effects of PCOS, highlighting its potential as a therapeutic agent in managing this condition.
Keywords: PCOS, Chlorogenic Acid, Inflammation, miRNAs

P436, The role rof SGLT2 inhibitors in the multifaceted management of diabetes: Beyond glycemic control

Anahita amiri[1], Azadehalsadat Hosseini dastgerdi[2]
1. Clinical Research Development Center, Najafabad Branch, Islamic Azad University, Najafabad, Iran
2. Department of medicine, Na.C., Islamic Azad University, Najafabad, Iran

Background: It points out the recent progress made in comprehending T2D by organizing its pathophysiological mechanisms and categorizing it into specific subgroups according to physiological factors and polygenic scores. Acknowledging these elements is vital for managing the rates of progression, responses to treatment, and associated complications.
According to experts, SGLT2 inhibitors have offered an exciting treatment option for diabetes. Originally developed as anti-hyperglycemic agents, these drugs exert pleiotropic metabolic responses and have emerged as promising antidiabetic agents with cardio-protective and renoprotective activities. New evidence regarding their therapeutic potential against cancer, male reproductive dysfunctions, and neurodegenerative diseases suggests that more research in this area may reveal novel perspectives on their potential use in the management of other chronic conditions.
Methods: This systematic review examines SGLT2 Inhibitors, Diabetes, Glycemic Control handling using
English and Persian keywords. The research involved electronic databases such as Scopus,
PubMed, SID covering articles from 2010 to 2024. A total of 39 articles were reviewed. The search strategy combined keywords using OR and AND operators, focusing on printed books, quantitative, qualitative, and review articles with accessible full texts in English or Persian.
Results: Beyond merely regulating blood sugar, managing diabetes tries to safeguard general health. For people with type 2 diabetes who are at high risk for heart issue there's exciting news: SGLT2 inhibitors may lower the risk of stroke, especially the kind caused by bleeding in the brain. They might also support brain health by reducing the chances of dementia or memory problems.
Conclusion: This study is significant because it has the potential to change diabetes treatment approaches by placing more emphasis on overall health outcomes rather than just glycaemic control**.**

Keywords: SGLT2 Inhibitors, Diabetes, Glycemic Control, Type 2 diabetes

P437, Effect of high-fat diet on sciatic nerve nitric oxide levels and peripheral neuropathy in type 2 diabetic rats

Sevda Abdolhosseinvand Fanid[1,2], Rana Keyhanmanesh[3], Fariba Ghiasi[4]
1. Student Research Committee, Tabriz University of Medical Sciences, Tabriz, Iran
2. Department of Physiology, Faculty of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran
3. Drug Applied Research Center, Tabriz University of Medical Sciences, Tabriz, Iran
4. Stem Cell Research Center, Tabriz University of Medical

Background: Type 2 diabetes is associated with peripheral neuropathy, which can be exacerbated by high-fat diets. As the sciatic nerve is the largest peripheral nerve, it is more susceptible to metabolic damage than other nerves; therefore, it serves as a suitable model for evaluating sensory function and neuropathy. Additionally, the direct involvement of this nerve in behavioral tests related to the hind limbs allows for a more accurate interpretation of sensory functional outcomes.
Methods: Eighteen male rats were divided into three groups (n=6): control (C), diabetic (D) and diabetic-high-fat diet (D+HFD). Diabetes was induced with a four-week high-fat diet and STZ (ip} injection. After confirmation of diabetes, the D+HFD group received a high-fat diet for 10 weeks. After the completion of the interventions, behavioral tests including hot plate, von Frey and tail withdrawal were performed. Then, after the animals were anesthetized, the sciatic nerve was removed and NO levels, histological and stereological changes were evaluated.
Results: The diabetic group had a significant decrease in mechanical pain threshold, an increase in latency to thermal pain, and a significant decrease in sciatic NO level. Also, in the diabetic group, moderate to severe myelin degeneration around axons, increased connective tissue around nerve fibers in the endonevrium areas, and increased connective tissue bundles in the perinevurium and epineurium areas were observed. All of these changes were more severe in the D+HFD group.
Conclusion: Diabetes and high-fat diet can cause damage to nerve tissue and lead to sensory dysfunction and neuropathy by reducing NO levels.
Keywords: Sciatic nerve, Type2 diabetes, High-Fat Diet, Male rat

P438, Anti-Inflammatory Effects of PGP on Post-Surgical Peritoneal Adhesions in a Rat Uterine Horn Adhesion Model

Mahsa Attarian[1], Mehrdad Moetamani-Ahmadi[2,3], Seyedeh Elnaz Nazari[2,4], Fereshteh Asgharzadeh[2,4], Nima Zafari[2], Mahla Velayati[2], Maryam Alaei[1,2], Seyed Mahdi Hassanian[1,2], Amir Avan[2,5] and Majid Khazaei[2,4]

1. Department of Clinical Biochemistry, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Metabolic Syndrome Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Medical Genetics, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
4. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
5. Faculty of Health, School of Biomedical Sciences, Queensland University of Technology (QUT), Brisbane, Australia

Background: Postoperative peritoneal adhesions are a frequent complication following abdominopelvic surgery, contributing to significant morbidity. *Punica granatum var. pleniflora* (PGP), a subspecies of pomegranate, contains diverse bioactive compounds with reported antioxidant and anti-inflammatory properties. This study aimed to evaluate the efficacy of PGP in reducing postoperative peritoneal adhesion formation in a rat uterine horn adhesion model.
Methods: Eighteen female Albino Wistar rats were randomized into three groups: control (adhesion induction, saline treatment), sham (surgical incision without adhesion induction), and treatment (adhesion induction, oral PGP at 400 mg/kg/day for ten days). Adhesions were generated using standardized abrasion of the uterine horn. On postoperative day 10, macroscopic adhesion scoring was performed, and adhesion tissues were harvested for histopathological evaluation of inflammation and fibrosis. Levels of inflammatory and fibrotic markers were quantified by ELISA.
Results: Oral administration of PGP significantly reduced postoperative peritoneal adhesions in rats by suppressing inflammation and fibrosis, as confirmed by histopathological grading and also decreased inflammatory and fibrotic factors at the protein level of TNF-α, IL-6, TGF-B. Macroscopic evaluation revealed a marked reduction in adhesion severity ($P < 0.001$), accompanied by a decrease in oxidative stress markers (MDA) and an increase in antioxidant enzymes, including SOD and catalase, supporting an antioxidative mechanism and a favorable safety profile for PGP.
Conclusion: PGP effectively diminished postoperative peritoneal adhesion formation in rats, likely through suppression of inflammatory and fibrotic pathways and reduction of oxidative stress. Thus, PGP may represent a safe and promising prophylactic agent for the prevention of intraperitoneal adhesions following abdominopelvic surgery.
Keywords: *Punica granatum var. pleniflora* (PGP), postoperative adhesion, fibrosis, inflammation, oxidative stress, rat model

P439, Hormonal and genetic underpinnings of male infertility: A physiological insight

Parisa Azimi [1], Zohreh Arab [2], Fereshteh Asgharzadeh [3]
1. Faculty of Medicine, Islamic Azad University, Mashhad Branch, Iran
2. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Applied Biomedical Research Centre, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Male infertility affects nearly 50% of infertile couples and stems from hormonal imbalances, genetic mutations, and chromosomal abnormalities. Many cases remain idiopathic, lacking a clear cause despite thorough evaluation. This review examines hormonal, genetic, and idiopathic factors, emphasizing their physiological impact and clinical significance in reproductive health and infertility treatment.
Methods: This review was conducted by systematically searching recent literature in databases such as PubMed, Scopus, and Google Scholar, using keywords including male infertility, hormonal imbalance, genetic abnormalities, chromosomal aberrations, and idiopathic infertility.
Results: The hypothalamic–pituitary–gonadal (HPG) axis regulates male reproduction by controlling GnRH, LH, and FSH, essential for testosterone production and spermatogenesis. Hypogonadotropic hypogonadism (e.g., Kallmann syndrome) lowers gonadotropin and testosterone levels, reducing sperm production, Hypergonadotropic hypogonadism (e.g., Klinefelter Syndrome (KS)) affects testicular function, hyperprolactinemia disrupts the HPG axis, leading to hypogonadism, Androgen insensitivity due to receptor mutations further impairs spermatogenesis. Hormonal imbalances significantly compromise testicular function, ultimately causing male infertility.
Male infertility is influenced by chromosomal abnormalities (e.g., KS, 46, XY mosaicism, and Y-chromosome deletions) and gene mutations (e.g., CFTR mutations in cystic fibrosis). Structural abnormalities like chromosomal translocations, AZF deletions and ring chromosomes disrupt spermatogenesis. Numerical abnormalities (e.g., KS, Down syndrome) are linked to azoospermia or oligospermia. Kartagener syndrome (due to ciliary dysfunction) and Noonan syndrome (gonadal failure) also contribute to infertility. Genetic testing and karyotyping are essential tools for identifying these cases.
Conclusion: Idiopathic male infertility (IMI) affects 25% of infertile men with abnormal semen parameters despite normal clinical, hormonal, and genetic evaluations. Causes remain unclear but may include genetic mutations, epigenetic dysregulation, sperm DNA fragmentation, immune responses, microbiome changes, and environmental toxins. Further research is needed to uncover underlying mechanisms.
Keywords: Male infertility, Hormonal imbalance, Genetic mutations, Spermatogenesis, Idiopathic infertility

P440, Comparative study of analgesic effect of vitagnus and fennel extracts on primary dysmenorrhea

Farzaneh Farajian Mashhadi[1], Mahin Edalatian [2], Roya Khojandi [3]
1. Department of Pharmacology, School of Meicine, Zahedan University of Medical Sciences, Zahedan, Iran
2. Islamic Azad University, School of Medicine, Zahedan, Iran
3. Islamic Azad University, School of Medicine, Zahedan, Iran

Background: Primary dysmenorrhea is a painful uterine contraction that affects quality of life and causes disability and inefficiency in severe cases. The aim of this study was to investigate the effect of Vitagnus and Fennel in women with primary dysmenorrhea.
Methods: This clinical trial includes 246 women with primary dysmenorrhea referred to the gynecology clinic of Zahedan. Participants were randomly assigned to receive either Vitagnus or Fennel extract. The Visual Analogue Scale (VAS) which measures pain intensity, was applied. A checklist was designed to collect information from patients.
Results: The mean pain intensity before the intervention was 7.1 in the Vitagnos group (V) and 7.01 in the Fennel group (F). After the intervention in the first cycle, it was 4.15 in V and 3.29 in F group, and in the second cycle it was 2.25 in V and 2.92 in F group. Which showed a decrease in pain intensity after the intervention. After taking Vitagnus, (1.2%) 3 patients reported nausea, (0.4%) 1 person reported nausea with vomiting and no side effects was reported after taking fennel. Out of 246 patients, 161 expressed moderate pain intensity and 85 patients expressed severe pain. Out of 120 people with mild severity, 34 were in V and 86 people were in F and out of 126 people with moderate intensity, 86 people were in V and 40 people were in F group.
Conclusion: Fennel and Vitagnos were able to reduce dysmenorrhea during treatment. However the effect of fennel was greater with less side effect.
Keywords: Plant extract, Vitagnus, Fennel, Dysmenorrhea

P441, Impact GLP-1Ras in hepatic insulin resistance

Mahdieh Gheysipour[1,4], Yasaman Akbarian[1,4], Reyhaneh Moghadam[1,4], Hossein Javid[1,2,3]
1. Department of Medical Laboratory Sciences, Varastegan Institute for Medical Sciences, Mashhad, Iran
2. Department of Clinical Biochemistry, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Surgical Oncology Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
4. Students research committee, Varastegan Institute for Medical Sciences, Mashhad, Iran

Background: Hepatocytes perform several functions, including regulating insulin metabolism. They do this through the storage and synthesis of glucose and a wide variety of lipids in these cells. The accumulation of fats in liver cells activates signaling pathways in the liver that are effective in insulin resistance and cause metabolic dysregulation in the liver. One of the diseases affected by hepatic insulin resistance is MASLD, for which GLP-1Ras is the proposed treatment.
Methods: This review article has been prepared by studying and reviewing research articles published in reputable databases such as PUBMED and Google Scholar. The presented materials have been collected after studying 15 articles and deleting 10 of them, by reviewing 5 articles in the period from 2023 to 2024.
Results: GLP-1 receptor agonists (such as liraglutide) are a group of anti-diabetic drugs that have a similar structure to the human hormone GLP-1. The drug liraglutide in MASLD patients significantly reduces liver fat and levels of inflammation and oxidative stress, inhibiting liver fibrosis. Also, GLP-1Ras can activate the PI3K/Akt pathway in hepatocytes, improving insulin signaling.
Conclusion: GLP-1Ras are a good option for treating MASLD, but they have challenges, such as cost, side effects, and how to get the drug. It is hoped that with the advancement of medicine, these challenges will be solved. The future prospects of this treatment are very promising, given the promising results of GLP-1Ras treatment and the development of oral forms of these drugs.
Keywords: GLP-1Ras, MASLD, Hepatic insulin resistance.

P443, Probiotic supplementation as an adjunct therapy in type 2 diabetes: Insights from the gut–pancreas axis

Hanieh Keikhay Moghaddam[1], Fateme Kourepaz[2]
1. Department of Nutrition Sciences, Varastegan Institute for Medical Sciences, Mashhad, Iran
2. Student research committee, Varastegan Institute for Medical Sciences, Mashhad, Iran

Background: Type 2 diabetes mellitus (T2DM) is a progressive metabolic disorder marked by insulin resistance, chronic low-grade inflammation, and impaired β-cell function. Emerging evidence indicates that gut microbiota dysbiosis plays a central role in T2DM pathophysiology. Probiotic supplementation, as a microbiota-modulating adjunct therapy, has gained attention as a potential strategy to improve metabolic control via the gut–pancreas axis. This review aims to evaluate both molecular mechanisms and clinical outcomes of probiotic supplementation as an adjunctive intervention in T2DM management.
Methods: A narrative review of peer-reviewed literature was conducted using PubMed, Scopus, and Web of Science. Studies addressing molecular pathways influenced by probiotics, effects on the gut–pancreas axis, and human clinical trials reporting glycemic outcomes—including fasting blood glucose (FBG), glycated hemoglobin (HbA1c), fasting insulin (FI), and HOMA-IR—were included.
Results: Probiotic supplementation modulates gut microbiota composition, enhances production of short-chain fatty acids (SCFAs), reinforces intestinal barrier integrity, reduces metabolic endotoxemia, and stimulates incretin secretion, particularly GLP-1, thereby improving insulin sensitivity and glucose homeostasis. Meta-analyses of randomized controlled trials demonstrate significant reductions in FBG, HbA1c, and insulin resistance indices following probiotic or synbiotic interventions. Nonetheless, heterogeneity in strain selection, dosage, colony-forming units (CFU), and intervention duration leads to variable clinical outcomes.
Conclusion: Current evidence supports probiotics as a promising adjunct therapy in T2DM, primarily through modulation of gut microbiota and activation of the gut–pancreas axis. However, standardized probiotic formulations, optimal dosing strategies, and long-term, high-quality clinical trials are needed to confirm efficacy, ensure safety, and guide clinical application.
Keywords: Probiotics, Synbiotics, Type 2 diabetes, Gut–pancreas axis

P444, The relationship between obesity and types of anemia

Morteza Garmei[1], Fatemeh Shams[1,2]
1. Department of Hematology and Blood Banking, Mashhad University of Medical Sciences, Mashhad, Iran
2. Cancer molecular pathology research center, Mashhad University of medical sciences, Mashhad, Iran

Background: Today, obesity and anemia are among the most common health-threatening phenomena worldwide. Although the molecular processes of each have been identified, the relationship between obesity and types of anemia is still unknown and Different studies sometimes report contradictory results about this relationship. The aim of this study is to gain a comprehensive view of the relationship between obesity and types of anemia and the related mechanisms.
Methods: In this study, in order to obtain a comprehensive view, we compare and analyze the results of various studies on the relationship between obesity and types of anemia, including iron deficiency anemia, megaloblastic anemia, and anemia of chronic disease.
Results: Obesity is often associated with chronic mild inflammation, and this inflammation can cause anemia by increasing hepcidin, a protein that regulates iron absorption. However, a review of the results of some studies shows that although obesity affects some blood parameters such as serum iron and ferritin levels and transferrin saturation, it does not significantly affect hemoglobin. Also, increasing BMI in individuals can be associated with decreased serum vitamin B12 levels and an increased risk of megaloblastic anemia.
Conclusion: Obesity affects iron homeostasis in several ways including inflammation. Although iron deficiency anemia is more common in obese individuals, some studies have refuted a definitive link between obesity and iron deficiency anemia. According to the results of the studies, there is a stronger relationship between obesity and the occurrence of anemia of chronic disease and megaloblastic anemia.
Keywords: Anemia, Obesity

P445, The effect of probiotic supplements on metabolic factors after Roux-en-Y (RYGB) surgery

Amir Goli[1,2], Negar Norouzi[1,2], Amirreza Khamineh[1,2], Mohammad Reza Mazaheri Habibi[3]
1. Department of Nutrition sciences, Varastegan Institute for Medical Sciences, Mashhad, Iran &
2. Student Research Committee, Varastegan Institute for Medical Sciences, Mashhad, Iran
3. Department of Health Information Technology, Varastegan Institute for Medical Sciences, Mashhad, Iran

Background: Roux-en-Y gastric bypass (RYGB) is a highly effective and durable treatment for severe obesity, leading to marked weight loss and remission of comorbidities. However, postoperative anatomical and physiological changes can disrupt gut microbiota composition and function. Probiotic supplementation has been proposed to restore intestinal eubiosis and potentially improve postoperative outcomes, including metabolic and nutritional parameters.
Methods: This systematic review was conducted in 2025 by searching the databases Scopus, Web of Science, PubMed, and Google Scholar search engine. The keywords "probiotic," "bypass," "bariatric surgery," and "supplementation" were examined in relevant studies up to 2025. English-language studies that examined the effect of probiotic supplements in the management of anthropometric, glycemic, and lipid profiles after RYGB met the inclusion criteria.
Results: A total of 29 articles were retrieved from the aforementioned databases. After reviewing titles and abstracts and applying inclusion and exclusion criteria, 5 articles were included. In all studies (100%), probiotics reduced body weight by an average of 23 kilograms. In two articles (40%), total cholesterol and triglyceride levels improved significantly (18 mg/dL greater reduction in the probiotic group than the placebo). In three articles (60%), probiotics diminished HbA1c by about 5.8%.
Conclusion: The findings of this study demonstrate that the probiotic supplementation after RYGB may help modulate the gut microbiota and improve metabolic parameters, with a potential benefit in reducing weight regain. However, its long-term clinical value remains uncertain, and larger, longer-term studies are required to confirm its efficacy and safety.
Keywords: Bariatric surgery, Probiotics, Gastric bypass

P446, From molecule to clinical function: Metabolic inhibition in type 2 diabetes with recombinant NMP protein; Glucose reduction and lipid profile modification in rats

Hamidreza Golian[1], Mojtaba Shabani-Kenari[1], Ehsan Mati-Poor[2], Amin Mati-Poor[3], Amir Panahian[2], Ali HajiMohammadRahim[3], Nooshin Roudbari[3], ELika Abbas-Zadegan[3], Morteza Eskandari[4], Mehrdad Hosein zadeh[4], Shilan Nasri[1]

1. Department of Medical Biotechnology, Faculty of New Biosciences, Medical University of Tehran, Tehran, Iran
2. Department of Nursing, Faculty of Nursing and Midwifery, Alborz University of Medical Sciences, Karaj, Iran
3. Department of Nursing, Faculty of Nursing and Midwifery, Iran University of Medical Sciences, Tehran, Iran
4. Department of Biotechnology, Faculty of New Sciences and Technologies, University of Science and Culture (ACCGR), Tehran, Iran

Background: Type 2 diabetes mellitus disrupts carbohydrate and lipid metabolism. This study evaluated the metabolic effects of a recombinant NMP protein on glycemia and lipid profile in streptozotocin (STZ)-induced type 2 diabetic rats.

Methods: Diabetic rats received intraperitoneal injections of insulin, glibenclamide, recombinant NMP Protein (various doses), or placebo for 14 days; blood was collected thereafter for glucose and lipid measurements. Recombinant NMP was produced from a codon-optimized gene cloned into the pET-28a vector bearing an N-terminal His-tag and expressed in E. coli BL21(DE3). Expression parameters (IPTG concentration, temperature, induction time) were optimized to favor soluble product; insoluble fractions were solubilized in 6 M urea and refolded by stepwise dialysis when required. Purification employed Ni-NTA affinity chromatography followed by size-exclusion chromatography. Endotoxin was removed (Triton-X114 phase separation) and preparations were sterile-filtered. Product identity and integrity were confirmed by SDS-PAGE, Western blot, mass spectrometry, and circular dichroism; concentration and endotoxin levels were assessed by BCA and LAL assays. In vitro antioxidant assays verified functional activity prior to in vivo use.

Results: STZ induced significant increases in glucose, triglycerides, total cholesterol, and LDL and a decrease in HDL versus controls. Treatment with insulin, glibenclamide, recombinant NMP, and placebo for 14 days significantly lowered glucose, TG, cholesterol and LDL and raised HDL compared with diabetic controls. Co-administration of low-dose NMP (40 mg/kg) with glibenclamide (10 mg/kg) produced a greater glycemic reduction than glibenclamide alone, though lipid parameters were not further improved. HbA1c decreased significantly ($P<0.001$) and eGFR showed a significant decline ($P<0.0001$).

Conclusion: Recombinant Protein NMP demonstrates promising glycemic and lipid-modulating effects in STZ diabetic rats; its activity may relate to isatin/imidazole moieties and antioxidant properties, with apparent target selectivity for glucose homeostasis.

Keywords: Recombinant NMP, Type 2 Diabetes mellitus, Glycemic control, Lipid-profile modulation, Antioxidant activity

P447, The role of circulatory disorders and anatomical abnormalities in male infertility

Negin Motevalizadeh Kakhki[1], Zohreh Arab[2], Fereshteh Asgharzadeh[3]
1. Faculty of Medicine, Islamic Azad University, Mashhad Branch, Iran
2. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Applied Biomedical Research Centre, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Male infertility is a multifactorial disorder influenced by anatomical abnormalities and circulatory dysfunctions that impair testicular function. Adequate testicular blood flow is essential for normal spermatogenesis, sperm maturation, and reproductive capacity. Anatomical and vascular pathologies contribute significantly to impaired fertility through interconnected mechanisms affecting both sperm production and endocrine function.
Methods: This narrative review summarizes current evidence regarding the role of anatomical and circulatory disorders in male infertility. Relevant studies investigating testicular vascular function, structural abnormalities, oxidative stress, and sperm dysfunction were reviewed to provide an integrated overview of their impact on male reproductive health.
Results: Anatomical abnormalities, including varicocele, cryptorchidism, and ductal obstructions, impair sperm production and transport. Varicocele, characterized by dilation of the pampiniform plexus, increases testicular temperature and oxidative stress, resulting in reduced sperm quality. Cryptorchidism compromises spermatogenesis when not corrected early in life, whereas congenital or acquired ductal obstructions, including congenital absence of the vas deferens, may lead to obstructive azoospermia. Circulatory disorders such as testicular ischemia, hypoxia, and torsion disrupt testicular perfusion, promote germ cell apoptosis, impair Leydig cell function, reduce testosterone production, and ultimately compromise fertility. In addition, sperm dysfunction is aggravated by genetic abnormalities, hormonal disturbances, environmental exposures, obesity, chronic stress, and oxidative damage, leading to impaired sperm motility, morphology, and fertilization potential.
Conclusion: Anatomical abnormalities and circulatory dysfunctions are major contributors to male infertility through overlapping mechanisms involving oxidative stress, hormonal imbalance, and impaired spermatogenesis. A comprehensive understanding of these mechanisms may improve diagnostic accuracy and facilitate the development of more effective therapeutic strategies for male infertility.
Keywords: Male infertility, Testicular function, Varicocele, Circulatory disorders, Sperm quality

P448, The interplay between glucose metabolism and sars-cov-2: implications for diabetes, insulin resistance, and COVID-19 severity

Hosein Motlagh [1], Zohreh Arab [2], Saeed Niazmand [2], Seyed Abdolrahim Rezaee [3]
1. Faculty of Medicine, Islamic Azad University, Mashhad Branch, Iran
2. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Immunology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: The COVID-19 pandemic has highlighted the complex and bidirectional relationship between glucose metabolism and SARS-CoV-2 infection. Diabetes mellitus (DM) and insulin resistance (IR) are major risk factors for severe COVID-19, while SARS-CoV-2 infection itself can disrupt glucose homeostasis and contribute to metabolic dysfunction. Understanding these interactions is essential for improving clinical management and identifying novel therapeutic targets.
Methods: This narrative review summarizes current evidence on the molecular interactions between SARS-CoV-2 infection and glucose metabolism. Relevant studies investigating hyperglycemia, insulin resistance, pancreatic β-cell dysfunction, viral entry mechanisms, and potential therapeutic interventions were reviewed to provide an integrated overview of viral-metabolic crosstalk.
Results: Diabetes mellitus is associated with an increased risk of hospitalization, mechanical ventilation, and mortality in patients with COVID-19. Hyperglycemia, whether pre-existing or infection-induced, promotes ACE2 receptor expression, enhances viral replication, and amplifies pro-inflammatory cytokine responses. SARS-CoV-2 alters host metabolism through increased glycolysis, mitochondrial reactive oxygen species (ROS) production, and HIF-1α activation, resulting in immune dysfunction and insulin resistance. The virus may directly infect pancreatic β-cells via entry factors including ACE2, TMPRSS2, NRP1, TFRC, and potentially DPP-4, leading to impaired insulin secretion and new-onset diabetes. Emerging evidence also suggests that insulin resistance exacerbates inflammatory signaling and may facilitate viral entry through angiotensin II-mediated pathways. Pharmacological agents such as metformin, through modulation of the PI3K/AKT/mTOR and AMPK signaling pathways, may improve glycemic control while exerting immunomodulatory effects. Furthermore, proteins such as GRP78 have emerged as potential mediators of both SARS-CoV-2 pathogenesis and metabolic regulation, representing promising therapeutic targets.
Conclusion: SARS-CoV-2 infection and glucose metabolism are closely interconnected through mechanisms involving hyperglycemia, insulin resistance, β-cell dysfunction, oxidative stress, and immune dysregulation. A better understanding of these molecular interactions may improve the management of COVID-19 in individuals with metabolic disorders and support the development of targeted therapeutic strategies for future viral pandemics.
Keywords: SARS-CoV-2, Diabetes mellitus, Hyperglycemia, Insulin resistance, Glucose metabolism

P449, Impact of desloratadine on kidney function disorders induced by ischemia/reperfusion in male rats

Atefeh Maghsoudi[1], Firouzeh Gholampour[1]
1. Department of Biology, School of Science, Shiraz University, Shiraz, Iran

Background: Renal ischemia-reperfusion injury (IRI) is a common clinical problem characterized by an inflammatory response that occurs when blood flow to the kidney is temporarily reduced or interrupted, followed by the restoration of blood flow. During I/R injury, there is an increase in inflammatory mediators, such as histamine, which can further damage tubular and endothelial cells. This study aimed to investigate the protective effects of desloratadine against renal functional impairment caused by 45 minutes of ischemia followed by 24 hours of reperfusion in male Sprague-Dawley rats.

Methods: The research involved 21 adult male Sprague-Dawley rats (weighing 220-240 g), divided into three groups: Sham, I/R (which involved 45 minutes of bilateral renal artery occlusion followed by 24 hours of reperfusion), and IR+Deslora (which involved administering desloratadine at a dose of 1 mg/kg in one milliliter of distilled water via gavage).

Results: After 24 hours of reperfusion, samples of urine, plasma, and kidney tissue were collected. The I/R injury resulted in kidney dysfunction, as evidenced by decreased creatinine clearance, increased fractional excretion of sodium, reduced urine osmolality, and impaired effective water reabsorption, along with heightened oxidative stress in kidney tissue. Administration of desloratadine mitigated all these changes in the I/R group.

Conclusion: Therefore, it can be concluded that desloratadine enhances kidney function by reducing oxidative stress and strengthening the antioxidant defense system.

Keywords: Renal ischemia-reperfusion injury, Inflammation, Desloratadine, Histamine, Water reabsorption

P450, Determining the relationship between sexual deprivation and sex hormone levels in male rats

Maryam maleki[1], Enayat Anvari[1], Ali Larti[1]
1. Department of Physiology, School of Medicine, Ilam University of Medical Sciences, Ilam, Iran

Background: Assuming that sexual deprivation leads to disruptions in brain physiological function and, consequently, to dysfunction of the brain-regulated gonadal glands, the present study investigated the effect of sexual deprivation on sex hormone levels in male rats.
Methods: In this study, 40 male and female rats (24 males and 16 females), each weighing approximately 100 grams, were divided into three groups: control, test group A, and test group B. In the control group, female rats—living freely with males—underwent bilateral ovariectomy (to prevent reproduction) and engaged in sexual activity. In test group A, healthy males and females were housed in the same cage but separated by a mesh barrier (to prevent sexual interaction). Test group B consisted of only male rats, two per cage (no sexual interaction). After three months, the animals were anesthetized, and blood samples were collected for hormone analysis.
Results: No significant differences in body weight were observed among the groups at the beginning and end of the experiment. No statistically significant differences were found among the groups in levels of testosterone, free testosterone, dehydroepiandrosterone (DHEA), and progesterone.
Conclusion: Based on the results, it can be concluded that sexual deprivation likely does not affect the neural and hormonal components regulating the gonads (i.e., the hypothalamus, pituitary gland, and testes).
Keywords: Rat, Sexual Deprivation, Testosterone, Dehydroepiandrosterone, Progesterone

P451, Link between lifestyle and non-alcoholic fatty liver disease: The influence of nutrition and pollutants

Elham Karimi-Sales[1,2]
1. Stem Cell Research Center, Tabriz University of Medical Sciences, Tabriz, Iran
2. Department of Physiology, Faculty of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran

Background: The modern lifestyle involves less physical activity, high consumption of ultra-processed foods (UPF), and exposure to various air and food pollutants, all of which contribute to the rising prevalence of non-alcoholic fatty liver disease (NAFLD). This is the most common chronic liver disease and can progress to non-alcoholic steatohepatitis (NASH), liver fibrosis, cirrhosis, and liver cancer. Therefore, it is essential to address the factors contributing to NAFLD and the underlying mechanisms responsible for these effects.
Methods: A combination of MeSH terms and keywords related to NAFLD, environmental pollutants, and nutrition was searched in Scopus, PubMed, Google Scholar, and Web of Science.
Results: Recent studies show that UPF, a calorie-rich but nutritionally poor food, negatively affects liver health. High UPF consumption increases the risk of NAFLD, obesity, and insulin resistance. Additionally, with the increase in plastic production and the emergence of microplastics and nanoplastics as serious health concerns, numerous studies have investigated these issues . These studies demonstrate that nanoplastics ingested through food and drink accumulate in the liver, leading to oxidative stress, inflammation, fat accumulation in hepatocytes, cell death, activation of hepatic satellite cells, and liver fibrosis. This risk is particularly high for individuals with obesity or NAFLD, as it can accelerate the progression of liver disease. Additionally, a recent meta-analysis demonstrated a link between long-term exposure to air pollution and increased risk of NAFLD.
Conclusion: Increasing evidence indicates that UPF overconsumption, combined with exposure to environmental pollutants, significantly raises the risk of developing NAFLD and also promotes its progression.
Keywords: Lifestyle, Non-alcoholic fatty liver disease, Nutrition, Pollutants

P452, Exercise and insulin glargine administration in mothers with gestational diabetes ameliorate hypothalamic-pituitary-gonadal axis function and sperm parameters in offspring

Keyvan Mehri[1], Zohre Zavvari Oskuyeh[2], Hadi Yousefi[1]
1. Department of Basic Medical Sciences, Khoy University of Medical Sciences, Khoy, Iran
2. Student Research Committee, Tabriz University of Medical sciences, Tabriz, Iran

Background: Despite evidence linking gestational diabetes mellitus (GDM) to reproductive anomalies in offspring, the precise molecular mechanisms involved are not well comprehended. This research designed to assess the impact of voluntary exercise and insulin glargine on DDG-induced sex hormones alterations and reproductive disorders in male offspring.
Methods: Fifty female Wistar rats, aged three weeks, were divided into two groups: a control diet group (n = 10) and a high-fat-high-sucrose diet group to induce gestational diabetes mellitus (GDM; n = 40). The duration of the dietary intervention was six weeks prior to mating. Starting from the seventh day of pregnancy, blood glucose levels exceeding 140 mg/dL were categorised as gestational diabetes mellitus (GDM). The GDM animals were divided into four subgroups based on the presence or absence of voluntary exercise and/or insulin glargine. A glucose tolerance test was performed on the 15th day of pregnancy to evaluate insulin resistance. Following a three-week period, the male offspring were weaned and subsequently given a control diet until they attained 12 weeks of age. At the end of the experiment, sex hormones, and sperm parameters were assessed.
Results: Our results indicated that voluntary exercise and/or insulin glargine administration in mothers with DDG ameliorated sex hormones, and quality of sperm in offspring.
Conclusion: Co-administration of voluntary exercise and insulin glargine during pregnancy by regulating the function of the hypothalamic-pituitary-gonadal axis and improving sperm parameters complications induced by GDM, can be considered as a suitable therapeutic strategy for improving sub-or in-fertility in the male offspring.
Keywords: Diabetes during gestation, Exercise, Insulin glargine, Male reproductive, Sperm

P453, Boosting pain tolerance: The power of aerobic exercise and chamomile flower hydroethanolic extract in type 2 diabetic rats

Ali Heidarianpour[1], Azadeh Naderi [2], Maryam Keshvari [3]
1. Faculty of Sport Sciences, exercise physiology department, Bu-Ali Sina University, Hamedan, Iran
2. Department of Physical education, Technical and Vocational University (TVU), Tehran, Iran
3. Department of Physical Education and Sport Sciences, Faculty of Literature and Human Sciences, Lorestan University, Khoramabad, Iran

Background: This study explores how oxidative stress contributes to neuropathy and examines whether aerobic exercise and chamomile flower hydro-ethanolic extract can improve pain tolerance in rats with type 2 diabetes.
Methods: 24 male Wistar rats were made diabetic using streptozotocin and nicotine amide, then divided into four groups: chamomile extract treatment, exercise, a combination of both, and a control. The chamomile group received daily extract in drinking water, while the exercise group completed treadmill training for 14 weeks. Pain thresholds were measured before and after interventions using the tail-flick, immersion, and hot plate tests.
Results: indicate that all intervention groups had significantly higher pain thresholds compared to controls, especially in the tail-flick test.
Conclusion: The combination of exercise and chamomile, and exercise alone, outperformed chamomile extract in the hot plate and immersion tests. The findings suggest that both aerobic exercise and chamomile extract can effectively alleviate neuropathic pain in diabetic rats.
Keywords: Neuropathy, Endurance training, Chamomile flower, Pain threshold, Diabetes mellitus

P454, Investigating the effects of induced ulcerative colitis on heart rate variability in isolated hearts of male rats

Roham Mazloom[1], Seyed Farzam Nezamalhosseini Ezabadi[1], Gholamreza Bayat[1], Marjan Hosseini[1]
1. Department of Physiology-Pharmacology-Medical Physics, School of Medicine, Alborz University of Medical Sciences, Karaj, Alborz Province, Iran

Background: Ulcerative colitis is a common inflammatory disease that affects various organs and systems of the body. One of the important organs impacted by this condition is the heart, particularly its rhythm. Therefore, this study investigates the effects of induced ulcerative colitis on heart rate variability in male rats.
Materials and methods: After the induction of ulcerative colitis, the animals were examined in both In Vivo and Ex Vivo conditions. In the Ex Vivo condition, the Langendorff apparatus was used to isolate the hearts of the animals, record ECG, and measure coronary flow. Both linear and nonlinear HRV indices were evaluated.
Results: In the In Vivo condition, the heart rate in the ulcerative colitis group showed a significant decrease compared to the control group ($p < 0.05$). Additionally, under the same conditions, the SD1/SD2 ratio indicated a predominant effect of tramadol ($p < 0.05$), and the entropy levels showed a significant decrease under the influence of ulcerative colitis ($p < 0.05$). In the Ex Vivo condition, the SD1/SD2 ratio and entropy levels demonstrated a significant increase under ulcerative colitis conditions ($p < 0.05$). Meanwhile, the coronary flow rate in the hearts subjected to induced ulcerative colitis significantly decreased compared to the control group ($p < 0.05$).
Conclusion: Ulcerative colitis can affect cardiac rhythm and function both independently and through the autonomic nervous system.
Key words: Ulcerative colitis, Heart rate variability, Coronary flow, Autonomic nervous system

P455, Thyroid hormonal and structural changes from non-ionizing radiation in rats

Raziye Hashemian[1], Amirali Ebrahimbabaei[1], Zeynab Seyedi Sarhad[2], Alireza Tavassoli[3], Manzarbanoo Shojaeifard[4]

1. Student Research Committee, Fasa University of Medical Sciences, Fasa, Iran
2. Radiation Protection Research Center, School of Paramedicine, Shiraz University of Medical Sciences, Shiraz, Iran
3. Department of Pathology, School of Medicine, Fasa university of Medical Sciences, Fasa, Iran
4. Department of Physiology, School of Medicine, Fasa university of Medical Sciences, Fasa, Iran

Background: Growing exposure to wireless devices has raised concerns about non-ionizing electromagnetic fields affecting endocrine organs. This study evaluated the effects of non-ionizing radiation on thyroid hormone levels and follicular architecture in rats.

Methods: Seventy Sprague-Dawley rats (30 males, 40 females; 2 months old, 200–220 g) were divided into exposure and control groups. Male rats (Group A) received 2-hour daily exposure to 2.45 GHz Wi-Fi or mobile jammer radiation for two weeks. Group B included non-pregnant females, pregnant females, and their offspring. The pregnant subgroup consisted of both exposed and non-exposed rats; in the exposed subgroup, only jammer radiation was applied. After delivery, the offspring—male or female—were classified according to whether their mothers had been exposed or unexposed during pregnancy. Serum thyroid hormones were measured, and thyroid tissues were examined histologically, focusing on epithelial and colloid areas of follicles.

Results: Male rats exposed to mobile jammer radiation had significantly higher T4 compared to controls ($p = 0.037$). Among offspring, only males showed elevated T3 following jammer exposure (mean = 109.00 vs. 65.50 in controls, $p < 0.001$). Histological analysis revealed structural changes in follicular architecture correlating with hormonal alterations.

Conclusion: Non-ionizing radiation may disrupt thyroid hormone regulation and follicular structure. Findings highlight the need to review safety standards, especially for sensitive populations.

Keywords: Non-ionizing radiation, Rat thyroid function, Hormonal regulation, Follicular histology, Endocrine disruption

P456, Evaluation of antioxidant capacity of melatonin in female Wistar rat kept in light pollution conditions

Reza Varanloo[1], Morteza Behnam-Rassouli[1], Amirhossein Koochakzaie[1], Fatemeh Saberi-iraj[1]
1. Department of Biology, Faculty of Science, Ferdowsi University of Mashhad, Mashhad, Iran

Background: Exposure to night-light, known as light pollution, disrupts circadian rhythms and may affect vital organs. Melatonin, as a key hormone regulating circadian rhythms compensate for such disruptions due to its probable antioxidant properties.
Methods: Thirty female Wistar rats (3–4-months-old) were randomly divided into 6 groups (n=5) as follows; control (12:12 hour light/dark; LD), control+Melatonin, experimental 1 (16:8 LD), experimental 1+Melatonin, experimental 2 (20:4 LD), and experimental 2+Melatonin. Melatonin was dissolved in drinking water (0.8 µg/mL). At the end of the experimental period (day 42), when rats were at diestrous stage of estrous cycle (determined by vaginal smear cytology) they were sacrificed and their right kidney and liver collected for following enzymes assay: catalase (CAT), malondialdehyde (MDA) and total antioxidant capacity (TAC).
Results: In the kidney: CAT levels did not affect by either night light or melatonin administration; TAC levels significantly increased ($P<0.001$) and decreased ($P<0.05$) in 16:8 LD and 12:12 LD groups, alternatively by melatonin administration: MDA levels in both 16:8 LD and 12:12 LD groups significantly reduced ($P<0.001$) by melatonin consumption.In the liver: CAT level in 16:8 LD group significantly reduced ($P<0.001$) by melatonin administration (compared to the control group); TAC level showed no significant change; MDA level remarkably reduced in 16:8 LD group ($P<0.001$).
Conclusion: It can be concluded that melatonin reduces oxidative stress in both kidney and liver. the kidney is more sensitive to night light as well as melatonin administration.
Keywords: Light pollution, Melatonin, Liver, Kidney, Oxidative stress

P457, Systematic review of clinical trials (2015–2025) of nutritional, supplementary, and microbiota-targeted interventions for managing psoriasis and psoriatic arthritis

Zahra Baghani[1], Maryam Ebrahimi[1]
1. Students Research Committee, Bushehr University of Medical Sciences, Bushehr, Iran

Background: Psoriasis and psoriatic arthritis are chronic inflammatory disorders with skin and joint involvement, metabolic disturbances, and reduced quality of life. Nutritional factors, dietary supplements, and microbiota-modulating therapies have gained attention as complementary treatments. This review systematically evaluates clinical trials (2015–2025) on the effects of dietary, supplementary, and microbiota-targeted interventions on clinical, inflammatory, and metabolic outcomes in these patients.
Methods: Ten randomized controlled or single-arm clinical trials involving patients with plaque psoriasis or psoriatic arthritis were analyzed. Interventions included ketogenic, low-calorie, and Mediterranean diets; vitamin D and omega-3 fatty acid supplementation; and probiotic/prebiotic therapy. Primary outcomes were disease severity (Psoriasis Area and Severity Index, PASI), inflammatory and metabolic markers, quality of life, and anti-inflammatory drug use.
Results: Ketogenic and low-calorie diets significantly reduced disease severity, improved quality of life, and enhanced metabolic parameters. The Mediterranean diet, rich in anti-inflammatory compounds and fiber, reduced systemic inflammation and improved overall health status. Vitamin D supplementation in patients with deficiency decreased symptom severity. Omega-3 fatty acids in psoriatic arthritis reduced joint pain, inflammation, and medication use. Probiotic and prebiotic supplementation improved clinical signs and quality of life, possibly via gut microbiota modulation.
Conclusion: Clinical evidence supports dietary, supplementary, and microbiota-targeted interventions as useful adjuncts for managing psoriasis and psoriatic arthritis. By modulating inflammation, immune function, body composition, and gut microbiota, these strategies may reduce disease burden, lower reliance on anti-inflammatory drugs, and enhance patient well-being. Further large, high-quality trials are needed to confirm long-term efficacy.
Keywords: Psoriasis, Psoriatic arthritis, Diet, Vitamin D, Probiotics

P458, The effect of spirulina supplementation on lipid profile and glycemic index in type 2 diabetes: A systematic review

Samane Yousefalizadeh[1], Amirhossein Mansouri-Baseri[1], Maryam Alinezhad-Namaghi[2]
1. Department of Clinical Nutrition, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Transplant research center, Clinical research institute, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Type 2 diabetes (T2D) is frequently associated with impaired glycemic control and dyslipidemia, both of which significantly increase the risk of cardiovascular complications. Functional foods such as spirulina have gained attention as supportive interventions in T2DM Spirulina a nutrient-dense blue-green microalga, is known for its antioxidant, anti-inflammatory, and lipid-lowering properties. Several clinical trials have investigated the effects of spirulina supplementation on glycemic and lipid parameters in patients with T2DM. However, the findings are often inconsistent due to differences in dosage, intervention duration, and outcome measures. This systematic review aims to synthesize existing evidence and assess the efficacy of spirulina as a complementary intervention for the metabolic management of T2DM.
Methods: A systematic search was conducted using PubMed, ISI, and Scopus databases up to January 28, 2025 Of 226 screened articles, five randomized controlled trials were included .
Results: Five RCTs were reviewed, with spirulina doses ranging from 2 to 20 g/day over 8 to 12 weeks. Spirulina supplementation significantly reduced fasting blood glucose (by 2-41 mg/dl) and PBG (by 20-42 mg/dl). HbA1c improved in only one study.
Lipid outcomes were more consistent, showing reductions in total cholesterol, LDL-C, and triglycerides.
Conclusion: Our finding suggested that spirulina may significantly improve glycemic control and lipid profiles in type 2 diabetes, particularly by reducing FBS, PPBS, LDL-C, and triglycerides. However, no significant effects were found on HbA1c or total cholesterol.
Overall, Spirulina may be a promising dietary adjunct in T2DM. Further long-term trials are needed to determine optimal dosage and duration.
Keywords: Spirulina, Blood glucose, Glycemic control, Lipid profile

P459, The effect of eight weeks of resistance training and elderberry supplement consumption on selected bone biomarkers in overweight middle-aged women

Mahmoud Soltani[1], Marzieh Ashkanifar[1], Ghazal Soltani[1], Arefe Rezaie Bahrabad[1]
1. Department of physical education and sports science, Mashhad Branch, Islamic Azad University, Mashhad, Iran

Background: Exercise training and nutritional supplementation are among the strategies used to improve skeletal health and prevent age- and weight-related complications in middle-aged women. The aim of the present study was to investigate the effects of eight weeks of resistance training and Elaeagnus angustifolia (Senjed) supplementation on selected bone biomarkers in overweight middle-aged women.
Methods: This quasi-experimental study was conducted on 40 middle-aged women aged 45.85 ± 3.19 years, with a BMI of 29.34 ± 0.77 kg/m² and body fat percentage of 29.33 ± 1.76 percent. Participants were voluntarily recruited and randomly assigned to four groups: resistance training plus supplementation (n = 10), resistance training without supplementation (n = 10), supplementation only (n = 10), and control (n = 10). The intervention lasted eight weeks. The experimental groups performed resistance training three sessions per week, while the supplementation and placebo groups did not participate in any training during this period. Data were analyzed using one-way ANOVA and Tukey post-hoc tests at a significance level of $P \leq 0.05$.
Results: Resistance training combined with elderberry supplement significantly increased plasma levels of alkaline phosphatase, vitamin D, and calcium. elderberry supplement alone did not affect alkaline phosphatase or vitamin D but did increase calcium levels
Conclusion: Resistance training accompanied by elderberry supplement plays an important role in enhancing bone density and strength in overweight middle-aged women. These findings suggest that this combined approach may be an effective strategy for improving skeletal health in this population.
Keywords: Resistance Training, elderberry supplement Bone Biomarkers, Middle-Aged Women

P460, The clinical and biomedical effects of absorption inhibitors drugs on liver disease subjects: A systematic review of random controlled trials

Samane Yousefalizadeh[1], Amirhossein Mansouri-Baseri[1], Maryam Alinezhad-Namaghi[2]
1. Department of Clinical Nutrition, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Transplant research center, Clinical research institute, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Liver diseases, including cirrhosis, non-alcoholic fatty liver disease (NAFLD), and hepatitis, represent major global health challenges. Obesity plays a key role in the development of metabolic syndrome and related disorders such as type 2 diabetes mellitus (T2DM) and NAFLD. Consequently, integrating Medical Nutritional therapy with anti-obesity agents, particularly orlistat and chromium, may provide essential support for healthcare professionals in managing these conditions.
Methods: A systematic literature search was performed in PubMed, Scopus and ISI databases up to September 18, 2025, following predefined criteria based on population, intervention, outcomes, and study design. The Cochrane risk-of-bias tool, which evaluates multiple methodological domains, was applied to assess the quality of included studies.
Results: According to the inclusion criteria, 12 studies met the eligibility requirements and were included in the final assessment. These trials evaluated the therapeutic effects of orlistat and chromium on liver disease–related outcomes, including anthropometric indices, liver enzyme levels, and biochemical parameters, both before and after liver transplantation.
Conclusion: Orlistat and chromium demonstrated beneficial effects on liver enzymes, fibrosis markers, and metabolic indices in pre-transplant patients, while orlistat additionally improved anthropometric parameters and liver enzymes in post-transplant settings.
Keywords: Orlistat, Chromium, Liver disease, Anti-Obesity Agents, Liver transplantation

P461, Anti-obesity medications in children and adolescents: efficacy, safety, and clinical considerations

Maraym Asakereh[1], Majid Ghayour-Mobarhan[2], seyedeh Sara Ebrahimi Mousavi[1]
1. Department of Clinical Nutrition, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2.Department of Clinical Nutrition, Founding Member of MetabolicSyndrome Research Center, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Childhood and adolescent obesity is a growing global public health concern and a complex chronic disease with significant metabolic and psychological consequences. WHO estimates indicate that by 2025 more than 390 million youths will be overweight, including 160 million with obesity [1]. In Iran, overweight and obesity rates are 12.43% and 6.51%. Early-onset obesity increases the risk of adult obesity and cardiometabolic complications such as dysglycemia, hypertension, dyslipidemia, NAFLD, sleep apnea, and reduced quality of life. When lifestyle modification is insufficient, FDA-approved anti-obesity medications (AOMs) such as orlistat, liraglutide, semaglutide, phentermine, and phentermine–topiramate may be used.
Methods: This review (2025) searched Scopus, PubMed, Google Scholar, and SID using keywords related to pediatric obesity and AOMs, including “pediatric obesity,” “anti-obesity medications,” “GLP-1 receptor agonists,” “semaglutide,” “phentermine–topiramate,” and “time–response pattern.”
Results: AOMs produce meaningful weight loss in youths, typically reaching 80% of maximal effect within 9–12 months. Older medications require 36–48 weeks, while long-acting GLP-1 agonists reach similar effects in 30–33 weeks. Semaglutide shows a comparable trajectory. Response varies with baseline BMI, dose, obesity phenotype, and sex. Semaglutide and phentermine–topiramate achieve the greatest BMI reductions, though each has notable adverse effects. Evidence remains limited by short follow-up and insufficient long-term data.
Conclusion: AOMs are promising but require longer, high-quality trials to better establish long-term safety, durability, and optimal use in pediatric obesity

P462, Effects of exposure to sericin on serum GH, IGF-1 and antioxidant levels following parturition in mice

Shahla Fadaei [1], Shahin Hassanpour [2], Akram Eidi [1], Morteza Zendehdel [3]
1. Department of Biology, SR.C., Islamic Azad University, Tehran, Iran
2. Department of Veterinary Basic Sciences, SR.C., Islamic Azad University, Tehran, Iran
3. Department of Basic Sciences, Faculty of Veterinary Medicine, University of Tehran, 14155-6453, Tehran, Iran

Background: This study assessed sericin's impact on serum GH, IGF-1, and antioxidants post-parturition in mice. Forty pregnant NMRI females were grouped: control (water), and sericin (112.5, 225, 450 mg/kg) orally on gestation days 5, 8,11,14,17. Postpartum, OFT, FST, TST tested depressive behaviors. Serum GH, IGF-1, MDA, GPx, SOD, and TAS were analyzed. Sericin decreased FST/TST immobility, increased OFT crossings ($P<0.05$); reduced MDA, elevated SOD, GPx, TAS, GH, IGF-1 ($P<0.05$) vs. control, suggesting antidepressant effects.
Methods: Sixteen males, 40 females NMRI mice (28-30g, 8-10wks) at 22±2°C, 12h light/dark, ad lib food/water. Females mated, pregnant randomized to groups: control water, treatments sericin. Ethical approval obtained.
Mice suspended by tail 50cm above ground; immobility over 6min.Placed in cylinder (25cm h, 15cm d, 10cm water 25±1°C); immobility last 4min of 6min.In 45x45x30cm arena; crossings over 6min.Serum parameters measured using kits. One-way ANOVA, Tukey post-hoc ($P<0.05$); mean±SE, SPSS 22.
Results: Sericin reduced immobility in FST/TST, increased OFT crossings ($P<0.05$). Lowered MDA, raised SOD, GPx, TAS, GH, IGF-1 ($P<0.05$).
Conclusion: Pre-partum sericin administration shows antidepressant effects in postpartum mice, boosting antioxidants and growth factors via possible Nrf2 and PI3K/Akt activation against oxidative stress. Further studies needed.
Keywords: Sericin, GH, IGF-1, Antioxidant, Parturition, Mice

P463, Effects of exposure to sericin during gestation on brain growth factor and antioxidant levels following parturition in mice

Shahla Fadaei [1], Shahin Hassanpour [2], Akram Eidi[1], Morteza Zendehdel [3]
1. Department of Biology, SR.C., Islamic Azad University, Tehran, Iran
2. Department of Veterinary Basic Sciences, SR.C., Islamic Azad University, Tehran, Iran
3. Department of Basic Sciences, Faculty of Veterinary Medicine, University of Tehran, 14155-6453, Tehran, Iran

Background: This study investigated sericin's effects during gestation on postpartum brain growth factors and antioxidants in mice. Pregnant mice randomized into control (water) and sericin groups (112.5, 225, 450 mg/kg orally, days 5, 8, 11, 14, 17). Postpartum maternal brains assessed for BDNF, MOG, MAG, MBP, MDA, GPx, SOD, CAT in cortex/subcortex. Dose-dependent increases in BDNF, MAG, MBP, decreases in MOG, MDA reductions, elevations in SOD, GPx, CAT ($P<0.05$) vs. controls. Sericin offers postpartum brain protection.
Methods: Sixteen male and 40 female NMRI mice (28-30 g, 8-10 weeks) housed at 22±2°C, 12-h light/dark, ad libitum food/water. Females mated, pregnancy confirmed by plug/sperm. Pregnant mice assigned to groups. Ethics approved by Islamic Azad University, per guidelines. Brains homogenized, centrifuged, stored -80°C. Protein by Bradford. Kits for biomarkers. Data analyzed via ANOVA, Tukey's ($P<0.05$), SPSS 22.0.
Results: Dose-dependent BDNF, MBP increases, MOG decreases, MAG raises ($P<0.05$; no difference 112.5/225 mg/kg). Dose-dependent MDA decreases, SOD, GPx, CAT increases ($P<0.05$).
Conclusion: Sericin protects brain postpartum via oxidative stress reduction, neurotransmitter regulation, synaptic plasticity/neurogenesis enhancement, inflammation curbing. BDNF increase supports survival/cognition; MOG decrease, MAG/MBP increase aid myelination. Mechanisms: BDNF induction, myelination modulation, oxidative/inflammatory mitigation. Potential for neurological disorder prevention and neuropharmacology.
Keywords: Sericin, Brain growth factor, Antioxidant, Parturition, Mice

P464, The effect of kombucha tea pre-treatment on liver enzymes and blood glucose in the brain ischemic model rat

Fezzeh Hosseinzadeh[1]
1. Department Physiology, Faculty of Medical Science Sarab, Sarab, Iran

Background: Cerebral ischemia can trigger a systemic stress response, resulting in dysfunction of peripheral organs like the liver. Kombucha tea, a traditional fermented beverage, which contains polyphenols and organic acids, is known for its antioxidant and anti-inflammatory effects. This study investigated the effects of Kombucha pre-treatment on liver injury markers (specifically, liver enzymes) and blood glucose levels in an animal model of brain ischemia.
Methods: Adult male Wistar rats were divided into four groups include; the sham, the ischemic, and the groups pre-treated with various doses of Kombucha tea (one and two ml/kg/day, gavage) two weeks before prior to the induction of ischemia. The global brain ischemia was induced by blocking the common carotid arteries for one hour, followed by 24 hours of reperfusion. At the end of reperfusion, blood samples were collected from the animals. The levels of liver enzymes (ALT, AST, ALP) and blood glucose were measured using commercial kits and standard laboratory methods.
Results: Our results showed that pre-treatment of KT, at none of the administered doses, had a statistically significant effect on the levels of liver enzymes (ALT, AST, ALP) in the ischemic rats compared to the sham group. Similarly, no significant changes in blood glucose levels were observed between the Kombucha-treated groups and the sham group.
Conclusion: Based on our findings, it appears that pre-treatment with Kombucha tea, under the used protocol, lacks a significant effect on biomarkers of liver injury and blood glucose regulation following a cerebral ischemic event.
Keywords: Cerebral Ischemia, Kombucha, Liver Enzymes, Blood Glucose, Pre-Treatment

P465, The relationship between vitamin D supplementation and platelet parameters, aggregation, and blood clot formation in healthy adult male dogs: A pilot study

Nooshin Derakhshandeh[1], Saeed Nazifi[2], Pardis Daneshpour[3], Haniyeh Yabandeh Jahromi[3]
1. Department of Clinical Sciences, Faculty of Veterinary Medicine, Shiraz University, Iran
2. Department of Clinical Sciences, Faculty of Veterinary Medicine, Shiraz University, Iran
3. Faculty of Veterinary Medicine, Shiraz University, Iran

Background: Vitamin D has well-documented antithrombotic effects on the coagulation system, and platelet associated vitamin D receptors (VDR) play an important role. Adenosine 5′-diphosphate (ADP) induced platelet stimulation and thrombin change the VDR shape, allowing it to bind fibrinogen and stimulate the aggregation process. The effect of vitamin D supplementations on blood clot formation in dogs has not been investigated.
Methods: Eight mixed-breed adult male dogs were selected, and oral vitamin D3 at a dose of 50 IU/kg was administrated for 42 days. Serum levels of 25 hydroxyvitamin D concentration, platelet number, mean platelet volume, fibrinogen, prothrombin time, and partial thrombin time were measured before treatment (day 0) and on days 14, 28, and 42.
Results: The results indicate a significant reduction in platelet count following the administration of oral vitamin D orally (P =0.003) and a non-significant upward trend in MPV. In 7 of 8 dogs, the percentage of platelet aggregation decreased with supplement administration. An initial decrease was observed in fibrinogen, prothrombin time, and partial thrombin time, followed by an increasing trend.
Conclusion: According to the present study, daily oral administration of vitamin D at a dose of 50 IU/kg BW for 42 days leads to a reduction in platelet count and an increase in MPV. Future research with larger sample size is necessary to confirm these findings and to better understand their clinical relevance.
Keywords: Aggregation, Platelet, 25 hydroxy Vitamin D3

P467, A systematic review of the impact of caloric restriction on the expression of longevity-associated genes in human fibroblast cells

Maryam Abedi[1], Melika Nosrati[1], Mohammad Kazem Imani Khoshkhoo[2]
1. School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. School of Public Health, Kerman University of Medical Sciences, Kerman, Iran

Background: Aging causes a gradual decline in body functions. Dietary changes, especially caloric restriction (CR) (reducing daily calories by 20–50%), can affect epigenetic marks related to aging, extend lifespan, and delay age-related diseases. CR influences key pathways by activating SIRT1 and AMPK and inhibiting mTOR, which regulate metabolism, stress resistance, and autophagy. CR also reduces senescence markers in human fibroblasts, making them useful for studying anti-aging mechanisms. However, the exact effects of CR on SIRT1, AMPK, and mTOR expression in fibroblasts remain unclear.
Methods: This PRISMA-guided systematic review included peer-reviewed in vitro studies (2000–2024) examining the effect of caloric restriction (CR) on SIRT1, AMPK, or mTOR expression in human fibroblasts. Studies were identified via PubMed, Scopus, and Web of Science using relevant keywords. Inclusion required quantitative gene or protein expression data. Study quality was evaluated using the JBI checklist.
Results: Eight studies met the criteria. Most showed that CR (20–50% nutrient reduction for 24–168 hours) increased SIRT1 and AMPK expression and decreased mTOR. qRT-PCR and Western blotting were the main techniques used. One study found no change in SIRT1 (short duration), and another reported unchanged AMPK (high baseline restriction).
Conclusion: This systematic review examines how caloric restriction (CR) modulates epigenetic mechanisms that regulate lifespan and promote longevity. Understanding these molecular connections may help develop anti-aging strategies and treatments for age-related diseases using epigenetically targeted dietary and drug interventions. However, more research is needed to translate these cellular findings into effective therapies.
Keywords: Aging, Calorie restriction, mTOR, Epigenetics

P468, The effect of vitamin D supplementation on carotid artery ultrasonographic parameters in healthy adult dogs

Nooshin Derakhshandeh[1], Saghar Karimi[1], Maedeh Masoumi[1], Aref Kashfi[1]
1. Department of Clinical Sciences, Faculty of Veterinary Medicine, Shiraz University, Shiraz, Iran

Background: Vitamin D plays a key role in cardiovascular health, but its effects on vascular hemodynamics in dogs remain unclear. This study assessed carotid artery hemodynamics in eight healthy dogs after 42 days of supplementation (50 IU/kg/day).
Methods: Serum 25-hydroxyvitamin D, peak systolic velocity (PSV), end-diastolic velocity (EDV), and resistive index (RI) were evaluated at baseline and on days 14, 28, and 42. Vitamin D was assessed using a commercial kit (BiorexFars, Iran). Doppler waveforms provided PSV and EDV, and RI was calculated as (PSV−EDV)/PSV. Data were analyzed in SPSS v26. Normality was checked via the Shapiro-Wilk test and comparisons were made using repeated measures ANOVA followed by Tukey's test ($P < 0.05$).
Results: Serum vitamin D levels increased significantly from 10.07 ± 12.62 ng/mL at baseline to 84.47 ± 3.23 ng/mL by day 42 ($p = 0.04$). PSV decreased significantly from 39.11 ± 7.13 cm/s to 25.65 ± 4.72 cm/s ($p = 0.0017$), while EDV declined from 13.94 ± 2.87 cm/s to 9.24 ± 2.84 cm/s (*p* = 0.006), RI showed no significant change (0.5625 ± 0.16 to 0.5938 ± 0.08; *p* = 0.839).
Conclusion: The results indicate vitamin D supplementation improves vascular hemodynamics in dogs, probably via pleiotropic processes including endothelium modulation and decreased arterial stiffness.
Keywords: Vitamin D, Dog, Carotid artery

P469, Protective role of royal jelly in dibutyl phthalate-induced oxidative injury in mouse ovary

Mahdieh Nezami-Majd[1], Gudarz Sadeghi-Hashejin[2], Hassan Malekinejad[3], Ali Rassouli[2]
1. Department of Basic Science, Faculty of Veterinary Medicine, Urmia University, Urmia, Iran,
2. Department of Comparative Biosciences (CBS), Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran
3. Department of Pharmacology and Toxicology, School of Pharmacy, Urmia University of Medical Sciences, Urmia, Iran

Background: Phthalates are man-made substances, and both humans and animals expose them ubiquitously because of their incorporation in plastics and other common consumer products. phthalates cause multi-organ damage through a number of mechanism such as oxidative stress through generation of reactive oxygen species, lipid peroxidation, DNA damage and disrupting cell function. In this study, protective effects of Royal jelly (RJ) and Quercetin (QCN) on Dibutyl phthalate (DBP)-induced oxidative stress were assessed.
Methods: A total of 40 Wistar albino rats were randomly divided into eight groups (n = 5): Control (corn oil), DBP (500 mg/kg), RJ (200 mg/kg), QCN (50 mg/kg), RJ (100, 200, 300 mg/kg + DBP) and QCN + DBP. After 28 days of daily oral gavage treatment, animals were euthanized and their blood samples and liver tissue were collected for determination of Total antioxidant capacity (TAC), Malondialdehyde (MDA), Nitric oxide (NO) and Total thiol molecules (TTM).
Results: DBP exposure diminished TAC significantly in DBP group ($p< 0.05$) compared to control group. RJ-DBP and QCN-DBP groups both increased TAC levels significantly compared with the DBP group. Compared to the control group, in the groups exposed to dibutyl phthalate, the TTM content in ovarian tissues did not show a significant difference ($P> 0.05$), DBP exposure significantly elevated MDA and NO ovary levels in the DBP group ($p< 0.05$). MDA and NO levels were reduced significantly in the RJ-DBP and QCN-DBP groups compared with the DBP group.
Conclusion: Our findings concluded that RJ and QCN reduced oxidative stress induced by DBP, and as a result, the consequences of oxidative stress are reduced.
Keywords: Royal jelly, Dibutyl phthalate, Oxidative stress, Total antioxidant capacity

P472, The effect of nanomicellar urolithin on acute liver toxicity caused by acetaminophen in male rats

Maryam Tehranipour[1], Javad Ekramifard[1], Mobina Sadeghi[1]
1. Department of Biology, Ma. C., Islamic Azad University, Mashhad, Iran

Background: Acetaminophen is a common over the counter analgesic with a high potential for toxicity. Ellagitannins found in pomegranates and blackberries are metabolized in the intestine to urolithin, a potent antioxidant and anti-inflammatory metabolite. This study investigated the hepatoprotective effects of nanomicellar urolithin in acetaminophen induced liver toxicity.
Methods: 36 male rats were divided into six groups. The control and negative control groups received silymarin (200 mg/kg), respectively. Experimental groups were treated with nanomicellar urolithin at doses of 0.5, 1, and 1.5 mg/kg. Except for the control group, all animals received acetaminophen (400 mg/kg) on the second day. After 24 hours, animals were anesthetized, blood samples were collected to measure liver enzymes (ALP, AST, ALT), and liver tissues were processed for histological evaluation and expression analysis of TNF-α and IL-6 using real-time. Data were analyzed using ANOVA followed by Tukey's test.
Results: The results showed that the levels of liver enzymes in the experimental and positive control groups were significantly reduced compared to the negative control
Group ($p<0.001$). Histopathologically, necrosis and lymphocyte infiltration were reduced in the groups receiving nanomicellar urolithin and the silymarin group. TNF-α and IL-6 genes expression increased in the negative control group. On the other hand, examining the expression of these genes in the treatment groups and comparing them with the negative control group showed significant decreases.
Conclusion: Apparently, nanomicellar urolithin was able to reduce the expression of these inflammatory genes. Thus,urolithin likely protects against acetaminophen-induced liver damage due to its antioxidant and anti-inflammatory properties.
Keywords: Nanomicellar urolithin, Acetaminophen, Antioxidant, liver toxicity

P474, Quercetin nanostructures for oral delivery: Enhancing bioavailability and restoring intestinal barrier function in inflammatory bowel disease

Afsaneh Salahvarzi[1], Seyed Mahdi Rezayat Sorkhabadi[2,3] Mahmoud Reza Jaafari[4,5]
1. Department of Medical Nanotechnology, Faculty of Advanced Sciences and Technology, Tehran Medical Sciences, Islamic Azad University, Tehran, Iran
2. Department of Medical Nanotechnology, School of Advanced Technologies in Medicine, Tehran University of Medical Sciences, Tehran, Iran
3. Department of Pharmacology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
4. Nanotechnology Research Center, Pharmaceutical Technology Institute, Mashhad University of Medical Sciences, Mashhad, Iran
5. Department of Pharmaceutical Nanotechnology, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran

Background: IBD describes a family of chronic diseases that result from sustained inflammation and disintegration of the epithelial barrier, ultimately causing a perturbation of the intestinal homeostasis. Quercetin, a plant-derived flavonoid with multiple promising biological activities, in particular, strong antioxidant and anti-inflammatory activity, may be an excellent choice for IBD treatment. Unfortunately, quercetin exhibits extremely low oral bioavailability that greatly constrains its clinical application primarily as a result of its poor aqueous solubility and severe first-pass metabolism.
Methods: This review article aims to summarized recent obtained data (in period 2020-2025) in oral quercetin nanocarriers design, including nanomicelles, liposomes and pH or enzyme responsive nanoparticles. Special attention is devoted to combinations that preserve quercetin in the gastrointestinal tract and provide site-specific release at the colon level.
Results: Nanoencapsulation resulted in very high oral bioavailability (10–20 fold in the rat models), as well as colonic tissue accumulation of quercetin. The major therapeutic measures are up-regulation of tight junction proteins (ZO-1, occludin), decreased paracellular permeability, and blocking of NF-κB dependent inflammatory signaling. In preclinical model of chemically induced colitis (DSS, acetic acid and TNBS) the inhibition in disease activity index and histopathological damage reached is always greater than that recorded when free quercetin was given.
Conclusion: Oral quercetin-loaded nanocarriers represent a promising and patient-friendly strategy for IBD therapy by improving drug delivery performance and mucosal healing. These nanosystems are deserving of more translational studies for their clinical use.
Keywords: Quercetin; Nanocarriers; Oral delivery; Inflammatory bowel disease; Intestinal barrier function.

P475, The effect of safranal on anxiety in a rat model of ulcerative colitis

Kaveh Rahimi[1], Nirvana Kafaie[1], Asal Chaboksavarian[1], Mohammad Javad Alimohammadi[1], Atena Kooti[1]

1. Department of Basic Sciences, Faculty of Veterinary Medicine, Shahid Chamran University of Ahvaz, Ahvaz, Iran

Background: In peripheral inflammatory conditions, such as inflammatory bowel diseases (IBD), comorbid anxiety and depression are associated with increased disease activity, greater rate of relapse and reduced responsiveness to therapies. The aim of this study was to investigate the effect of safranal on anxiety in a rat model of ulcerative colitis induced by acetic acid.
Methods: The study involved 24 male rats, which were divided into four groups: a control group, a colitis group, a colitis group treated with 72.75 mg of safranal, and a colitis group treated with 145.5 mg of safranal. Each group received different treatments over the course of seven days. To assess anxiety levels, we used the open field test and the elevated plus maze test.
Results: In the colitis model rats, anxiety-like behaviors observed in the open field and elevated plus maze tests were found to be higher than those in the control group. However, both doses of safranal effectively reduced these anxiety-like behaviors in the open field and elevated plus maze tests when compared to the colitis group.
Conclusion: Safranal may effectively reduce anxiety-like behaviors in open field and elevated plus maze tests, as well as the conditions caused by colitis.
Keywords: Safranal, Anxiety, Ulcerative colitis

P476, Histomorphometric and histopathological study on the intestines in methadone-treated mice

Mahdi lotfi[1], Abolghasem Nabipour[1], Hosein Nourani[2]
1. Department of Basic Sciences, Faculty of Veterinary Medicine, Ferdowsi University of Mashhad
2. Department of Pathobiology, Faculty of Veterinary Medicine, Ferdowsi University of Mashhad

Background: Methadone is a μ opioid receptor agonist and has analgesic properties. Also, it can control the occurrence of opioid withdrawal symptoms. This study showed the effects of methadone on the histopathology and histomorphometry of the intestines in Mice.
Methods: This study was carried on 40 Female/adult Mice which were divided randomly in to 4 groups. First, second and third groups received 1 mg/kg, 2mg/kg and 3 mg/kg of Methadone, respectively and control group received normal saline, orally by gavage for 1 month. The duodenum, jejunum, cecum and rectum samples were collected.
Results: Epithelium was simple columnar with goblet cells. Lieberkühn glands were simple or twisted tubular. Brunner's glands were not seen in duodenum of all groups. Morphometry results showed increased the size of villi and epithelium thickness in small intestine (duodenum and jejunum), depth of Lieberkühn glands decreased in small intestine and rectum and increased in cecum. Tunica muscularis thickness of duodenum and cecum was increased and decreased in jejunum and rectum. The total wall thickness of duodenum, jejunum and rectum was decreased but it increased in cecum. We didn't observe significant pathological changes except of inflammation that seen in methadone-treated groups.
Conclusion: The results showed that the cause of constipation in people using methadone may be a decrease in the depth of the rectal Lieberkühn glands and, consequently, a decrease in mucin secretion.
Keywords: Methadone, Mouse, Intestine, Histomorphometry, Histopathology

P477, The Effect of simultaneous use of opium and ischemic preconditioning on ischemia/reperfusion injury in the rat liver

Maryam Karami[1], Hossein Ali Arab[1], Javad Jamshidian[2], Asma Kheirollahi[1]
1. Department of Comparative Biosciences, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran
2. Department of Basic Sciences, Faculty of Veterinary Medicine, Shahid Chamran University of Ahvaz, Ahvaz, Iran

Background: Ischemia preconditioning (IPC) is a protective procedure against the injury induced by ischemia/reperfusion (IR). There is evidence that the administration of opioids may have the same effects on the injury. It was aimed to investigate the ameliorating effects of concurrent use of opium and IPC on lobar IR injury in the rat liver.
Methods: Twenty-five adult male Wistar rats were randomly divided into 5 groups: 1) sham-operated, 2) IR, 3) IR+IPC, 4) opium+IPC+IR, and 5) naloxone+opium+IPC+IR. At the end of the reperfusion, alanine aminotransferase (ALT) and aspartate aminotransferase (AST) in the blood were assayed and oxidative stress was determined by measuring malondialdehyde (MDA), total antioxidant capacity (TAC), superoxide dismutase (SOD) and catalase (CAT) activities in the liver tissues.
Results: ALT, AST and MDA levels were significantly increased in the IR group compared to the sham-operated group ($P<0.05$). However, the application of IPC and IPC+opium significantly decreased the release of these enzymes, while the simultaneous application of opium and IPC had a stronger restorative effect on the IR injury ($P<0.05$). The recovery effects induced by opium+IPC in terms of TAC, SOD and catalase were also higher than that of the IPC alone. However, the use of naloxone significantly inhibited the protective effects induced by the opium.
Conclusion: It was concluded that the simultaneous use of opium and IPC was able to accelerate the protective effects of IPC on the IR injury.
Keywords*:* Ischemia preconditioning; Ischemia/reperfusion; Liver; Opium; Rat.

P479.Trans-benzalacetophenone protects steatotic liver from progression to non-alcoholic steatohepatitis by targeting proteins involved in lipid metabolism

Elham Karimi-Sales[1,2], Mohammad Reza Alipour[1,3], Maryam Kazemi[1,2], Haniyeh Farokhpay[2], Parizad Rezaye[2]

1. Stem Cell Research Center, Tabriz University of Medical Sciences, Tabriz, Iran
2. Department of Physiology, Faculty of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran
3. Drug Applied Research Center, Tabriz University of Medical Sciences, Tabriz, Iran

Background: Non-alcoholic steatohepatitis (NASH) is a progressive and inflammatory subtype of the most prevalent chronic liver disease. Progression of steatosis to NASH is linked to abnormal hepatic lipid metabolism and related inflammatory events in the liver. *Trans*-benzalacetophenone is the fundamental structure of chalcone derivatives, with anti-diabetic and hepatoprotective effects. This study investigated effect of *trans*-benzalacetophenone on progression from steatosis to NASH.

Methods: Male Wistar rats were divided into three groups: control group that received 10% Tween 80, NASH group that received NASH inducing high-fat emulsion (HFD) and 10% Tween 80, NASH+chalcone group that received HFD and *trans*-benzalacetophenone. Gavages of HFD were done once a day for six weeks. *Trans*-benzalacetophenone and Tween 80 were gavaged once a day for 14 days (during weeks five and six). Finally, the protein expressions of peroxisome proliferator-activated receptor alpha (PPAR-α), fatty acid synthase (FAS), ATP Binding Cassette Subfamily A Member 1 (ABCA1), and interleukin-8 (IL-8) were measured using ELISA kits.

Results: Induction of NASH significantly increased protein expression levels of FAS and IL-8, and also significantly reduced PPAR-α and ABCA1 protein levels in the NASH group. However, *trans*-benzalacetophenone significantly inhibited these HFD-induced changes in the NASH+chalcone compared to the NASH group.

Conclusion: *Trans*-benzalacetophenone inhibited lipogenesis by inhibiting FAS expression, stimulated cholesterol efflux through up-regulating ABCA1, increased fatty acid oxidation by increasing PPAR-α, and suppressed inflammation by down-regulating IL-8 in the liver of HFD-fed rats. Therefore, this compound protects rats against steatosis progression to NASH by inhibiting HFD-induced changes in hepatic lipid metabolism and related inflammation.

Keywords: *Trans*-benzalacetophenone, Non-alcoholic steatohepatitis, ABCA1, FAS, Rat

P480. The preventing effect of umbellipreninon hyperglycemia in diabetic rats by activating the insulin receptor IR/PDK1 pathway

Amir Bagher Eilkhani[1], Maryam Tehranipour[2], jina Khayatzade[2], Akram Eidi[1]
1. Department of biology, SR.C., Islamic Azad University, Tehran, Iran
2. Department of biology, MA.C., Islamic Azad University, Mashhad, Iran

Background: Today, with the prevalence of metabolic diseases such as diabetes, which can be caused by insulin resistance, the need for targeted drug delivery seems essential. Umbelliprenin (UM) has a coumarin core with antioxidant and anti-inflammatory activity. The aim of this study is to investigate the IR/PDK1 pathway in the presence Umbelliprenin in diabetic rats.
Methods: Forty twoWistar male rats (aged 12 weeks, 250–300 g), were divided to seven groups of six(Control, Negative control -diabetic, Positive control -metformin (300 $mg.kg^{-1}$),Treatment with 5 and 10 $mg.kg^{-1}$(UM) and diabetic+ 5 and 10 $mg.kg^{-1}$ (UM)). After induction of diabetes with a single dose of intraperitoneal injection of STZ (60 $mg.kg^{-1}$), the treatment groups were treated orally with doses of 5 and 10 $mg.kg^{-1}$UM. After the treatment period, the rats were anesthetized and blood was taken from the rats' retro-orbital plexus area and their serum glucose, total cholesterol (TC), triglyceride and HDL levels were measured. RNA was extracted from the tissue samples and cDNA was synthesized and the expression of IR and PDK1 genes was examined by real-time. Pathological changes were evaluated in the prepared sections.
Results: The results showed that UM improving glucose and blood factors. Gene expression analysis showed a significant increase in the expression of IR and PDK1 genes in the groups receiving UM.
Conclusion: Therefore, UM were probably able to prevent hyperglycemia by activating the IR/PDK1 pathway through anti-inflammatory and antioxidant properties.
Keywords: Umbelliprenin- Anti-diabetic- IR/PDK1 pathway

P482, Hepatoprotective effect of nano-selenium in hypothyroid rats

Mahsan Akbarian[1], Farimah Behehsti[2], Narges Marefati[3], Akbar Anaeigoudari[4], Mahmoud Hosseini[1]
1. Applied Biomedical Research Center, and Department of Physiology, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Physiology, School of Medicine, Torbat Heydariyeh University of Medical Sciences, Iran
3. Department of Physiology and Medical Physics, Faculty of Medicine, Baqiyatallah University of Medical Sciences, Tehran, Iran
4. Department of Physiology, School of Medicine, Jiroft University of Medical Sciences, Jiroft, Iran

Background: Hypothyroidism is associated with organ damage including hepatic injury. Oxidative stress has an important role in organ damaging effect of hypothyroidism. Nano-selenium (N.Sel) is suggested to have some antioxidant effects. The present study examined the hepatoprotective effect of N-Sel in hypothyroid rats.
Methods: The rats were grouped into (1) Control; (2) Hypothyroid group which received propylthiouracil (PTU) in drinking water (0.05%; (3-5) Hypothyroid- N.Sel 50, Hypothyroid - N.Sel 100, and Hypothyroid - N.Sel 150 groups which were treated with 50, 100, or 150 µg/kg of N.Sel (gavage). Treatments were done for 6 weeks. The serum level of thyroxin, aspartate transaminase (AST), alanine transaminase (ALT), and alkaline phosphatase (ALP) was measured. Malondialdehyde (MDA) and total thiol concentration and catalase (CAT) and superoxide dismutase (SOD) activity in hepatic tissue was also determined.
Results: Hypothyroidism induced by PTU significantly increased AST, ALT, ALP, and MDA concentration and reduced total thiol level, and SOD and CAT activity. Administration of N.Sel ameliorated the adverse effects of hypothyroidism on liver function.
Conclusion: N-Sel showed hepatoprotective effect in a rat model of hypothyroidism via ameliorating the oxidative stress. More cellular and molecular experiments need to be done to understand the exact mechanisms.
Keywords: Hepatic; Hypothyroidism; Nano-selenium; Oxidative stress

P484, Effect of helium cold plasma on VEGF and CD34 in diabetic rat wound healing

Ayda Andarzi Gargari[1], M. Reza Atar Nosrati[2]
1. Faculty of Veterinary Medicine, Islamic Azad University, Shabestar Branch, Shabestar, Iran
2. Faculty of Veterinary Medicine, Islamic Azad University, Shabestar Branch, Shabestar, Iran

Background: Chronic diabetic wounds are difficult to treat because of impaired angiogenesis, delayed repair and a high risk of infection. Pro-angiogenic mediators such as vascular endothelial growth factor (VEGF) and CD34-positive cells are critical for effective healing. Cold atmospheric plasma has been introduced as a non-invasive modality with potential regenerative effects. This study evaluated the effect of helium cold plasma on tissue levels of VEGF and CD34 in streptozotocin-induced diabetic rats.
Methods: 20 male Wistar rats were randomly assigned to a control group and a plasma-treated group. Diabetes was induced by subcutaneous streptozotocin (STZ) injection. A 6-mm full-thickness dorsal skin wound was created in all rats. The treatment group received helium cold plasma irradiation once daily for 60 seconds over the wound surface. Wound tissues were harvested on days 7 and 14 and subjected to immunofluorescence staining for VEGF and CD34. Quantitative analysis of fluorescence intensity was performed using ImageJ software. Statistical comparisons were conducted using two-way ANOVA with $P<0.05$ as the significance threshold.
Results: Cold plasma significantly increased VEGF and CD34 expression at both evaluation points compared with controls ($P<0.05$). The enhanced fluorescence distribution indicated improved neovascularization and accelerated wound repair.
Conclusion: Helium cold plasma enhances angiogenic marker expression and promotes wound healing in diabetic rats, supporting its potential as an effective adjunctive therapy for chronic diabetic ulcers.
Keywords: Diabetic Foot, Cold Atmospheric Plasma, Wound Healing, Vascular Endothelial Growth Factor A, CD34 Antigens.

P485, Inositol role in enhancing oocyte quality and fertility in women with polycystic ovary syndrome: Systematic review and meta-analysis

Pooya Bagheri[1], Zahra Baghani[1]
1. Students Research Committee, Bushehr University of Medical Sciences, Bushehr, Iran

Background: Polycystic Ovary Syndrome (PCOS) is a common endocrine disorder of women's reproductive health. Inositol, as myo-inositol (MI) and D-chiro-inositol (DCI), has been suggested as a therapy for enhancing oocyte quality and fertility in PCOS women. To critically assess the effectiveness of inositol supplementation for enhancing oocyte quality and fertility in PCOS women.
Methods: A systematic search was made in the databases, i.e., PubMed, EMBASE, Cochrane Library, and Scopus, up to March 2025. RCTs that compared the effects of MI and/or DCI on oocyte quality, ovulation rate, and pregnancy rate in women with PCOS were included. Data extraction and quality assessment were done independently by two reviewers. Random-effects models evaluated meta-analyses.
Results: We found 12 RCTs including 1,200 women with PCOS. Inositol supplementation was associated with a significant increase in ovulation (RR: 2.3; 95% CI: 1.1–4.7) and menstrual regularity (RR: 6.8; 95% CI: 2.8–16.6) when compared to placebo. There were no differences in oocyte quality (OR: 2.2; 95% CI: 0.8–5.9) or clinical pregnancy (RR: 1.16; 95% CI: 0.87–1.53). Subgroup analysis demonstrated that MI was superior to DCI for reproductive outcome improvement.
Conclusion: Supplementation with inositol, and more specifically MI, is found to improve ovulation and menstrual regularity in PCOS women. Its effect on oocyte quality and pregnancy rates is unclear. Additional high-quality RCTs are needed to make conclusive decisions.
Keywords: Polycystic Ovary Syndrome (PCOS), Myo-inositol, D-chiro-inositol, Oocyte quality, Infertility

P486, *In vitro* effects of fluoxetine on the expression of apoptosis-related proteins and the quality of normal human sperm

Zahra Roostaee[1], Malek Soleimani Mehranjani[1], Ebrahim Cheraghi[2], Seyed Mohammad Ali Shariatzadeh[1]
1. Department of Biology, Faculty of Science, Arak University, Arak, Iran
2. Department of Biology, Faculty of Science, Qom University, Qom, Iran

Background: Depression is a common psychiatric disorder, and fluoxetine, a selective serotonin reuptake inhibitor (SSRI), is among the most frequently prescribed medications for its treatment. While generally considered safe and effective, some studies have reported that fluoxetine may increase oxidative stress and reduce cell viability in certain cell types, including ovarian epithelial cells. Given its widespread use among men of reproductive age, this study aimed to investigate the in vitro effects of fluoxetine on sperm quality and the expression of apoptotic proteins.
Methods: Semen samples were collected from 30 fertile men and divided into two groups: control (no treatment, incubation 1 hour) and fluoxetine-treated (treated with 5 µM fluoxetine, incubation 1 hour). The parameters studied included sperm motility, viability, DNA fragmentation, reactive oxygen species (ROS) levels and expression of apoptosis-related proteins Bax, Bcl2 and caspase 3. Statistical analysis of the data was performed using repeated measures analysis.
Results: In the fluoxetine group, there was a significant decrease ($p<0.001$) in the mean percentages of total motility, progressive motility, viability, and the expression level of the anti-apoptotic protein Bcl2 compared to the control group. Conversely, the fluoxetine group showed a significant increase ($p<0.001$) in the mean percentages of non-progressive motility, DNA fragmentation, ROS levels, and the expression of the pro-apoptotic proteins Bax and caspase 3.
Conclusion: Our results showed that short-term in vitro exposure of sperm from fertile men to fluoxetine negatively affects sperm quality by decreasing motility, viability, and the expression of anti-apoptotic proteins, while increasing oxidative stress, DNA fragmentation, and pro-apoptotic markers. These findings suggest potential reproductive risks associated with fluoxetine use in men of reproductive age.
Keywords: Fluoxetine, Human sperm, Oxidative Stress, Apoptosis-Related Proteins

P487, Therapeutic effect of metformin on male infertility associated with oxidative stress: A review

Marjan Firouzi[1], Masoud Alasvand[1], Sara Chavoshinezhad[1], Erfan Daneshi[2], Ehsan Motaghi-Dastnaei[3]
1. Cellular and Molecular Research Center, Research Institute for Health Development, Kurdistan University of Medical Sciences, Sanandaj, Iran
2. Department of anatomy, Cellular and Molecular Research Center, Kurdistan University of Medical Sciences, Sanandaj, Iran;
3. Neurosciences Research Center, Research Institute for Health Development, Kurdistan University of Medical Sciences, Sanandaj, Iran

Background: Male Infertility, affects about 7% of men worldwide and is mainly caused by spermatogenic, hormonal, genetic, lifestyle and environmental factors. Among these, oxidative stress plays a significant role in male infertility. It can damage sperm DNA, lipids, and proteins, impairing sperm motility, morphology, and function, and ultimately reducing fertility potential. This makes targeting oxidative stress a vital strategy in managing infertility. Metformin, a first-line agent for type 2 diabetes, demonstrates notable pleiotropic effects with antioxidant, anti-inflammatory, and antiapoptotic properties. Mechanistically, metformin activates AMP-activated protein kinase, which regulates cellular energy homeostasis and modulates oxidative stress. Previous studies have found that metformin decreases the generation of reactive oxygen species and boosts the expression of antioxidant enzymes such glutathione peroxidases (GPXs), catalase (CAT), and superoxide dismutase (SOD). We review studies on the mechanisms and therapeutic effects of metformin for male infertility.
Methods: The databases Science Direct, Google Scholar, PubMed, were searched using keywords such as "male infertility", "metformin", "oxidative stress", "testis", and "sperm" and relevant studies were retrieved from 2010–2024.
Results: Research on obesity, type 2 diabetes, testicular torsion/detorsion, ischemia/reperfusion injury, and drug-induced infertility shows that metformin improves sperm parameters, maintains hormonal balance, and preserves fertility. Metformin reduces inflammation, suppress apoptosis, maintains blood-testis barrier integrity, increase the expression of proteins involved in steroidogenesis. Interestingly, Metformin reduces oxidative stress, boosts testicular SOD, CAT, and GPX activities, and improves mitochondrial function.
Conclusions: These findings underscore the potential of metformin as a therapeutic agent in managing male infertility associated with oxidative stress.
Keywords: Metformin, Male infertility, Oxidative stress

P488, Investigating the singly and combination effects of Tadalafil and Omeprazole use on acetic acid-induced gastric ulcer model in male rats

Behzad Mesbahzadeh[1], Mohammadmehdi Hassanzadeh-Taheri[2], Mehran Hosseini[2], Negar Moodi[3]

1. Cardiovascular Diseases Research Center, Birjand University of Medical Sciences, Birjand, Iran
2. Department of Anatomical Sciences, Faculty of Medicine, Birjand University of Medical Sciences, Birjand, Iran
3. Cellular and Molecular Research Center, Birjand University of Medical Sciences, Birjand, Iran

Background: Gastric ulcers are common gastrointestinal disorders marked by mucosal damage, and current treatments sometimes fail to achieve complete healing. This study aimed to evaluate the therapeutic efficacy of tadalafil, both as a monotherapy and in combination with omeprazole, in a rat model of acetic acidinduced gastric ulcers.

Methods: In this experimental study, male Wistar rats were randomly divided into five groups of eight: sham, model, omeprazole (40 mg/kg), tadalafil (20 mg/kg), and a combination of tadalafil (20 mg/kg) and omeprazole (40 mg/kg). Prior to grouping, gastric ulcers were induced using acetic acid in 32 rats, and 8 rats were subjected to surgery for the sham group, being exposed to normal saline instead of acetic acid. The rats with gastric ulcers were then randomly assigned to the aforementioned groups, and treatments were administered orally for 12 days on a daily basis. At the end of the study, ulcer size, histological changes, and the expression of NF-κB, PCNA, lipid peroxidation, and eNOS/iNOS/NOx pathways were evaluated.

Results: Compared to the model group, tadalafil therapy could reduce ulcer size, inflammation and lipid peroxidation ($p<0.001$ all) while enhancing cell proliferation ($p<0.001$) without affecting NOx content. On the other hand, the simultaneous treatment with tadalafil and omeprazole also improved gastric ulcers in the rats, but it did not show superiority compared to the separate administration.

Conclusions: Tadalafil promotes gastric ulcer healing by modulating inflammation and enhancing tissue regeneration, independent of NO pathway. These findings suggest that tadalafil may represent a promising therapeutic strategy for gastric ulcer treatment, warranting further investigation into its clinical applications.

Keywords: Gastric ulcers, Tadalafil, NF-κB, Nitric oxide, Nitric oxide synthase

P489, The role of exercise in modulating gut microbiota and intestinal permeability in nsaid-induced gastrointestinal disorders: A systematic review

Elham Abdi[1], Zeynab Golara[1], Shayan Rezanejad[2]
1. Department of Nutrition, School of Health, Zanjan University of Medical Sciences, Zanjan, Iran
2. Department of Nutrition, School of Health, Bushehr University of Medical Sciences, Bushehr, Iran

Background: Non-steroidal anti-inflammatory drugs (NSAIDs) are widely used for pain and inflammation but are frequently associated with gastrointestinal side effects, including increased intestinal permeability and mucosal injury. Recent evidence highlights the significant role of gut microbiota in mediating these adverse effects. This systematic review aims to evaluate the impact of exercise on gut microbiota composition and intestinal permeability in NSAID-induced gastrointestinal disorders.
Methods: A systematic search was conducted in PubMed and Frontiers databases up to March 2024. Eligible studies included both human and animal research examining the effects of exercise on gut microbiota or intestinal barrier integrity during NSAID use. Quality assessment and inclusion criteria were applied uniformly.
Results: Twelve studies met the inclusion criteria. Regular moderate exercise consistently increased microbial diversity and abundance of beneficial bacteria such as Faecalibacterium prausnitzii, known for producing short-chain fatty acids (SCFAs) that reinforce the gut barrier. Exercise was also associated with reduced intestinal inflammation and improved epithelial repair. However, outcomes varied based on exercise type, intensity, and duration.
Conclusion: Exercise appears to be a promising non-pharmacological strategy to counteract NSAID-related gastrointestinal damage by modulating gut microbiota and enhancing intestinal barrier function. Further well-designed clinical trials are necessary to determine optimal exercise protocols for therapeutic application.
Keywords: NSAIDs; Exercise; Gut microbiota; Intestinal permeability; Gastrointestinal

P490, Hepatoprotective effects of cellulose nanocrystals on thioacetamide-induced liver cirrhosis in experimental rats

Elahe Kamelnia[1], Reyhane Kamelnia[2], Iliya Ahmadzadeh Kermani[1]
1. Department of biology, Faculty of sciences, Mashhad branch, Islamic Azad University, Mashhad, Iran
2. Mashhad medical sciences, Islamic Azad University, Mashhad Iran

Background: Cellulose is the most abundant terrestrial polymeric material in nature. Liver cirrhosis is a significant health concern that has become increasingly common today. The protective effect of nanocellulose was investigated.
Methods: The rats received injections of 150 mg/kg thioacetamide (TAA) due to gain liver complication for three times over a period of 2 weeks. Thirty-five adult male rats were randomly assigned to seven groups: control, thioacetamide (TAA) and groups treated with livergol (LV, 2000 mg/Kg), cellulose nanocrystal (CNC, 20 mg/Kg), livergol-cellulose nanocrystal complex (LV-CNC) in three different concentrations of CNC (2, 10 and 20 mg/ kg). Biochemical parameters and histopathological evaluations of liver was conducted using established scoring systems.
Results: The liver homogenates showed increased antioxidant enzyme activity of superoxide dismutase (SOD), catalase (CAT), and glutathione peroxidase (GPx), as well as decreased malondialdehyde (MDA) levels. The serum biomarkers associated with liver function, namely alkaline phosphatase (ALP), alanine aminotransferase (ALT), aspartate aminotransferase (AST), and gamma glutamyl transaminase (GGT), returned to lower levels with $p<0.001$, comparable to those observed in both the normal control group and the reference control group. Thus, there was a significant reduction in liver weight and hepatocyte propagation, with much lower cell injury in rat groups treated with livergol – CNC (20 mg/kg).
Conclusion: Taken together, the normal microanatomy of hepatocytes, present of livergol – CNC, improved antioxidant enzymes (SOD, CAT, and GPx), and condensed MDA with repairs of liver biomarkers validated CNC hepatoprotective effect. The synthesized CNCs can be a good candidate as a valuable drug for future research on the mechanisms of antitumor drugs.
Keywords: Cellulose nanocrystals; Liver cirrhosis; Thioacetamide; Antioxidant enzymes

P491, Omega-3s and lactobacillus probiotics in canine atopic dermatitis: a systematic review and call for mechanistic research

Narges Safari[1], Zahra Dolati[1], Amirreza Khodakarami[1], Mahda Nobahari[1], Soodeh Tavakoli[2]
1. Department of Veterinary Medicine, Garmsar Branch, Islamic Azad University, Garmsar, Iran
2. Small Animal Clinical Sciences, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran

Background: Canine atopic dermatitis (CAD) is a chronic inflammatory skin disease. Modulating the gut-skin axis with probiotics and omega-3 fatty acids offers therapeutic potential, but systematic evaluation of clinical evidence, especially for combination therapy and short-chain fatty acid (SCFA) mechanisms, is lacking.
Methods: We systematically searched PubMed, Scopus, and Web of Science (up to Dec 1, 2024) for randomized (RCTs) or controlled clinical trials (CCTs) on these interventions in CAD dogs. Data on clinical scores (CADESI, pruritus VAS), microbiota, and SCFAs were extracted. Quality was assessed using Cochrane RoB 2 and ROBINS-I.
Results: From 351 records, six primary studies and one meta-analysis were included. Four trials evaluated omega-3 fatty acids, two investigated Lactobacillus-based probiotics. No trials examined their combination. All primary studies showed modest clinical improvement (CADESI reductions: 11-28%), though statistical significance varied. Critically, no trials directly measured SCFA concentrations. However, a separate study (Gonçalves et al., 2025) reported lower fecal SCFA levels in CAD dogs versus healthy controls.
Conclusion: Current evidence provides modest support for standalone omega-3 or Lactobacillus probiotics in alleviating CAD signs. Significant gaps exist: no clinical trials evaluate potential synergistic effects, and no direct evidence links clinical benefits to SCFA-mediated mechanisms. This review highlights the urgent need for well-designed combination therapy trials integrating microbiome and metabolite analyses.
Keywords: Atopic dermatitis, Gut-skin axis, Omega-3 fatty acids, Probiotics, Lactobacillus

P492, Expression changes of apoptotic genes in cumulus cells in relationship to oocyte and embryo quality of polycystic ovary syndrome women undergoing ICSI: Ameliorative effect of Myo-inositol

Zeynab Yazdanpanah[1], Mitra Heydari Nasrabadi[1], Ebrahim Cheraghi[2], Masoud Salehipour[1]
1. Department of Biology, Parand Branch, Islamic Azad University, Tehran, Iran
2. Department of biology, Faculty of Sciences, University of Qom, Qom, Iran

Background: Myo-inositol (MI) has been shown to alter gene expression in cumulus cells, improving oocyte and embryo quality in Women with polycystic ovary syndrome (PCOS) undergoing intracytoplasmic sperm injection (ICSI). This study investigated the effect of myo-inositol on apoptosis-related genes expression in cumulus cells of PCOS patients undergoing ICSI, and its relationship with the of quality oocyte and embryo.
Methods: The study included 40 women undergoing ICSI, comprising 20 PCOS patients and 20 healthy controls. The MI group received 2000 mg Myo-inositol+1 mg folic acid twice a day for 6 weeks with starting the ICSI cycle. Serum hormone levels were assessed using radioimmunoassay for all participants. Real-time polymerase chain reaction (real-time PCR) was employed to analyze the expression of survivin, caspase-3, and caspase-7 in 200 cumulus-oocyte complexes (100 from the PCOS group and 100 from the control group) collected during oocyte retrieval.
Results: The expression of survivin was significantly lower in PCOS patients compared to controls, while caspase-3 and caspase-7 levels were significantly higher in the PCOS group ($p < 0.05$). A statistically significant correlation was observed between the expression levels of these genes and embryo quality.
Conclusions: These findings suggest that Myo-inositol administration in PCOS patients undergoing ICSI may improve of apoptosis-related genes expression such as survivin, caspase-3, and caspase-7 levels in cumulus cells in assisted reproductive technology (ART) programs. However, further prospective studies are necessary to confirm these results and establish their clinical applicability.
Keywords: Polycystic ovarian syndrome, Cumulus cells, Apoptotic genes, Embryo quality

P493, Exercise Reverses Diabetes-Induced MicroRNA Dysregulation in White Adipose Tissue

Maryamossadat Mirtajaddini-Goki[1], Mahboobeh Yeganeh-hajahmadi[2], Mohammad-Mojtaba Farazi[3], Saeideh Jafarinejad-Farsangi [3], Yasmin Moosavi-Said[3]

1. Physiology Research Center ,Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
2. Cardiovascular Research Center, Institute of Basic and Clinical Physiology Sciences, Kerman University of Medical Sciences, Kerman, Iran
3. Endocrinology and Metabolism Research Center, Institute of Basic and Clinical Physiology Sciences, Kerman University of Medical Sciences, Kerman, Iran

Background: Type 1 diabetes mellitus (T1DM) induces significant metabolic dysregulation and alters microRNA (miRNA) expression in key metabolic tissues. While exercise is a cornerstone of diabetes management, the effects of different exercise modalities on miRNA expression in white adipose tissue (WAT) of T1DM subjects remain largely unexplored. This study aimed to investigate the effects of eight weeks of moderate-intensity endurance training (MIET) and high-intensity interval training (HIIT) on the expression of miR-29a and miR-126 in the WAT of the T1DM rat model.

Methods: Forty-two male Wistar rats were randomly assigned to six groups (n=7): Control, MIET, HIIT, T1DM, T1DM+MIET, and T1DM+HIIT. Diabetes was induced by a single injection of STZ (60 mg/kg).

Results: T1DM resulted in a significant upregulation of miR-29a (15-fold, $p<0.001$) and miR-126 (4-fold, $p<0.001$) compared to the control. Both MIET and HIIT completely normalized miR-29a expression in diabetic rats ($p<0.001$). Furthermore, both exercise interventions profoundly suppressed miR-126 expression to levels significantly below those of the T1DM group ($p<0.001$). Metabolically, both MIET and HIIT significantly reduced fasting blood glucose in diabetic rats, with MIET demonstrating a more potent effect ($p<0.001$).

Conclusion: The findings demonstrate that both MIET and HIIT effectively normalize the diabetes-induced aberrant expression of miR-29a and miR-126 in WAT. This normalization is associated with improved glycemic control, suggesting a potential mechanistic role for these miRNAs in the beneficial effects of exercise in T1DM. The differential impact on glucose levels suggests that exercise intensity is an important consideration for therapeutic outcomes.

Keywords: miR-29a, miR-126, Endurance training, High-intensity interval training, Type 1 diabetes mellitus.

P494, A histopathological review of diabetic tissue changes and their association with recurrent pregnancy loss

Reyhane Kamelnia[1], Bita Saifi[2], Elahe Kamelnia[3], Yasamin Shams[4]
1. Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of biology, Faculty of sciences, Mashhad branch, Islamic Azad University, Mashhad, Iran
4. Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Recurrent miscarriage (RM), as the loss of two or more consecutive pregnancies, is the spontaneous loss of a pregnancy before the fetus has reached viability. The causes of recurrent pregnancy loss are many including parental chromosomal abnormalities, maternal thrombophilia, immunologic causes and endocrine disorders.
Methods: In this review, we summarize current concepts on recurrent miscarriage and modified insulin in reduce of failed pregnancy and efficient treatment intervention on RM. The literature survey of the different databases until the end of June 2025 was explored on miscarriage and modified insulin and effect of insulin in reduce miscarriage. RM is really sad disorder can take. There is a complex relationship between beta-cell (β-cell) dysfunction and insulin insensitivity. Uncontrolled diabetes is recognized as a risk factor for RM due to its impact on metabolic and hormonal balance essential for pregnancy maintenance. m
Results: Human insulin (INS) has a well-defined structure and is among the best-characterized proteins, providing a wealth of information on the mechanisms of structural organization and modification can produce insulin analogs via more stable structure and effective support. Insulin and related proteins play a significant role in pregnancy and may be linked to recurrent miscarriages through their effects on fetal development and maternal metabolic regulation. Pregnancy induces adaptations in pancreatic β-cells, increasing insulin secretion to meet maternal and fetal metabolic demands. In women with diabetes, especially type 1 diabetes, some endogenous insulin production may be regained during pregnancy, influenced by hormones like prolactin and placental lactogen.
Conclusion: The research into improved diagnosis and development of new treatment strategies is essential. These findings underscore the importance of screening for and managing insulin resistance in women with recurrent miscarriage to improve pregnancy outcomes.
Keyword: Acetylated insulin, Insulin analogs, Recurrent miscarriage

P495, Evaluation of the effect of testosterone administration on the sperm functional parameters in hypothyroid rats

Sepideh Moradi[1], Alireza Godini[1], Aliashraf Godini[1]
1. Department of Physiology, School of Medicine, Kermanshah University of Medical Sciences, Kermanshah, Iran

Background: Testosterone administration is common in hypogonadism. Reports indicate that testosterone production is reduced in hypothyroidism and it may be the culprit of spermatogenesis impairment, reported in hypothyroidism. Therefore, the aim of this study is to investigate the effects of testosterone administration on the sperm function indices in hypothyroidism in rats.
Methods: Adult male rats weighing about 250 grams were randomly divided into six groups (9 per group): 1- Control rats 2- Rats received testosterone (2mg/kg) 3- Rats received testosterone (20mg/kg) 4- Hypothyroid rats 5- Hypothyroid rats received testosterone (2mg/kg) 6- Hypothyroid rats received testosterone (20mg/kg). Hypothyroidism was induced by consumption of tap water containing %0.025 propylthiouracil. After 9 weeks, surgery was performed under anesthesia, blood was collected and their serums were separated and serum T3, T4 and testosterone concentration were measured. Sperm functional indices were also determined by separating the epididymis and placing it in culture medium.
Results: Results indicate that serum T3, T4 and testosterone concentrations are significantly attenuated in hypothyroid rats versus the control group. Sperm number per each epididymis after induction of hypothyroidism decreases significantly ($p<0.05$) in hypothyroid rats (22600000±2200000) in comparison to the control group (34600000±720000). Low testosterone administration significantly ($p<0.05$) increases sperm count (34900000±4160000) in comparison to the hypothyroid group. High dose testosterone also increases significantly ($p<0.05$) the sperm count in control animals that received testosterone compared to the control group.
Conclusions: Low serum testosterone concentration could be one of the reasons for the decrease in sperm count in hypothyroidism. Testosterone administration partially improves spermatogenesis indices.
Keywords: Hypothyroidism, Spermatogenesis, Testosterone

P496, Hepatoprotective effects of *Nigella sativa* oil against LPS-induced liver injury in rats

Mahdieh Sadat Mortazavi Sani[1], Mahmoud Hosseini[2]
1. Medical Student, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Lipopolysaccharide (LPS) induces systemic inflammation and oxidative stress, leading to hepatocellular injury. Excessive reactive oxygen species (ROS) impair antioxidant defenses and increase inflammatory mediators such as interleukin-6 (IL-6) and nitric oxide (NO). Nigella sativa (NS) oil, known for its antioxidant and anti-inflammatory properties, may protect against LPS-induced liver damage.
Methods: Adult male Wistar rats were randomly assigned to five groups: control (1 ml/kg saline, i.p.), LPS (1 mg/kg, i.p.), and three treatment groups receiving NS oil (100, 200, or 400 mg/kg, i.p.) plus LPS. Treatments were administered daily for two weeks. Liver tissues were analyzed for oxidative stress markers (malondialdehyde, thiol content, superoxide dismutase, catalase) and inflammatory mediators (IL-6, NO metabolites). Serum liver function indicators (AST, ALT, ALP, total protein, albumin) were also measured.
Results: LPS increased hepatic MDA and inflammatory mediators while decreasing thiol content and antioxidant enzyme activities. Serum AST, ALT, and ALP levels were elevated, and albumin and total protein decreased. NS oil treatment significantly restored antioxidant enzyme activities, reduced MDA and inflammatory mediators, and normalized liver function markers in a dose-dependent manner.
Conclusion: Nigella sativa oil demonstrates potent hepatoprotective effects against LPS-induced liver injury in rats, likely through enhancement of antioxidant defenses and suppression of inflammation, suggesting its therapeutic potential in endotoxin-mediated hepatic damage.
Keywords: Nigella sativa, Liver injury, Oxidative stress, Lipopolysaccharide, Antioxidant enzymes

P497, The role of selenium in enhancing the survival of Sertoli cells under testicular hypoxic injury in an in vitro model

Faezeh Abolhasani[1,2], Amir Reza Saberi[1,2], Shadi Mohammadpour-Asl[3], Naseh abdollahzade[3,4], Shiva Roshan-Milani[4,5]

1. Student Research Committee, Urmia University of Medical Sciences, Urmia, Iran
2. School of Pharmacy, Urmia University of Medical Sciences, Urmia, Iran
3. Department of Physiology, School of Medicine, Urmia University of Medical Sciences, Urmia, Iran
4. Neurophysiology Research Center, Cellular and Molecular Medicine Research Institute, Urmia University of Medical Sciences, Urmia, Iran
5. Cellular and Molecular Research Center, Cellular and Molecular Medicine Research Institute, Urmia University of Medical Sciences, Urmia, Iran

Background: Selenium is an essential trace element that is necessary for normal male reproductive health. Recently selenium has become the focus of intensive research for its potential role in the protecting ischemia/reperfusion (I/R) injuries. However, little is known about the effects of selenium on testicular hypoxic damages, especially in isolated Sertoli cells. Therefore, present study investigated the effect of selenium on Sertoli cell survival in an *in vitro* model of cobalt chloride (CoCl2)-induced hypoxia.

Methods: The mouse Sertoli cells (TM4) were cultured in DMEM-F12 medium. The TM4 cells were incubated in the medium on a 96-well cultured plate. The cells investigated in four main groups: control, CoCl2 (50, 125, 150 µM), Selenium (2 µM) and a pretreatment group (selenium before CoCl2). TM4 cell viability was then investigated by MTT assay.

Results: Cell viability decreased in TM4 cells exposed to CoCl2 in a concentration-dependent manner following 24-hour exposure period. Cell viability decreased from 99.5±0.07 % in the control group to 81.5±0.05, 60.2±0.02 and 56.6±0.02 %, in cells exposed to 50, 125 and 150 µM CoCl2, respectively ($P<0.001$). However, pretreatment with selenium could reversed CoCl2-indiuced reduction in cell viability. Accordingly, cell viability increased significantly to 93.6±0.07 % in Selenium + CoCl2 (125 µM) group, and to 71.3±0.09 % in Selenium + CoCl2 (150 µM) group.

Conclusion: The present data indicate the protective effect of selenium against hypoxia-induced toxicity in Sertoli cells. This may be mediated through selenium's anti-apoptotic and antioxidative effects. Selenium may contribute, at least in part, to mitigating hypoxia-associated infertility.

Keywords: Selenium, Cobalt Chloride, Hypoxia, Sertoli cell, TM4, Cell viability

P498, Effects of endurance exercise on hepato-nephropathy in diabetic rats

Maryam Mahmoudabady[1,2], Sadegh Shabab[1], Zahra Gholamnezhad[1,2], Maryam Farazandeh[1], Mohammad Hosein Eshaghi Ghalibaf [1]

1. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

2. Applied Biomedical Research Center, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Diabetes mellitus is a metabolic disorder that can lead to long-term complications affecting multiple organs and diminish the quality of life. This study aims to explore the impact of endurance exercise on hepato-nephropathy by mitigating biochemical and oxidative alterations in streptozotocin (STZ)-induced diabetic rats.

Methods: Forty-nine adult male rats (average weight of 250±20 g) were split into seven groups (n = 7), consisting of control, diabetic, diabetic rats treated with metformin (300 mg/kg) alongside high-intensity interval training （HIIT, 20 m/min) and moderate-intensity continuous training (MICT, 15 m/min) exercises, as well as combined groups of metformin with each form of exercise. Biochemical markers and oxidative stress indicators (SOD, CAT, thiol, and MDA) in liver and kidney tissues were assessed using colorimetric assays.

Results: In comparison to the control group, diabetic rats exhibited increased levels of fasting blood sugar (FBS), aspartate aminotransferase (AST), alanine transaminase (ALT), lactate dehydrogenase (LDH), blood urea nitrogen (BUN), and creatinine (Cr), along with an imbalance between oxidants and antioxidants. The diabetic groups receiving metformin and both HIIT and MICT exercises showed improvements in FBS, liver function tests (AST, ALT, and LDH), and renal function tests (BUN and Cr). Furthermore, both exercise groups, in conjunction with metformin-treated and combined groups, reduced diabetes-induced increases in MDA and restored levels of SOD, CAT, and Thiol in hepatic and renal tissues.

Conclusion: The findings of this study demonstrated that both HIIT and MICT exercises provided protective benefits against diabetic hepato-nephropathy, with the most notable effects observed in the metformin+HIIT group.

Keywords: Diabetes, Exercise, Oxidative stress, Liver, Kidney

P501, IgY reduces *S. aureus* biofilm, inflammation, and pain in chronic wound infections

Alireza Hosseinzadeh Pilehvar[1]
1. Dvm student, Semnan University, Tehran, Iran

Background: *Staphylococcus aureus* biofilms in chronic wounds resist antibiotics, causing persistent inflammation and pain. Immunoglobulin Y (IgY) targets bacterial antigens without promoting resistance, offering a novel therapeutic approach.
Methods: Anti-*S. aureus* PIA/SpA IgY was produced via PEG precipitation from immunized hens. Full-thickness wounds in BALB/c mice (n=16) were infected with *S. aureus* USA300 (10^7 CFU/mL). Mice received daily topical IgY (15 mg/mL) or PBS for 7 days. Bacterial load, wound size, pain behaviors, and inflammatory markers (TNF-α, IL-6) were assessed.
Results: IgY reduced bacterial load by 42%, wound size by 23%, and pain behaviors by 34% compared to controls. TNF-α and IL-6 levels decreased by 42% and 40%, respectively. SpA expression dropped by 73%.
Conclusion: IgY effectively targets *S. aureus* biofilms, reducing inflammation and pain, suggesting potential as a non-antibiotic therapy for chronic wounds.
Keywords: Staphylococcus aureus, Biofilm, Immunoglobulin Y, Chronic Wound, Inflammation

P502, mRNA vaccines for cancer treatment: Emerging immunotherapeutic strategies

Seyyed Amir Hoseyn Haghayeghee Kakhki Mohassel[1], Roya Behnamiyan[1], Fatemeh Tavakoli Kosha[1], Kimia Asadi[1]
1. Department of Biology, Ma. C., Islamic Azad University, Mashhad, Iran

Background: Cancer remains a significant global health challenge due to uncontrolled cell proliferation and the limited long-term efficacy of many conventional treatments. Over the past decade, advances in molecular biology and immunology have enabled the development of mRNA-based cancer vaccines, which offer a flexible strategy for inducing targeted anti-tumor immune responses.
Methods: A structured review of PubMed literature published from 2015 to 2025 was conducted using keywords such as “mRNA vaccine,” and “cancer immunotherapy”. Clinical studies, delivery innovations, and comparisons with existing cancer therapies were included.
Results: mRNA vaccines provide several advantages, including rapid and programmable design, favorable safety, and translation directly in the cytoplasm without entering the nucleus, which avoids any risk of genomic integration. Nucleoside modifications and lipid-nanoparticle delivery have improved stability, translation efficiency, and immunogenicity, helping the development of personalized cancer vaccines. Clinical studies during the past decade have shown that mRNA vaccines can stimulate strong neoantigen-specific T-cell responses and may enhance therapeutic outcomes when combined with immune checkpoint inhibitors. Compared with conventional therapies, mRNA vaccines differ in important ways. Chemotherapy often causes widespread cytotoxicity and immunosuppression, whereas mRNA vaccines induce antigen-specific immunity with minimal off-target effects. Unlike targeted therapies, which require defined molecular abnormalities and may encounter resistance, mRNA vaccines can be rapidly updated to match evolving tumor neoantigens. Moreover, compared with cell-based therapies, mRNA vaccines offer greater scalability and faster personalization.
Conclusion: Given their adaptability and immunological advantages, mRNA vaccines represent a promising emerging modality with the potential to substantially strengthen current cancer treatment strategies.
Keywords: Cancer, mRNA vaccines, Neoantigen, Immunotherapy

P503, Effects of moderate aerobic exercise on antiviral immune responses in Adults

Zahra Mohammadnia[1], Fahimeh Lavi[2]
1. Department of Virology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Immunology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Viral infections remain a major cause of morbidity in adults, affecting quality of life and overall health. Recently, there has been interest in lifestyle behaviours that might help support immune defences. Aerobic activities such as brisk walking, light jogging, or cycling have been repeatedly discussed for their potential to enhance immune function. Although the overall literature indicates a positive influence, specific immune pathways are affected, and response rates vary somewhat across different studies.
Methods: This study examines indicators of antiviral immune responses in adults. Our Analysis was based on the acute effects of exercise to multi-week training interventions, allowing us to consider both immediate physiological changes and longer-term adaptations.
Results: Moderate aerobic exercise has been shown to boost NK cell cytotoxic function, often concurrently with heightened expression of activating receptors and increased release of cytotoxic mediators. Further analysis presented that lower levels of inflammatory cytokines and a modest rise in anti-inflammatory markers contributed to a more balanced immune profile. Strong evidence was indicated in enhanced expression of pattern-recognition receptors and more effective antigen presentation by dendritic cells. In previously inactive older adults, sustained moderate aerobic training helped restore NK cell function and improve immunity.
Conclusion: This study's findings suggest that regular moderate-intensity aerobic exercise supports antiviral immunity. It could also be a safe, accessible, and non-pharmaceutical strategy for maintaining immune health in adulthood.
Keywords: Moderate aerobic exercise, NK cells, Antiviral immunity, Innate immunity, Older adults

P505, Viral RNA-driven epigenetic silencing: a novel paradigm in Ebola virus pathogenesis

Saadat Samadidinani[1]
1. Department of Molecular Biology, Ashrafi Esfahani University, Isfahan, Iran

Background: Ebola virus (EBOV) is a highly lethal pathogen that suppresses host innate immunity. While viral proteins such as VP35 and VP24 are known interferon antagonists, the potential of viral RNA to directly modulate host gene expression via epigenetic mechanisms remains unexplored.
Methods: Genomes of 100 RNA viruses were analyzed using NCBI Virus and ClinVar. Viral RNA sequences were aligned with human promoters and exons to identify complementarity and R-loop potential. CpG islands were mapped to assess epigenetic susceptibility. RNA-seq data from EBOV-infected cells were examined to validate predicted effects on interferon-stimulated genes (ISGs).
Results: EBOV VP35 and VP24 RNA regions showed strong complementarity to ISG15, MX1, and IFITM3 promoters, overlapping with predicted R-loop forming sequences. RNA-seq data confirmed significant downregulation of these ISGs. Comparative analysis across 100 RNA viruses revealed similar RNA-driven silencing potential, suggesting a generalizable mechanism that may extend beyond EBOV.
Conclusion: This study introduces a novel paradigm: viral RNA can directly induce epigenetic silencing of host immune genes, independent of viral proteins. The discovery of RNA-mediated gene suppression across diverse RNA viruses may reshape our understanding of viral pathogenesis and open new avenues for antiviral therapy development. Further experimental validation is necessary to confirm these computational findings and explore therapeutic implications.
Keywords: Ebolavirus, Epigenesis, R-Loop Structures, Innate Immunity, Genetic

P506, The effects of vitamin B12 on lipopolysaccharide-induced systemic inflammation in rats

Aliye Ghorbanpour[1], Fereshteh Asgharzadeh[1], Sima Beygoli[2], Sepide Behrouz [2], Mahmoud Hosseini [3], Zahra Gholamnezhad[1]

1. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Applied Biomedical Research Center, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
3. Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Lipopolysaccharide (LPS) is a key factor in inducing systemic inflammation by activating immune cells and increasing the secretion of interleukin-6 (IL-6). Considering the antioxidant and immunomodulatory properties of vitamin B12, this study aimed to evaluate the effects of vitamin B12 on LPS-induced systemic inflammation markers (IL-6 and white blood cell (WBC) count).

Methods: Forty male Wistar rats were randomly assigned to five groups: Control, LPS (1 mg/kg) and LPS treated with B12 at doses of 0.25, 0.5 and 1 mg/kg. Vitamin B12 was administered orally for 6 days prior to and 10 days following LPS injection. Finally, the blood total and differential WBC counts and serum IL-6 levels were measured.

Results: The blood's total WBC, neutrophil, eosinophil and monocyte counts, as well as the serum level of IL-6 increased in LPS group compared to control animals ($p<0.05$-$p<0.001$). Treating the animals with vitamin B12 at all doses reduced the total and differential WBC count compared to LPS group ($p<0.05$-$p<0.001$), except for neutrophils at a dose of 0.5 mg/kg. There was no significant difference between IL-6 levels in LPS and LPS+ vitamin B12 treated groups.

Conclusion: These findings suggest that vitamin B12 ameliorated the LPS-induced leukocytosis, while could not prevent elevation of IL-6 as a pro-inflammatory cytokine.

Keywords: Lipopolysaccharide, Vitamin B12, Systemic Inflammation, WBC, IL-6

P507, Clinical relevance of HSP60 in diagnosis of rheumatoid arthritis: a systematic review

Amir Mohammad Ganjali[1,2], Yekta Rezapour[1,2], Hossein Javid [1,3,4]
1. Department of Medical Laboratory Sciences, Varastegan Institute for Medical Sciences, Mashhad, Iran
2.Student Research Committee, Varastegan Institute for Medical Sciences, Mashhad, Iran
3.Department of Clinical Biochemistry, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
4. Surgical Oncology Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Rheumatoid arthritis (RA) is a chronic autoimmune condition that mainly affects the synovial joints, leading to a gradual decrease in the structure of the joints over time. Heat shock protein 60 (HSP60) plays a crucial role in this condition, greatly aiding in the diagnostic processes related to rheumatoid arthritis. This systematic review analyzes the roles of HSP60 in the diagnosis of rheumatoid arthritis (RA).
Methods: This research was executed as a systematic review. A total of 330 articles were first collected from the databases ScienceDirect, PubMed, and Scopus. Following the selection of inclusion and exclusion criteria, 23 articles were chosen for the final analysis.
Results: The studies reviewed indicate a notable rise in anti-HSP60 antibodies, especially IgG, in individuals diagnosed with rheumatoid arthritis (RA). The detection of these antibodies correlates with inflammatory markers such as IL-4, indicating their potential as a significant biomarker for the diagnosis of rheumatoid arthritis. The possible significance of HSP60 in the early detection and monitoring of diseases has been emphasized, yet additional research is necessary to validate its reliability as a diagnostic tool.
Conclusion: This study focused on the diagnostic role of HSP60 in rheumatoid arthritis. The findings suggest that HSP60 may serve as a potential biomarker for disease detection. However, further research and clinical trials are needed to standardize its application in diagnostic protocols.
Keywords: Rheumatoid arthritis, Biomarkers, Heat Shock Protein, HSP60

P508, DNA vaccines: A powerful strategy for controlling brucellosis

Saeid Abedi[1]
1. Department of Biology, Fal.C., Islamic Azad University, Falavarjan, Iran

Background: Brucellosis is a common disease between humans and animals. Although there is no approved vaccine for brucellosis in humans, many efforts have been made to develop vaccines for animals. Live attenuated vaccines are cheaper and more effective than other vaccines, but they can increase antibiotic resistance, interfere with serological diagnostic tests, and increase virulence in animals. Vaccines containing recombinant protein or their coding DNA can be suitable alternatives to the conventional vaccines, because they can reduce unwanted side effects. Choosing the suitable antigen that stimulates the immune system is very important in the preparation of these vaccines. In the present study, by observing the new recombinant vaccines that are made based on recombinant proteins and DNA, it has been tried to clarify their strengths and weaknesses and the new perspective of vaccination against brucellosis. There is currently no approved vaccine for brucellosis in humans. In addition, the control of brucellosis in humans depends on the control of the animal disease. Vaccination of animals with commercially available vaccines may cause disease and, in some cases, have low efficacy
Methods: This review article searches Google scholar, PubMed, and SID databases for new research on recombinant protein and DNA vaccines against brucellosis until 2024.
Results: Advantages and disadvantages of common and new brucellosis vaccines, recombinant and DNA vaccines, after conducting the research stages in large animals, can be a suitable approach to prevent the progress of brucellosis.
Conclusion: the best way to prevent Brucellosis is use of recombinant DNA vaccines
Keywords: Brucellosis, Vaccine, Recombinant protein, DNA vaccines

P509, Lymphocyte immunotherapy in recurrent miscarriage: A novel strategy to restore maternal-fetal immune tolerance

Mobina Kashki[1,2], Amin Solouki[1,3]
1. Department of Medical Laboratory Science, Varastegan Institute for Medical Science, Mashhad, Iran
2. Student Research Committee, Varastegan Institute for Medical Sciences, Mashhad, Iran
3. Department of Hematology and Blood Banking, School of Allied Medical Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: The loss of two or more consecutive pregnancies is known as recurrent miscarriage, and about half of these instances are still idiopathic. Immune system dysfunction is thought to be a major contributing element in these situations. A safe and effective treatment for those with immunologically mediated reproductive issues is lymphocyte immunotherapy (LIT). The purpose of this study is to assess the clinical importance of LIT in preventing repeated miscarriages.
Methods: This review article included studies published on PubMed, ScienceDirect, Google scholar, and SID until November 2025. By searching these databases, 19 articles were found. About 11 of them were removed by reading titles and abstracts, and 8 articles were selected under the inclusion criteria.
Results: During pregnancy, the maternal immune system was required to tolerate the semi-allogeneic fetus. If key immune components including natural killer (NK) cells, T lymphocytes, cytokines, and antibodies failed to function properly, implantation was impaired, leading to miscarriage. LIT was a new therapeutic strategy that involved giving the mother paternal lymphocytes. In order to produce a favorable environment for a successful implantation, this intervention sought to modify the mother's immune response, reduce immunological attacks against the fetus, and affect the mother's endocrine glands.
Conclusion: The chance of miscarriage seems to be greatly decreased by LIT. However, because lymphocytes are administered, this treatment may cause negative side effects like fever and allergic reactions. Therefore, before starting LIT, a thorough medical checkup and professional monitoring are crucial.
Keywords: Immunotherapy, Recurrent Miscarriage, Alloimmunity, Lymphocyte Immunotherapy

P510, Protective effect of chloroquine on experimental model of Methotrexate-induced oral mucositis in male rats

Nooshin Koohi[1], Razieh Mohammad Jafari[1,2], Mojgan Alaeddini[3], Hamed Shafaroodi[1], Ahmad-Reza Dehpour[1,2]

1. Department of Pharmacology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
2. Experimental Medicine Research Center, Tehran University of Medical Sciences, P.O. Box: 13145-784, Tehran, Iran
3. Dental Research Center, Tehran University of Medical Sciences, Tehran, Iran

Background: Oral mucositis is a debilitating complication commonly associated with methotrexate therapy, characterized by painful inflammation and ulceration of the oral mucosa. Currently, there is no mechanistic treatment for this condition. In this study, we investigated the therapeutic potential of chloroquine, a well-known anti-inflammatory and antioxidant agent, in mitigating methotrexate-induced oral mucositis. Additionally, we explored the possible involvement of opioidergic and nitrergic signaling pathways, which may contribute to chloroquine's effects by modulating inflammation, and oxidative stress.

Methods: *25* male Wistar albino rats were kept in standard environmental conditions. The oral mucositis model was induced by two intraperitoneal injections of methotrexate 40mg/kg. Then after 24h. animals were treated with chloroquine 0.3mg/kg. For investigating the possible effects of mentioned pathways, pretreatment with naltrexone 3mg/kg for blocking the opioid receptors and L-NAME 10mg/kg to inhibit the NOS, was attempted. After 4 days of treatment, tongue tissues were collected for histopathology and biochemistry studies to measure NO, MDA, GSH, IL-1β, TNF-α, caspase-3, and NF-kB factors

Results: This study showed that methotrexate increased oxidative stress marker (MDA), inflammatory biomarkers (IL-1β, TNF-α, and NF-κB), and apoptosis (caspase-3) while reducing antioxidant capacity (GSH) in oral mucositis. Treatment with chloroquine, particularly at 0.3 mg/kg, significantly improved these parameters, reducing inflammation, oxidative stress, and apoptosis. The nitrergic pathway was implicated in chloroquine's effects, as its inhibition nullified the benefits.

Conclusion: Overall, chloroquine demonstrated protective effects against methotrexate-induced oral mucositis, highlighting its potential as a therapeutic candidate for further research.

Keywords: Oral mucositis, Methotrexate, Chloroquine, Opioids, Nitric oxide, Rats

P511, The new face of monkeypox: Updated insights on spread, hosts, and global risks

Fatemeh Sadat Taghavi[1], Mohammad Javad Rasaee[2]
1. Students' Research Committee, Faculty of Medicine, Mashhad Branch, Islamic Azad University, Mashhad, Iran
2. Department of Medical Biotechnology, School of Medical Science, Tarbiat Modarres University, Tehran, Iran

Background: Monkeypox virus (MPXV) was first discovered in monkeys in a laboratory in Denmark in 1958, and the first human case was reported in Congo in 1970. It causes a disease called Mpox disease which is mainly characterized by rashes. Viral transmission occurs through body fluids, respiratory droplets, saliva, the content of vesicles, and lesions in addition to skin contact. Initially, Mpox was restricted to Africa, and sporadic cases outside Africa had a history of travel or links to Africa.
Methods: A narrative review was conducted using PubMed and Google Scholar up to October 2024 with key terms and MeSH headings related to monkeypox. This review covers the discovery, history of the disease and transmission, immune system response and immune evasion, vaccination, and the possibility of turning into an outbreak with the countries at higher risk of infection.
Results: The etiology of the recent increase in Mpox cases is an increase in animal reservoir population and animals' adaptation to urban environments. MPXV is capable of crossing species and has a wide range of hosts; however, not all of them are specified currently. All mammals should be considered susceptible to MPXV, and investigating its new and unknown host should be seriously pursued.
Conclusion: The recent discovery of Mpox outside Africa has shed light that health research is vital for preventing, controlling, and/or eradicating infectious diseases at their origins. The ability to monitor and respond to Mpox requires enhanced global preparedness.
Keywords: Mpox, Pandemic, Monkeypox virus, Infection

P512, Exosome-mediated immune modulation in oncovirus infections: therapeutic potential for vaccines and drugs

Reza Jafari[1], Reza Farid[2]
1.Department of Immunology, Sarab School of Medical Sciences, Tabriz University of Medical Sciences, Tabriz, Iran
2. Department of Allergy and Clinical Immunology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Oncogenic viruses (e.g., EBV, HPV, HTLV-1) exploit exosomes to evade immune surveillance and promote carcinogenesis. These extracellular vesicles also offer promising platforms for immunopharmacological interventions, yet a systematic synthesis of their dual role is lacking.
Methods: Following PRISMA guidelines, we conducted a systematic review of PubMed, Scopus, and Web of Science (2010–2025). Studies were included if they addressed exosome-mediated immune modulation by oncoviruses or their translational applications. Quality assessment used ISEV-MISEV and SYRCLE's RoB tools.
Results: Among 2,318 screened records, 68 studies met inclusion criteria. The results showed that Exosomes from virus-infected cells carry immunosuppressive cargo (e.g., PD-L1, viral miRNAs) that dampen T-cell responses. For therapeutic potential, Engineered exosomes loaded with viral antigens (e.g., HPV-E7) or immunomodulators (e.g., STING agonists) show efficacy in preclinical models. Challenges include exosome heterogeneity and lack of clinical trials.
Conclusion: Exosomes are pivotal in oncovirus immune evasion but can be repurposed for targeted immunotherapy. Standardization and clinical validation are critical next steps.
Keywords: Exosomes, Oncoviruses, Immunomodulation, Vaccine Development, Drug Delivery

P513, Efficacy and resistance of amprolium in broiler chickens in iran: a systematic review (2000–2025)

Fatemeh Hoseinpour[1], Ali Tashakori[2], Mohsen Akbari[2]
1. Department of Basic Sciences, Faculty of Veterinary Medicine, Razi University, Kermanshah, Iran
2. Department of Clinical Sciences, Faculty of Veterinary Medicine, Razi University, Kermanshah, Iran

Background: Coccidiosis is a significant parasitic disease affecting poultry, leading to substantial economic losses in Iran. Amprolium, whether used alone or in combination with ethopabate, is one of the most commonly utilized anticoccidial treatments. However, reports of decreased efficacy and the emergence of resistance underscore the necessity for a systematic review of its application in broiler chickens in Iran.
Methods: A systematic search was conducted in PubMed, Scopus, SID, Magiran, IranDoc, and Google Scholar for studies published from 2000 to 2025 using the keywords "Amprolium," "Broiler," and "Iran." Out of 383 retrieved articles, duplicates, review papers, studies on non-chicken species, and those conducted outside Iran were excluded. Ultimately, seven original studies conducted in Iran met the inclusion criteria. Data on performance indices, lesion scores, intestinal histomorphology, oocyst output, and resistance status were extracted and synthesized.
Results: Early studies (2003–2005) confirmed Amprolium's strong anticoccidial effect compared to herbal alternatives. In 2013, field surveys reported partial to complete resistance to Amprolium+Ethopabate in several *Eimeria* isolates. Experimental trials (2013–2018) consistently demonstrated reduced lesion scores and oocyst shedding with Amprolium, though intestinal villus morphology was variably affected. In recent studies (2019-2020), Amprolium or combining Amprolium with herbal extracts (e.g., *Artemisia sieberi*, *Curcuma longa*) improved growth performance, intestinal integrity, and synergistic oocyst reduction.
Conclusion: Amprolium remains effective in broiler chickens in Iran; however, resistance is beginning to emerge. Combining Amprolium with herbal extracts may improve its efficacy and reduce resistance. Continuous monitoring of drug sensitivity is crucial for sustainable control of coccidiosis.
Keywords: Amprolium, Broiler Chickens, Coccidiosis, Drug Resistance, Ethopabate

P514, The effect of nanocarriers on inducing antigen-specific immune tolerance in various autoimmune diseases

Faezeh Dangkoub [1,2], Mojtaba Sankian [3], Mohsen Tafaghodi [1,2], Mahmoud Reza Jaafari [1,2,4], Ali Badiee [1,2]
1. Department of Pharmaceutical Nanotechnology, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran
2. Nanotechnology Research Center, Pharmaceutical Technology Institute, Mashhad University of Medical Sciences, Mashhad, Iran
3. Immunology Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
4. Biotechnology Research Center, Pharmaceutical Technology Institute, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Induction of antigen-specific immune tolerance is the long-term goal of immunotherapy for the treatment of various autoimmune diseases such as multiple sclerosis (MS), rheumatoid arthritis (RA), type-1 diabetes (T1D), etc. In recent years, many studies have been conducted on the potential of nanotechnology-based formulations to modulate the immune system, leading to promising results both *in vitro* and *in vivo*.
Methods: In this article a narrative review of relevant studies was conducted, focusing on several factors that influence the design of tolerogenic nanocarriers (tNCs) for uptake by antigen-presenting cells (APCs) to induce antigen-specific immune tolerance in autoimmune diseases.
Results: The various physicochemical properties of NCs such as composition, size and shape, charge, particle stiffness and fluidity, protein corona composition, as well as their rout of administration have been shown to play a fundamental role in achieving a desirable immunological outcome. Also, targeting dendritic cells and macrophages as APCs and directly targeting autoreactive lymphocytes, have been proposed as the two main strategies for induction of antigen-specific T cells anergy and activation of regulatory T cells (Tregs) using these tNCs.
Conclusion: Therefore, by simultaneously delivering antigens and immunomodulator drugs to the target site, these tNCs offer a promising approach to treat or even prevent unwanted immune reactions, especially in humans.
Keywords: Tolerogenic nanocarriers, Antigen-specific immune tolerance, Antigen presenting cells, Autoimmune diseases

P516, Antifungal susceptibility of environmental *Cryptococcus neoformans* isolates to amphotericin B and fluconazole

Mohammad Rasoul Sanjari Pour[1], Samaneh Eidi[2], Hamideh Kalateh Rahmani[2]
1. Graduated from the Faculty of Veterinary Medicine, Ferdowsi University of Mashhad, Mashhad, Iran
2.Department of Pathobiology, Faculty of Veterinary Medicine, Ferdowsi University of Mashhad, Mashhad, Iran

Background: *Cryptococcus neoformans* is an opportunistic fungal pathogen commonly associated with bird droppings. Human infection occurs through inhalation of environmental particles and may lead to severe cryptococcosis, particularly fatal meningoencephalitis in immunocompromised individuals. Since environmental reservoirs can harbor resistant strains, monitoring antifungal susceptibility is essential to prevent transmission of resistance to humans.
Methods: In this descriptive cross-sectional study, 60 isolates of *C. neoformans* were collected from bird droppings at the Mashhad Bird Garden. Identification was performed using culture on SDA (Sabouraud Dextrose Agar) and CAFC (Caffeic Acid Ferric Citrate) media, urease testing, and India ink staining. Antifungal susceptibility was evaluated for fluconazole (FLC) and amphotericin B (AMB) according to the CLSI guidelines M27-A3 document. Yeast inoculum suspensions were prepared in RPMI 1640. MIC readings were taken at 48 and 72 hours. *Candida parapsilosis* ATCC 22019 served as the quality-control strain.
Results: All 60 isolates (100%) were susceptible to both antifungal agents. AMB MIC values ranged from 0.125–0.5 µg/mL (MIC_{50}=0.125, MIC_{90}=0.5), while FLC MICs ranged from 0.25–4 µg/mL (MIC_{50}=1, MIC_{90}=2). MIC results showed no significant difference between 48- and 72-hour readings (p=1). AMB demonstrated significantly lower MIC values than FLC (p<0.001).
Conclusion: This study provides important baseline susceptibility data for environmental *C. neoformans* isolates and confirms current antifungal effectiveness of AMB and FLC. Continuous environmental surveillance is crucial for early detection of resistance trends before they pose a risk to human health.
Keywords: *Cryptococcus neoformans,* Bird feces, Amphotericin B, Fluconazole, Minimum Inhibitory Concentration (MIC)

P518, Formulation, *ex-vivo* and *in-vivo* evaluation of oxytetracycline hydrochloride hydrogels based on polyvinyl alcohol and chitosan for wound healing applications

Mitra Alami-Milani[1], Mitra Jelvehgari[2]
1. Department of Pharmaceutics, School of Pharmacy, Urmia University of Medical sciences, Urmia, Iran
2. Department of Pharmaceutics, Faculty of Pharmacy, Tabriz University of Medical Sciences, Tabriz, Iran

Background: Hydrogels are promising drug delivery systems that provide a moist environment conducive to wound healing. Hydrogels are being increasingly investigated for their biocompatibility and sustained drug release, making them strong candidates for topical drug delivery. This study aimed to formulate and evaluate oxytetracycline hydrochloride (OTC-HCl) hydrogels composed of polyvinyl alcohol (PVA) and chitosan.
Methods: Using a Box–Behnken design, various formulations were prepared via the freezing–thawing technique and evaluated for gel fraction, swelling index, protein adsorption, drug content, mechanical properties, and skin permeation using Franz diffusion cells. Antimicrobial efficacy was assessed via MIC determination. Additionally, an *in vivo* wound healing study was conducted on a rat model. Wound closure rate and histological changes were monitored over 14 days.
Results: Among the tested formulations, F6 (containing 5% PVA, 0.75% chitosan, and 1000 mg OTC-HCl, and subjected to three freeze–thaw cycles) was identified as the optimized hydrogel. It demonstrated high mechanical integrity, swelling index of 270%, drug loading efficiency of 91.2%, and a permeation flux of 0.02 µg/min/cm². Protein adsorption and water vapor transmission were also within ideal ranges. MIC results revealed that the hydrogel maintained antimicrobial activity longer than the free drug. *In vivo*, F6 significantly accelerated wound closure and improved tissue regeneration compared to control and blank groups, as confirmed by histopathological scoring.
Conclusion: OTC-HCl-loaded PVA/chitosan hydrogels showed excellent *ex-vivo* and *in-vivo* results, supporting their potential as a novel wound dressing for localized infection control and enhanced healing.
Keywords: Hydrogel, Wound healing, Topical drug administration, Chitosan, Oxytetracycline

P519, Exploring the improved impact of 5FU encapsulated within magnetic nanoparticles (MOF) for the treatment of colorectal cancer (CRC)

Akram Aminian[1], Elham Einafshar[2], Seyedeh Elnaz Nazari[3], Fereshteh Asgharzadeh[3,4], Moein skandari[9], Khatereh Kharazmi[3], Amir avan[4,8], Siyavash Joukar[1,5,6,7], Majid Khazaei[2,3]

1. Department of Physiology and Pharmacology, Afzalipour Faculty of Medicine, Kerman University of Medical Sciences, Kerman, Iran
2. Pharmaceutical Research Center, Pharmaceutical Technology Institute, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Medical Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
4. Metabolic Syndrome Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
5. Physiology Research Center, Institute of Basic and Clinical Physiology Sciences, Kerman University of Medical Sciences, Kerman, Iran
6.Cardiovascular Research Center, Institute of Basic and Clinical Physiology Sciences, Kerman University of Medical Sciences, Kerman, Iran
7. Neuroscience Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
8. Cancer Research Center, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
9. Department of Laboratory Sciences, School of Paramedical Sciences, Zahedan University of Medical Sciences, Zahedan, Iran

Background: CRC is the top non-communicable-disease, which 5FU is its main treatment. Cancer arises from genetic mutations. Nanoparticles offer precise drug-delivery, minimizing toxicity and enhancing therapy. Nano encapsulation boosts drug concentration, exploiting the EPR-effect for multidrug-therapy. Nanotechnology reduces chemotherapy costs, protects the immune system and improves drug-stability by avoiding reticuloendothelial-systems & first-hepatic-pathway. The aim of our study was to investigate the effect of the 5FU-conjugated with magnetic-nanoparticles on the change of survival-index and necrosis area-progression resulting from histopathological findings.
Methods: The synthesis procedure for MOF encompasses: the preparation of Biodegradable chitosan-modified magnetic nanoparticles and the drug-loading process of 5FU. The In-vivo phase of the study was carried out on 24 C57BL6 male mice(14-day period; weighing=20-30gr). The groupings (n=6) comprised: CRC/Saline, CRC/5FU, CRC/Magnetic-5FU and CRC/5FU-MOF. (5mg/kg) every-other-day).
Results: FESEM-characterization showed that loading-drug, didn't increase particle diameter. The in-vitro phase of CT26-cells viability (MTT-assay) don’t show any significant differences at 72-hours comparing to 5FU. But the dose of 1500µg at 24-hours, the main group showed a 0% survival comparing to 5FU, but the difference was not significant. However, in-vivo, according to histopathological findings (H&E-staining) showed, the necrotic area had a significant difference ($p<0.005$) compared to 5FU-group. In oxidative-stress analysis the main group showed a significant difference ($p<0.05$) in MDA-index compared to control. Likewise, the thiol index in main group was significantly different from the control ($p<0.05$).
Conclusion: The introduction of 5FU-encapsulated by MOF to TME, showed an efficient administration of the specified minimal dose to cancer cells. Adding surface modifications that stimulate the antioxidant-system can yield more favorable results for stronger therapeutic potential.
Keywords: 5FU, CRC, Nanoparticle, MOF

P520, Anticancer potential of kombucha tea in breast cancer: Mechanisms and therapeutic implications

Leyla Azmayesh[1], Majid Rajabian Noghond[1], Fereshte Asgharzadeh[1], Maryam Sarshar[1], faezeKhoshhal[1], Samira Kaboudani[1]
1. Department of biology, Payam Noor University, Tehran, Iran

Background: Breast cancer remains a leading cause of cancer-related mortality globally. Kombucha tea, a fermented beverage rich in polyphenols and organic acids, has demonstrated potential anticancer properties that merit scientific evaluation for complementary therapy.
Methods: A systematic literature review (2000-2023) was conducted using PubMed, Scopus, and Web of Science. Search terms included "kombucha," "breast cancer," and "anticancer." Studies were selected based on preclinical evidence evaluating kombucha's effects on breast cancer models.
Results: The reviewed studies consistently demonstrate kombucha's multifaceted effects on breast cancer biology. The fermented beverage exhibits notable antioxidant capacity, reducing oxidative damage while enhancing cellular antioxidant defenses. Its bioactive components show selective toxicity against malignant cells, particularly aggressive breast cancer subtypes, through induction of apoptotic pathways. The fermentation process appears crucial for optimizing the bioavailability and efficacy of tea polyphenols. Importantly, kombucha's complete biochemical matrix demonstrates superior activity compared to isolated compounds, suggesting synergistic interactions between its various organic acids, polyphenols, and fermentation metabolites. These effects are observed across different experimental models while maintaining a favorable safety profile at therapeutic concentrations.
Conclusion: Kombucha shows promising anticancer activity against breast cancer through multiple mechanisms. Further clinical studies are needed to validate these findings and establish therapeutic protocols for integrative oncology approaches.
Keywords: Kombucha, Breast neoplasms, Antioxidants, Apoptosis, Complementary therapies

P522, Monoclonal antibody-based therapies in hodgkin and non-hodgkin lymphomas: review of current evidence

Mobina Bagherian[1], Houman Nazeri[1], Mahdi Moassesfar[2], Fereshteh Atabi[3]
1. Department of Laboratory Science, TeMS.C., Islamic Azad University, Tehran, Iran
2. Department of Biosciences, University of Milan, Milan, Italy
3. Department of Biochemistry and Biophysics, TeMS.C., Islamic Azad University, Tehran, Iran

Background: Monoclonal antibody (mAb)-based therapies have transformed the treatment landscape of lymphoid malignancies by targeting specific tumor-associated antigens. In both Hodgkin lymphoma (HL) and non-Hodgkin lymphoma (NHL), these agents offer improved efficacy and reduced toxicity compared to traditional chemotherapy. This study aims to review current clinical evidence on mAbs in HL and NHL to inform future pharmacologic strategies.
Methods: A systematic review was conducted following PRISMA guidelines. PubMed, Scopus, and Web of Science were searched for studies published from 2015 to 2025. Eligible studies included those evaluating monoclonal antibodies in HL and NHL. Non-English articles, animal studies, and case reports were excluded.
Results: In NHL, Rituximab remains a key agent for B-cell malignancies, improving survival when combined with chemotherapy. Radioimmunoconjugates like ibritumomab tiuxetan show high response rates but are limited by myelosuppression. Alemtuzumab is effective in refractory chronic lymphocytic leukemia and select T-cell malignancies. In HL, Brentuximab vedotin and PD-1 inhibitors have demonstrated strong efficacy in relapsed/refractory cases. PD-1 blockade is particularly effective due to immune evasion mechanisms in HL. Trials of bispecific antibodies and CAR-T cells suggest promising future directions.
Conclusion: Monoclonal antibody therapies have substantially improved clinical outcomes in both Hodgkin and non-Hodgkin lymphoma. Future research should focus on optimizing antibody engineering and therapeutic combinations to enhance efficacy, minimize toxicity, and advance personalized treatment approaches.
Keywords: Monoclonal Antibodies, Hodgkin Disease, Lymphoma, Non-Hodgkin, Immunotherapy.

P523, Cancer immunoediting: Phases of elimination, equilibrium, and escape

Mobina Bagherian[1], Hadiseh Vahabi[2], Amirmahdi Panzaei[1], Mahdi Moassesfar[3], Fereshteh Atabi[4]
1. Department of Laboratory Science, TeMS.C., Islamic Azad University, Tehran, Iran
2.Student Research Committee, Department of Medical Laboratory Sciences, School of Allied Medical Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran
3. Department of Biosciences, University of Milan, Milan, Italy
4. Department of Biochemistry and Biophysics, TeMS.C., Islamic Azad University, Tehran, Iran

Background: Cancer immunoediting encompasses the dynamic relationship between the immune system and tumor cells, progressing through three phases: elimination, equilibrium, and escape. This process is fundamental in determining tumor evolution, immune evasion, and therapeutic response. This study aims to review the mechanisms underlying each immunoediting phases.
Methods: A systematic review was conducted using PubMed, Scopus, and Web of Science to identify English-language, peer-reviewed articles published between 2015 and 2025. Studies focusing on the mechanisms of cancer immunoediting were included, while studies lack sufficient data were excluded.
Results: Cancer immunoediting progresses through three phases. In the elimination phase, cytotoxic T cells, NK cells, and other innate immune components recognize and destroy tumor cells through antigen presentation and cytokine release. Senescent tumor cells also contribute by enhancing immune activation. In the equilibrium phase, surviving tumor cells are kept in a dormant state by immune surveillance. During this phase, selective pressure promotes the emergence of less immunogenic variants. The escape phase occurs when tumor cells evade immunity through downregulation of MHC-I, expression of immune checkpoints, and recruitment of immunosuppressive cells. Senescent cells further contribute by secreting factors that promote tumor growth and immune evasion. These phases highlight the shifting balance between immune control and tumor progression, emphasizing targets for immunotherapeutic intervention.
Conclusion: Cancer immunoediting illustrates the shifting balance between tumor suppression and immune evasion. Future studies should focus on identifying phase-specific biomarkers and developing therapies that restore immune surveillance, inhibit senescence-driven tumor promotion, and prevent immune escape.
Keywords: Tumor Escape, Tumor Microenvironment, Immunotherapy

P524, Enhancing the efficacy of 5-fluorouracil in human colorectal cancer cells via allopurinol co-treatment

Fatemeh Taghavi[1], Majid Khazaei[1], Fereshteh Asgharzadeh[1,2]
1. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Applied Biomedical Research Center, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Colorectal cancer (CRC) is a leading cause of cancer-related deaths globally. Although 5-fluorouracil (5-FU) remains a cornerstone in CRC chemotherapy, its clinical effectiveness is often compromised due to drug resistance and systemic toxicity. Allopurinol, a well-established xanthine oxidase inhibitor used to prevent uric acid crystal deposition, may enhance 5-FU efficacy by reducing chemotherapy-induced oxidative stress and inflammation, and preventing tumor lysis–associated uric acid accumulation.
Methods: HT29 human colorectal adenocarcinoma cells were cultured and treated with 5-FU (standard chemotherapy), allopurinol, and a combination of both agents. Cytotoxicity was evaluated using the MTT assay. Cell migration, oxidative stress parameters (malondialdehyde [MDA], total thiol content, superoxide dismutase [SOD], and catalase [CAT]), pro-inflammatory cytokines (interleukin-6 [IL-6] and tumor necrosis factor-alpha [TNF-α]), and expression levels of apoptosis-related genes (BAX, BCL2, P53) were measured to assess therapeutic interactions.
Results: Allopurinol significantly suppressed HT29 cell proliferation and migration. Co-treatment with 5-FU and allopurinol showed a synergistic antitumor effect, characterized by enhanced apoptosis via increased expression of BAX and P53 and decreased expression of BCL2. The observed effects were accompanied by a reduction in oxidative stress and pro-inflammatory cytokine levels, supporting a mechanistic link through redox and inflammatory modulation.
Conclusion: Allopurinol enhances the antineoplastic activity of 5-FU in colorectal cancer cells by modulating oxidative stress, inflammation, and apoptotic signaling. Given its clinical availability and favorable safety profile, allopurinol represents a promising adjuvant to conventional CRC chemotherapy, warranting further preclinical and clinical validation.
Keywords: Colorectal Neoplasms, Allopurinol, 5-Fluorouracil, Xanthine Oxidase Inhibitors

P525, Dual role of opioids in leukemia: Tramadol suppresses and morphine promotes cancer progression in AML and ALL cells

Freshteh Haerifar[1], Hossein Kalarestaghi[2], Ali Rafat[3]
1. Department of Addiction Studies, School of Medical, Kashan University of Medical Sciences, Kashan, Iran
2. Research Laboratory for Embryology and Stem Cell, Department of Anatomical Sciences, School of Medicine, Ardabil University of Medical Sciences, Ardabil, Iran
3. Anatomical Sciences Research Center, Institute for Basic Sciences, Kashan University of Medical Sciences, Kashan, Iran

Background: Pain is an inseparable part of cancer, especially in advanced stages, and opioids remain a cornerstone of its management. However, beyond symptom relief, these drugs may influence the disease itself. This study dives into the dual and opposing roles of two commonly used opioids—*tramadol* and *morphine*—on the progression of *Acute Myeloid Leukemia (AML)* and *Acute Lymphoblastic Leukemia (ALL)*, aiming to explore how these medications might either support or suppress cancer cell survival.
Methods: We exposed AML (Kg-1a) and ALL (Molt-4) cells to *tramadol* (1–100 µM) and *morphine* (0.1–10 µM) over 24, 48, and 72 hours. Cell viability (MTT assay), proliferation (Ki-67 marker), and apoptosis (Annexin V/PI assay) were analyzed, along with the expression of key apoptotic genes (*Bax*, *Bcl-2*, *and Bcl-xl*) via quantitative real-time PCR (qRT-PCR).
Results: *Tramadol* significantly reduced cell viability and proliferation while triggering apoptosis, upregulating *Bax* and downregulating *Bcl-2* and *Bcl-xl*. Conversely, *morphine* increased cell viability and proliferation, and suppringsed apoptosis, and exhibited a reverse gene expression profile. These findings point toward tramadol's potential anti-cancer activity, while raising concern about morphine's possible tumor-promoting effects.
Conclusion: Our data suggest that not all opioids are biologically equal in cancer. While *tramadol* may act as an ally by sensitizing leukemia cells to apoptosis, *morphine* might unintentionally aid their survival. These findings call for a more nuanced view of opioid use in hematologic malignancies, balancing pain control with the potential impact on disease progression.
Keywords: Opioids, Tramadol, Morphine, AML, Apoptosis.

P526, Protective effects of silymarin supplementation against capecitabine–irinotecan-induced hepatotoxicity in a mouse model of colorectal cancer

Sepideh Hassani[1], Hassan Malekinejad[2], Fatemeh Kheradmand[1], Shima Zeinali-Moghaddam[2], Ata Abbasi[3], Amin Hassani[4], Faezeh Malekinejad[1,4]

1. Department of Clinical Biochemistry, School of Medicine, Urmia University of Medical Sciences, Urmia, Iran
2. Department of Pharmacology and Toxicology, School of Pharmacy, Urmia University of Medical Sciences, Urmia, Iran
3. Department of Pathology, School of Medicine, Urmia University of Medical Sciences, Urmia, Iran
4. Student Research Committee, Urmia University of Medical Sciences, Urmia, Iran

Background: The Capecitabine–Irinotecan (CAPIRI) regimen is widely used in chemotherapy for colorectal cancer (CRC). However, its clinical efficacy is limited by significant hepatotoxicity, leading to liver dysfunction. The flavonolignan, Silymarin (SMN), has been extensively studied for its hepatoprotective properties. Therefore, we investigated the effect of SMN supplementation on CAPIRI-related hepatotoxicity in 1,2-dimethylhydrazine (DMH)-induced mouse CRC.
Methods: Thirty-two male BALB/c mice (25-30 g) were randomly allocated to four groups (n=8): control, DMH, DMH+CAPIRI, and DMH+SMN-CAPIRI. CRC was induced by i.p. injection of DMH (20 mg/kg BW) once a week for ten consecutive weeks. Following initiation, mice were administered daily oral CAP (100 mg/kg BW) and weekly i.p. IRI (25 mg/kg BW). Furthermore, the SMN-CAPIRI group received SMN (2500 ppm) in their diet for eight weeks. Hepatic biomarkers, including serum ALT, AST, and LDH levels as well as hepatic SOD, GPx, MPO, and MDA levels were evaluated.
Results: CAPIRI treatment significantly decreased ALT levels but caused MDA, MPO, AST, and LDH elevations along with insignificant changes in SOD and GPx levels compared to the DMH group, demonstrating its independent hepatotoxicity ($P<0.05$). However, SMN supplementation effectively restored antioxidant enzyme activity, reduced oxidative stress and inflammation, and improved liver function relative to CAPIRI.
Conclusion: Despite reduced ALT levels, CAPIRI treatment exacerbated liver toxicity through oxidative and inflammatory pathways. SMN supplementation mitigated these effects, supporting its potential as an adjunct herbal remedy in chemotherapy regimens.
Keywords: Colorectal cancer, Silymarin, Combination therapy, Hepatotoxicity

P527, Evaluating CAR-NK cell therapy as a novel immunotherapeutic approach for pediatric B-acute lymphoblastic leukemia

Elahe Khani[1], Ali Validokht-Toroghi[1], Mohammed Khani-Eshratabadi[2,3]
1. Students Research Committee, MMS.C., Islamic Azad University, Mashhad, Iran
2. Department of Hematology and Blood Transfusion Sciences, School of Allied Medical Sciences, Tehran University of Medical Sciences, Tehran, Iran
3. Kashmar School of Medical Sciences, Mashhad University of Medical Sciences, Mashhad, Iran

Background: B-cell acute lymphoblastic leukemia (B-ALL) is the most common childhood hematological malignancy, defined by uncontrolled proliferation of immature B lymphoblasts in bone marrow and blood. Despite conventional therapies, high toxicity and poor outcomes in refractory cases highlight the urgent need for safer, more effective treatments. The aim of this study is to investigate the potential therapeutic effects of chimeric antigen receptor natural killer (CAR-NK) cells in patients with B-ALL.
Methods: In this systematic review, PubMed, Scopus, WOF, and Google Scholar were searched without time limits using keywords ("CAR-NK Cell" OR "CAR Natural Killer Cell" OR "Chimeric Antigen Receptor NK Cell") AND (Therapy OR Immunotherapy) AND (ALL OR B-ALL OR B Cell Acute Lymphoblastic Leukemia). Studies in English on human children with B-ALL evaluating CAR-NK therapy were included; non-English, animal/in vitro, non-B-ALL, non-CAR-NK, or non-primary data articles were excluded. Two researchers extracted clinical and outcome data, resolving disagreements via a third. Quality was assessed with RoB 2.0/ROBINS-I, and data synthesized using R (v4.2).
Results: From 1005 studies identified, 678 were screened, 24 assessed, and 7 included in this systematic review. These Phase I–II trials investigated diverse CAR-NK and NK-based strategies—including haploidentical grafts with NK add-back, anti-CD19 redirected NK cells, IL15/41BBL-activated NK cells, and CAR-modified constructs—in 105 B-ALL patients. Outcomes reported 5 ORR, 29 CR1, 28 CR2, and 5 clinical/molecular responses. Expected hematologic toxicities included leukopenia, febrile neutropenia, and thrombocytopenia, with acute GVHD in 36% and chronic GVHD in 26%. Importantly, no cytokine release syndrome, neurotoxicity, or dose-limiting toxicities occurred, though 2 patients experienced progressive disease.
Conclusion: Our findings demonstrates that CAR-NK cell therapies in B-ALL yield promising clinical responses. These study underscore CAR-NK cells as a safe, effective, and evolving immunotherapeutic strategy, addressing urgent needs in refractory childhood B-ALL treatment.
Keywords: CAR-NK Cell, Natural Killer Cell, Chimeric Antigen Receptor, Immunotherapy, Acute Lymphoblastic Leukemia,

P528, Revealing new potential: how calcium channel blockers could transform colorectal cancer therapy

Samira Khani[1], Hamid Farahani[1]
1. Cellular and Molecular Research Center, Qom University of Medical Sciences, Qom, Iran

Background: Colorectal cancer (CRC) remains one of the leading causes of cancer-related mortality worldwide. Emerging evidence suggests that calcium signaling plays a critical role in tumor proliferation, invasion, and metastasis. Calcium channel blockers (CCBs), widely used antihypertensive agents, have shown potential anti-cancer properties in preclinical studies.
This review aims to evaluate current preclinical and clinical evidence regarding the role of CCBs in colorectal cancer management and explore their potential as adjunct therapeutic agents.
Methods: A comprehensive literature search was conducted across PubMed, Scopus, and clinical trial databases to identify relevant studies published up to June 2025. Included studies encompass in vitro experiments, animal models, epidemiological investigations, and clinical trials examining the effects of CCBs on CRC.
Results: Preclinical studies indicate that CCBs can inhibit CRC cell proliferation and migration by modulating calcium-dependent signaling pathways. Epidemiological data are mixed, with some population-based studies suggesting a potential protective effect of CCBs against CRC development or progression. However, large-scale clinical trials are lacking, and definitive conclusions cannot yet be drawn.
Conclusion: Calcium channel blockers exhibit promising anti-tumor activity in laboratory settings, highlighting their potential as adjunctive agents in CRC therapy. Further clinical research is necessary to establish their efficacy, optimal dosing, and safety profile in this context. This review underscores the need for future prospective trials to evaluate the therapeutic role of CCBs in colorectal cancer.
Keywords: Colorectal cancer, Calcium channel blockers, Calcium signaling, Cancer therapy

P529, The key role of vitamin d in the destruction of cancer cells in colorectal cancer

Mohammad Javad Khataee[1]
1. Department of Immunology, Faculty of Medicine, Golestan University of Medical Sciences, Gorgan, Iran

Background: Vitamin D is an essential vitamin for maintaining human health, and plays a key role in reducing the risk of various cancers. Colorectal cancer is one of these types of cancers.
Methods: The objective of this study was to investigate the effect of vitamin D over a one year period in 48 patients with colorectal tumors. All patients whose diagnosis was confirmed via blood tests, endoscopy, and colonoscopy were randomly allocated into two groups. We aimed to compare the progression of the disease, via blood analysis, between individuals with optimal vitamin D or supplemental intake and those with deficient vitamin D levels.
Results: The disease initially presented in patients with benign neoplasms and gradually underwent malignant. During the 12-month period pharmacological treatment protocol, 24 patients were prescribed either vitamin D supplementation or a diet rich in vitamin D. Regular follow-up and assessment of treatment adherence were conducted for this cohort. Due to its vital role in protecting DNA, regulating cell growth and enhancing the immune system this vitamin was able to halt the proliferation of cancer cells and disrupt their multiplication.
Conclusion: Findings revealed that a daily intake of 40 IU of vitamin D can reduce the progression of colorectal cells by 38% in individuals with this tumor, compared to those with low vitamin D consumption. Although vitamin D deficiency alone is not typically a direct cause of cancer, it can be an influential factor alongside other elements such as obesity, smoking, alcohol consumption, and genetic predisposition.
Keywords: Colorectal Cancer, Vitamin D, Tumors, Endoscopy, Colonoscopy

P530, Beyond the genetic code: Non-coding RNAs as master regulators in cancer pathogenesis

Negin Khazaee[1], Mahdi Moassesfar[2], Fereshteh Atabi[1]
1. Department of Biochemistry and Biophysics, TeMS.C., Islamic Azad University, Tehran, Iran
2. Department of Biosciences, University of Milan, Milan, Italy

Background: Cancer is no longer seen solely as a disease of genetic mutations. Increasingly, non-coding RNAs (ncRNAs), especially long non-coding RNAs (lncRNAs) and microRNAs (miRNAs), have emerged as key regulators in how cancer progresses. This study aims to review ncRNAs roles in cancer pathogenesis.
Methods: A systematic review was performed using PubMed, Scopus, and Web of Science databases for articles published between 2015 and 2025. Inclusion criteria were original studies and reviews focused on the role of lncRNAs and miRNAs in human cancers, validated in vitro or in vivo. Exclusion criteria included non-English articles and studies lacking experimental evidence.
Results: Out of 247 initially screened studies, 159 were included in our study. In breast cancer, lncRNA HOTAIR and MALAT1 are frequently upregulated, while miR-34a and miR-145 are commonly downregulated. In colorectal cancer, lncRNA CCAT1 and H19 show significant upregulation, whereas miR-143 and miR-145 are downregulated. Lung cancer is marked by overexpression of lncRNA PVT1 and NEAT1, along with downregulation of miR-126 and miR-200c. In liver cancer, lncRNA HULC and HEIH are upregulated, while miR-122 and miR-199a-5p are frequently suppressed. These patterns suggest that specific lncRNAs and miRNAs are consistently dysregulated in a cancer, contributing to tumor progression and metastasis.
Conclusion: Non-coding RNAs are master regulators in cancer biology. Their unique expression patterns in different cancers and their ability to regulate a wide range of cellular processes make them compelling targets for new therapies. Future studies should focus on turning these insights into practice, by developing ncRNA-based diagnostics and treatments.
Keywords: Cancer, Non-coding RNA, Long non-coding RNA, MicroRNAs.

P531, Identification of significant alk overexpression and neurochemical pathways in metastatic melanoma: An RNA-Seq-based differential expression analysis approach

Dorna Dehghani [1], Neda Rahimi Dashti [1], Abolghasem Esmaeili [1]
1. Department of Cell and Molecular Biology & Microbiology, Faculty of Biological Science and Technology, University of Isfahan, Isfahan, Iran

Background: Melanoma is one of the most aggressive types of skin cancer, and its metastasis significantly increases treatment complexity. Understanding the molecular changes between primary and metastatic melanoma is crucial for identifying potential therapeutic targets.
Methods: RNA-Seq data from the TCGA-SKCM project were used to perform differential gene expression analysis between primary and metastatic melanoma samples. Genes with $|\log2FC| > 2$ and adjusted P-value < 0.05 were considered significantly differentially expressed. Pathway enrichment analysis (GO) was conducted to explore biological processes associated with these genes.
Results: A total of 1,431 significantly differentially expressed genes were identified. Pathway enrichment analysis indicated significant activation of processes related to cellular response to monoamines and catecholamines (GO:0071868, GO:0071870), extracellular matrix remodeling, particularly collagen structure changes (GO:0062023), and heparin binding activity (GO:0008201) in metastatic melanoma. Key genes such as ALK ($\log2FC = 3.82$), HTR2C, and NR4A3, involved in neurochemical pathways and matrix remodeling, were highlighted as potential therapeutic targets.
Conclusion: The study identifies critical molecular changes associated with melanoma metastasis, highlighting ALK and neurochemical/extracellular matrix-related pathways as potential targets. Therapeutic strategies, including drugs like Crizotinib that inhibit ALK, could be explored in combination approaches to improve treatment response in metastatic melanoma patients.
Keywords: Differential gene expression, ALK overexpression, Crizotinib, Targeted therapy

P532, Enhancing glioblastoma therapy: Behavioral and tumor-suppressive effects of combination therapy with vericiguat and temozolomide in rat

Fatemeh Rahmani niya[1], Ladan Emadi[2], Hamideh Bashiri[3], Hossein jonaidi[2], Shahrzad Azizi[4]
1.PHD Student of Veterinary Physiology, Department of Basic Sciences, Faculty of Veterinary Medicine, Shahid Bahonar University of Kerman, Kerman, Iran
2.Department of Basic Sciences, Faculty of Veterinary Medicine, Shahid Bahonar University of Kerman, Kerman, Iran
3.Department of Physiology and Pharmacology, Afzalipour School of Medicine, Kerman University of Medical Sciences, Kerman, Iran
4.Department of Pathobiology, Faculty of Veterinary Medicine, Shahid Bahonar University of Kerman, Kerman, Iran

Background: This study evaluated the effects of single or combined administration of temozolomide (TMZ) at doses (3.75 mg/kg and 7.5 mg/kg), and vericiguat (0.5 mg/kg), on anxiety-like behaviors, balance, social interaction, learning, and memory in a rat model of C6-induced glioblastoma. According to TMZ's neurotoxic profile, we hypothesized that combining a reduced dose of TMZ with vericiguat could alleviate central nervous system side effects while maintaining or improving anti-tumor outcomes
Methods: Eighty male wistar rats received either intra-caudate nucleus (CN) culture medium or C6 glioma cells and were randomly assigned to eight groups: Sham, Tumor, Vehicle, TMZ 3.75 mg/kg, TMZ 7.5 mg/kg, Vericiguat 0.5 mg/kg, TMZ 3.75 mg/kg + Vericiguat, and TMZ 7.5 mg/kg + Vericiguat. Behavioral assessments, including the open field test (OFT), elevated plus maze (EPM), rotarod test, passive avoidance test (PAT), and social interaction test (SIT), were conducted on days 20–24. On day 25, brain tissues were extracted for macroscopic examination and tumor measurement.
Results: All treatment groups significantly inhibited tumor growth and showed improvements in anxiety-like behaviors, balance, social interaction, and memory deficits compared to the untreated tumor group. Combination therapy treatment groups and TMZ 3.75mg\kg group, Improved neurocognitive impairments more than other treatment groups.
Conclusion: TMZ, vericiguat, and their combination improved neurocognitive functions in rats with C6-induced glioblastoma. Combination therapy was more effective in tumor growth inhibition and reduction of neurotoxic effects than monotherapy.
Keywords: Glioblastoma, Behavioral Test, Temozolomide, Vericiguat.

P533, Cytotoxic and apoptotic effects of *Ferula gummosa* Boiss: extract on human breast adenocarcinoma cell line

Roghayeh Rashidi[1], Ali Roohbakhsh[2], Leila Mohtashami[3], Leila Mobasheri[1], Hamidreza Kheradmand[4], Mohammad Sadegh Amiri[5], Ahmad Ghorbani[1], Seyed Hadi Mousavi[4,5]

1. Pharmacological Research Center of Medicinal Plants, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
2. Pharmaceutical Research Center, Pharmaceutical Technology Institute, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Pharmacognosy, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran
4. Medical Toxicology Research Center, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
5. Department of Biology, Payame Noor University, Tehran, Iran

Background: *Ferula gummosa* Boiss. is a well-known and valuable medicinal plant in Iran Research has shown that this plant has several pharmacological properties, including anti-bacterial, anti-cancer and etc. In the present study, we investigated the cytotoxic properties of F. gummosa Boiss. extract in MCF-7 breast adenocarcinoma cells.

Methods: The cytotoxicity and pro-apoptotic properties of the extract were assessed by 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyl tetrazolium bromide (MTT) test and propidium iodide (PI) stained cells, respectively. Apoptosis and necrosis were evaluated by annexin V-PI staining. The levels of reactive oxygen species (ROS), malondialdehyde (MDA), glutathione (GSH), and superoxide dismutase (SOD) was determined to evaluate oxidative stress. The cell migration and the gene expression were assessed by scratch assay and quantitative real-time polymerase chain reaction (q-RT-PCR), respectively

Results: The extract of *F. gummosa* decreased the viability and cell cycle progression of MCF-7 cells by inducing apoptosis and necrosis, increasing ROS and MDA levels, and decreasing GSH levels and SOD activity. It also lowered the cells' migration capability by enhancing p53 mRNA levels and reducing MMP-9 mRNA expression

Conclusion: *F. gummosa* exhibited pro-apoptotic, anti-proliferative, and anti-metastatic effects on MCF-7 cells. It is therefore recommended that detailed future research be done on different parts of the plant or its secondary metabolites to find anti-cancer lead compounds.

Keywords: *Ferula gummosa* Boiss, Breast cancer, Apoptosis, Oxidative stress, Metastasis

P534, Fabrication of gemcitabine-loaded gelatin and chitosan core-shell nanofibers for targeted cancer therapy: Anti-cancer properties and in vitro investigation

Hadis Zarafshani[1], Sogand Abbasi Azizi[2], Reza Erfani Far[3,4]
1. Nano Drug Delivery Research Center, Health Technology Institute, Kermanshah University of Medical Sciences, Kermanshah, Iran
2. Student Research Committee, Kermanshah University of Medical Sciences, Kermanshah, Iran
3.Resident of Neurology, Department of Neurology, Rasoul Akram Hospital, Iran University of Medical Sciences, Tehran, Iran
4. Student Research Committee, Iran University of Medical Sciences, Tehran, Iran

Background: The mortality rate of pancreatic cancer is rapidly increasing and is projected to become the second most common malignant tumor by 2030. Chemotherapy remains a cornerstone of cancer treatment, with Gemcitabine (GEM) recognized as the standard of care for improving the prognosis of patients with pancreatic cancer (PC). However, its effectiveness is significantly limited by poor absorption of chemotherapy agents.
Methods: In this study, we developed anti-cancer fibrous materials aimed at enhancing the absorption of gemcitabine to inhibit pancreatic cancer growth. Our biodegradable core-shell nanofibers were prepared via electrospinning using a coaxial nozzle, with GEM and gelatin forming the core and chitosan serving as the shell. Following synthesis, we confirmed the physicochemical properties of the nanofibers using Scanning Electron Microscopy (SEM), Fourier-transform Infrared Spectroscopy (FTIR), X-ray Energy Dispersive Spectroscopy (EDS or EDX), and Differential Scanning Calorimetry (DSC). For in vitro evaluation, we conducted cell growth inhibition tests using transwell assays, which demonstrated significant inhibition of cell growth.
Results: The synthesis of gemcitabine-loaded gelatin-chitosan core-shell nanofibers improved the solubility, stability, and anti-cancer properties of gemcitabine while simultaneously reducing the accumulation of chemotherapy drugs in liver and kidney tissues. Furthermore, this approach achieved sustained drug release.
Conclusion: Our investigation into the effects of administering chemotherapy via GEM-loaded nanofibers on the tumor microenvironment provides novel insights for addressing tumor challenges and enhancing the efficacy of pancreatic cancer treatment.
Keywords: Gemcitabine, Core-Shell Nanofibers, Electrospinning, Cancer, Pancreatic

P535, The synergism of irreversible electroporation and intermittent fasting on the treatment of breast tumor in an animal model

Zeinab Shankayi[1], MohammadParsa Khalaj[1], Farideh Bahrami[1], Zohreh Jangravi[2], Zahra Jafari[2]
1. Department of Physiology and Medical Physics, School of Medicine, Baqiyatallah University of Medical Sciences, Tehran, Iran
2. Department of Biochemistry, Faculty of Medicine, Baqiyatallah University of Medical Sciences, Tehran, Iran

Background: Cancer is a disease with increasing prevalence worldwide. In highly treatable cancers such as breast cancer, modern therapeutic approaches aim to on maintaining patients' quality of life by minimizing treatment-related side effects. Among emerging treatments are intermittent fasting, a form of partial food deprivation without water restriction, and irreversible electroporation, a technique that increases cell membrane permeability to enhance treatment efficacy. This study investigates the combined effect of these two methods compared to conventional treatments.
Methods: Female BALB/c mice were divided into six groups:1- served as a cancer control with no additional treatment. 2- underwent an intermittent fasting regimen initiated immediately after cancer cell injection, consisting of 13 hours of food deprivation twice weekly with 24-hour intervals. 3- received irreversible electroporation treatment once tumors reached approximately 0.5 x 0.5 cm. 4: treated with both electroporation and intermittent fasting. 5- received a taxol chemotherapy regimen after tumors reached the target size. 6- subjected solely to the intermittent fasting diet without cancer induction. Mice were monitored for 15 days' post-treatment, after which blood serum and tumor tissues were collected to measure inflammatory markers IL-12, IFN-γ, and IL-6.
Results: Results demonstrated that intermittent fasting delayed tumor growth, with fasting mice taking an average of 26 days to reach the target tumor size compared to 20.7 days in non-fasting controls. The combination of irreversible electroporation and intermittent fasting yielded the most significant tumor volume reduction and treatment response, outperforming other groups. Additionally, all treatment modalities reduced elevated inflammatory markers associated with cancer progression, with the combination therapy showing the greatest effect.
Conclusion: These findings suggest that integrating intermittent fasting with irreversible electroporation may offer a superior therapeutic strategy for breast cancer by enhancing treatment efficacy and reducing inflammation, potentially improving patient outcomes and quality of life.
Keywords: Irreversible electroporation, Intermittent diet, Inflammatory markers

P536, Identification of Hub genes and transcriptional regulators in liver cancer cells treated with galangin

Pouria Abidi[1], Forouzan Amerizadeh[2,3]
1. Student Committee of Medical Education Development, Education Development Center, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Neurology, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Internal Medicine, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Galangin, a flavonoid derived from turmeric, exhibits promising anticancer effects in various malignancies, including liver cancer. However, the molecular mechanisms underlying its impact on gene regulation remain largely unexplored.
This study aimed to investigate the transcriptomic changes induced by Galangin in liver cancer cells and identify key regulatory genes and pathways through integrated bioinformatics analyses.
Methods: Gene expression data (GSE142680) from liver cancer cells treated with 100 μM Galangin versus DMSO control were retrieved from the Gene Expression Omnibus (GEO) database. Differential gene expression analysis was performed using the GEO2R web tool. Genes with |log2 fold change| ≥ 1 and adjusted p-value < 0.05 were selected as differentially expressed genes (DEGs). DEGs were uploaded to the STRING database to construct a protein-protein interaction (PPI) network, which was further visualized in Cytoscape. Hub genes were identified using cytoHubba plugin based on MCC, MNC, DMNC, and Degree algorithms. Clustering of the network was performed using the cytoCluster plugin to detect functionally enriched modules. In addition, promoter motif analysis was conducted for the top hub genes using Tomtom and GOMO databases to identify potential transcription factor binding sites and regulatory elements.
Results: A total of 368 DEGs were identified. PPI network analysis revealed multiple key hub proteins such as SREBF1, FASN, and HSP90AB1 with high connectivity. Four significant protein clusters were detected with strong functional associations. Promoter analysis of hub genes revealed several enriched transcription factor motifs potentially involved in liver cancer progression and Galangin-mediated gene regulation.
Conclusion: This integrative analysis highlights several critical genes and regulatory motifs affected by Galangin in liver cancer cells, suggesting potential biomarkers and therapeutic targets. Further validation, including molecular docking of Galangin with hub proteins, is recommended to support these findings.
Keyword: Liver cancer, Differential gene expression, Protein-protein interaction (PPI) network, Promoter motif analysis

P537, Multifunctional photoactive hydrogel loaded with cancer cell membrane and Sorafenib for synergistic photo-immuno-chemotherapy of cancer

Samin Abbaszadeh[1], Vahideh Nosrati[2], Mohammad-Reza Eskandari[3], Mohammad-Ali Shahbazi[4]
1. Department of Pharmacology and Toxicology, School of Pharmacy, Urmia University of Medical Sciences, Urmia, Iran
2. Department of Pharmaceutical Biomaterials, School of Pharmacy, Zanjan University of Medical Sciences, Zanjan, Iran
3. Department of Pharmacology and Toxicology, School of Pharmacy, Zanjan University of Medical Sciences, Zanjan, Iran
4. Department of Biomedical Engineering, University Medical Center Groningen, University of Groningen, Netherlands

Background: Photothermal therapy (PTT) has attracted extensive attention in cancer therapy owing to the minimal damage to non-target tissues. Combination of PTT with chemotherapy and immunotherapy has a high potential to increase the chance of cancer eradication without metastasis to other vital organs. In this work, cancer cell-membrane (CCM) and sorafenib (SFN) were loaded into a photoactive injectable hydrogel to render tumor-specific immunotherapeutic function and chemotherapy to the prepared hydrogel.
Methods: Bi_2S_3 NRs were prepared and coated with hyaluronic acid to form BiH NRs. An injectable hydrogel of poly methyl vinyl ether-maleic acid (PMVE-MA) and gelatin was prepared via chemical crosslinking and loaded with BiH NRs, CCM, and SFN. The physicochemical characterization and photothermal performance of the NRs and hydrogels were assessed. Afterward, the in vivo toxicity, the antibacterial activity of the hydrogels, and its anti-cancer effect were evaluated on a 4T1 tumor-bearing mouse model.
Results: BiH NRs, which loaded into injectable hydrogel demonstrated sufficient temperature elevation to kill cancer cells after 10 min of near infrared (NIR) irradiation. No abnormality was observed in the histopathological analysis of the main organs of treated groups. In addition, the BiH loaded hydrogel showed very potent antibacterial activity. The combined intratumoral photo-chemo-immunotherapy demonstrated more anticancer effect than the individual photo-, chemo- or immunotherapy alone.
Conclusion: In this study, an injectable hydrogel containing BiH NRs, CCM, and SFN is reported for cancer ablation via a synergistic effect. In addition, the injectable hydrogel had the capability to load drugs for sustained release at the cancer tissues over a long period.
Keywords: Injectable Hydrogel, Photothermal therapy, Chemotherapy, Immunotherapy, Breast cancer.

P538, Effects of metformin on ARID1A gene expression and LncRNAs regulating ARID1A gene expression in SW480 and HCT116 colorectal cancer cell lines

Nasrin Aghilinezhad[1], Afshin Samiei[2,3], Heydar Aqababa[4], Mehran Erfani[2], Mohammad Amin Edalatmanesh[1]

1. Department of Biology/Shi. C./Islamic Azad University, Shiraz, Iran
2. Molecular Medicine Research Center/Hormozgan Health Institute, Hormozgan University of Medical Sciences, Bandar Abbas, Iran
3. Tobacco and Health Research Center/Hormozgan University of Medical Sciences, Bandar Abbas, Iran
4. Department of Biology/Ars. C./Islamic Azad University, Arsanjan, Iran

Background: The ARID1A gene has been identified as a key tumor suppressor in various cancers, especially the common and deadly colorectal cancer. Recently, LncRNAs have attracted much attention for their potential roles in various stages of the formation, invasion, and progression of colorectal cancer (CRC). LncRNA CASC15, an oncogene, and LncRNA GAS5, a known tumor suppressor, have both been reported as regulators of ARID1A gene expression. On the other hand, several studies have suggested the anticancer effects of metformin. Therefore, the aim of this study was to investigate the effect of metformin on the expression of ARID1A gene and two LncRNAs, GAS5 and CASC15, regulating the expression of this gene in SW480 and HCT116 colorectal cancer cell lines. In addition, the effect of this drug on the proliferation, survival, and migration and invasion capabilities of CRC cells was investigated.

Methods: We evaluated the expression of ARID1A, LncRNA GAS5, and LncRNA CASC15 using quantitative real-time PCR. Wound healing assays and colony formation assays were performed to evaluate the effect of metformin on cell migration and colony formation.

Results: Our results showed that metformin significantly increased the expression of ARID1A and LncRNA GAS5 in both cell lines, especially HCT116, but the reduction of LncRNA CASC15 was not significant. In addition, metformin treatment significantly inhibited wound closure and reduced colony formation, indicating its potential to suppress metastatic behavior.

Conclusion: These findings highlight the therapeutic potential of metformin in targeting ARID1A and LncRNA GAS5 in preventing metastasis in CRC and provide a basis for further preclinical and clinical research.

Keywords: Colorectal Cancer (CRC). ARID1A. LncRNA GAS5. LncRNA CASC15. Metformin

P539, The dual role of miR-17-5p in colorectal cancer: intracellular tumor suppressor, extracellular oncomiR

Zahra Ghafouri[1], Arash Khorrami[2]
1. Department of Medical Biotechnology, Maragheh University of Medical Sciences, Maragheh, Iran
2. Medicinal Plants Research Center, Maragheh University of Medical Sciences, Maragheh, Iran

Background: Numerous scientific studies show that some microRNAs can play a dual role (tumor suppressor and oncomiR) in certain cancers, such as colorectal cancer. This dual role is often dependent on the cellular context, stage of cancer, status of genetic mutations, signaling pathways involved, study type (in vitro, in vivo), and even interactions with other molecules such as exosomes or lncRNAs. One of these microRNAs with a dual role is miR-17-5p, and we will examine studies and factors influencing its role in colorectal cancer.
Methods: PubMed, Scopus, and web of science (2022-2025) were searched using miR-17-5p, colorectal cancer and dual role. Original studies in vitro/in vivo models were selected.
Results: Tumor suppressor effects are mainly achieved by directly regulating vimentin expression and suppressing epithelial-mesenchymal transition (EMT). Increasing miR-17-5p expression significantly reduces vimentin expression, inhibits cancer cell migration, invasion, and metastasis. The oncogenic function of oncomiRs is mainly due to the transfer of miR-17-5p from tumor stem cells to surrounding cells via exosome. Through direct inhibition of SPOP, miR-17-5p increases PD-L1, weakens antitumor immunity, and enhances proliferation, migration, and invasion of cancer cells. Additionally, miR-17-5p matures and is packaged into exosomes in response to circLONP2, which promotes the transfer of metastasis-initiating ability to neighboring cells.
Conclusion: miRNA17-5p is a completely dual-role and context-dependent microRNA in colorectal cancer, and a miRNA should not be used as a true therapeutic agent but rather as a sensitizer of cancer cells through the imbalance of their signaling profiles before anti-cancer drugs are injected into them.
Keywords: miR-17, Colorectal cancer, Dual role, Therapeutic miRNA

P540, CA4 and 5-FU combination shows synergistic anticancer effects in esophageal squamous cell carcinoma

Elaheh Gheybi[1,2], Maryam Shojae[1], Mohammad Jalili-Nik[1], Mohammad Soukhtanloo[1,2]
1. Pharmacological Research Center of Medicinal Plants, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Clinical Biochemistry, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: This study explores combined effect of Combretastatin A4 (CA4) and Fluorouracil (5-FU) against aggressive esophageal squamous cell carcinoma (ESCC).
Methods: KYSE-30 ESCC cells were treated with CA4, 5-FU and CA4/5-FU combination. We assessed viability (MTT assay), apoptosis/cell cycle (flow cytometry), gene expression (qPCR), migration (wound healing), and MMP activity (zymography).
Results: The CA4/5-FU combination synergistically inhibited proliferation, induced apoptosis and ROS, arrested the cell cycle at sub-G1/G2/M, and suppressed migration by downregulating MMP-2 and MMP-9.
Conclusion: The combination therapy demonstrates potent multi-target anticancer effects, presenting a promising novel strategy for ESCC treatment.
Keywords: Esophageal Squamous Cell Carcinoma, Combretastatin A4, Fluorouracil

P541, Microencapsulated bioactive constituents of *smirnovia iranica*: a novel therapeutic approach targeting cancer progression and angiogenesis

Sogand Ghazi[1], Kimia Asadi[1], Ehsan Karimi[1]
1. Department of Biology, Ma. C., Islamic Azad University, Mashhad, Iran

Background: This research aimed to develop and evaluate microcapsules loaded with bioactive compounds extracted from *Smirnovia iranica*, investigating their potential anticancer and anti-angiogenic effects. Since *S. iranica* contains valuable bioactive constituents, its encapsulation was considered a promising strategy to improve stability and biological performance.
Methods: The extraction of bioactive components was performed using ethanol, followed by spray-drying encapsulation with maltodextrin and modified starch as wall materials. The resulting microcapsules were characterized for physicochemical properties such as particle size and morphology. In vitro cytotoxicity was assessed using the MTT assay on MCF-7 breast cancer cells and normal HFF fibroblasts. To evaluate anti-angiogenic efficacy, a chick chorioallantoic membrane (CAM) assay was conducted.
Results: The average particle size of the microcapsules was approximately 365 nm, with a narrow polydispersity index indicating high uniformity and stability. Cytotoxicity tests showed that *S. iranica* microcapsules significantly inhibited MCF-7 cancer cell proliferation without inducing toxicity in normal HFF cells. CAM assay results demonstrated that the microcapsules inhibited in vivo angiogenesis in a concentration-dependent manner ($p<0.05$), reducing both the number and length of blood vessels. Further analysis indicated a notable downregulation of the key angiogenic marker VEGF.
Conclusion: These findings suggest that microcapsules of *Smirnovia iranica* hold considerable promise as effective anticancer and anti-angiogenic agents. Their demonstrated bioactivity highlights valuable opportunities for pharmaceutical and biomedical applications.
Keywords: Angiogenesis properties, Anticancer agent, Microencapsulation, drug discovery.

P542, Thyroid microbiome: Implications for autoimmunity and cancer

Asra Graiti[1], Reyhane Abidi[2], Hossein Javid[3]
1. Department of Medical Laboratory Sciences, Varastegan Institute for Medical Sciences, Mashhad, Iran
2. Department of Clinical Biochemistry, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department Surgical Oncology Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: The thyroid gland is very important in regulating metabolism, growth, and maintaining the health of the body. Imbalance in the function of the thyroid gland causes serious damage to the body. Recently, the presence of the microbiome in the thyroid gland, which was once sterilized, has attracted much attention. Its presence affects the utilization of important micronutrients required by the body for its function, such as iodine, selenium, and zinc. It also suggests that the microbiome can cause some of its own diseases such as Hashimoto's thyroiditis, Graves' disease, and thyroid cancer. Its role in chronically in human thyroid tissues can lead to cellular changes and hence cause thyroid cancer. The aim of this study was to investigate the association of the thyroid microbiome with autoimmune disorders and cancer.
Methods: A search of articles from PubMed, ScienceDirect, and Google Scholar was conducted between 2020 and 2025, of which 16 articles were reviewed, 11 were excluded, and 5 articles were selected. Articles are from English-language sources.
Results: The thyroid microbiome may be associated with cancer and autoimmune disorders. The microbiome may interfere with the absorption of micronutrients required for thyroid function. Microbial diversity in specific species may influence disease severity.
Conclusion: Research suggests a link between the microbiome and autoimmune diseases and thyroid cancer. A better understanding of this could help develop prevention and treatment strategies. As this is an emerging field, further studies are warranted.
Keywords: Thyroid microbiome, Autoimmune disease, Thyroid cancer.

P543, The relationship between apelin and colon cancer: A review article

Maryam Mohammadzadeh[1]
1. Department of Basic Medical Sciences, Khoy University of Medical Sciences, Khoy, Iran

Background: Colorectal cancer is the second most common human cancer, and multiple factors, including genetic alterations, chronic inflammation, and environmental factors, contribute to its occurrence. Apelin is a bioactive peptide produced by adipose tissue, and its role in physiological processes, including blood pressure regulation, metabolism, and inflammation, has been identified. The adipokine apelin plays a direct role in various physiological processes of embryogenesis and human cancers.
Results: The results showed that apelin and its receptor (APJ) are more highly expressed in colon cancer than in healthy tissues. Apelin promotes angiogenesis and cell proliferation in colorectal tumors by stimulating signaling pathways. Therefore, it is hypothesized that apelin signaling may play an important role in the development of colon tumors. Apelin may serve as a new prognostic and diagnostic marker for cancer grade. Some studies have shown that increased apelin expression is associated with more advanced stages of the disease and poorer prognosis. However, the underlying mechanism of the relationship between apelin/APJ and tumor genesis and progression is still unclear.
Conclusions: Recent findings suggest that apelin may play a role in cell proliferation during the progression of colorectal cancer. However, conflicting results in some studies highlight the need for further research with larger samples and focusing on the precise mechanisms. The increasing number of data also suggests that apelin could be considered as a potential biomarker or therapeutic target in colorectal cancer, but its clinical application requires further investigation.
Keywords: Apelin, Colon cancer

P544, Protective effect of α- bisabolol on the development of fibrosis in liver HepG2 and LX2 cell lines

Farhad Manoochehri[1], Mohammad Raman Moloudi[2], Zakariya Vahabzadeh[3], Esmaeil Izadpanah[3,4], Alina Abdollahi[3]

1. Medical Student, Student Research Committee, Kurdistan University of Medical Sciences, Sanandaj, Iran
2. Liver and Digestive Research Center, Kurdistan University of Medical Sciences, Sanandaj, Iran
3. Cellular and Molecular Research Center, Research Institute for Health Development, Kurdistan University of Medical Sciences, Sanandaj, Iran
4. Department of Medical Physiology and Pharmacology, Faculty of Medicine, Kurdistan University of Medical Sciences, Sanandaj, Iran

Background: This study aimed to assess the effects of α-bisabolol, a natural anti-inflammatory and antioxidant compound, on non-alcoholic fatty liver disease (NAFLD). Using co-cultured HepG2 and LX2 cells, researchers examined how α-bisabolol influences the expression of NLRP3 and NFκB genes and the levels of TGF-β and α-SMA proteins involved in liver steatosis.
Methods: In this experimental study, HepG2 and LX2 cell lines were co-cultured at a 5:1 ratio in DMEM with 10% FBS. Steatosis was induced using oleate and palmitate fatty acids (2:1, 1.2 mM) for 96 hours, followed by treatment with 0–5 μM α-bisabolol for 24 hours. Gene expression of NLRP3 and NFκB was analyzed by RT-qPCR, and fibrosis-related proteins were assessed using Western blotting.
Results: The data showed that alpha bisabolol in the treatment groups significantly reduced the expression of NFκB gene in all groups ($p < 0.0001$) and also reduced the expression of NLRP3 gene in the treatment group with alphabisabolol 2.5 and 1 μm ($p < 0.0045$). Analysis of Western blot data in co-culture of HepG2 and LX2 showed that α-SMA and TGF-β1 protein expression was reduced ($p < 0.0001$).
Conclusion: The results of this study showed that alpha bisabolol reduced hepatic fibrosis through reducing the expression of NLRP3 and NFκB genes and also had a protective effect on non-alcoholic fatty liver by reducing the expression of TGF-β1 and α-SMA proteins.
Keywords: α-Bisabolol; NAFLD; Fibrosis; Co-culturing

P546, PNU-74654 as a Wnt/β-catenin antagonist: Reduced tumor growth in colorectal cancer model

Seyedeh Najibeh Nasiri[1], Amir avan[2], Zahra jalayeri darbandi[1], Majid Khazaei[3]
1. Tissue Engineering Research Group (TREG), Department of Anatomy and Cell Biology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of genetics, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Physiology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Colorectal cancer (CRC) is a deadly malignancy due to its ability to metastasize and resist chemotherapy. This highlights the urgent need for new therapeutic strategies. Recent research emphasizes the role of dysregulated Wnt/β-catenin signaling in CRC progression and treatment outcomes. This study investigates the potential of PNU-74654, a novel Wnt/β-catenin inhibitor, both alone and in combination with 5-fluorouracil (5-FU) in CRC models.
Methods: The anti-proliferative effects of PNU-74654 were evaluated using 2D and 3D cell culture models. We assessed its impact on cell viability (MTT assay), migration (wound healing assay), invasion (transwell assay), cell cycle progression (flow cytometry), and apoptosis (Annexin V staining). Additionally, oxidative stress markers (MDA, SOD activity, DCFH-DA assay) were measured. To validate these findings in vivo, a mouse xenograft model of CRC was used, where tumor response to PNU-74654 (alone and with 5-FU) was analyzed through histopathology, biochemical assays, and molecular profiling (RT-PCR, Western blot).
Results: PNU-74654 significantly suppressed CRC cell proliferation and enhanced the anti-tumor effects of 5-FU by modulating Cyclin D1 and Survivin expression. It also reduced cell migration and invasion by restoring E-cadherin function. In vivo, PNU-74654 strongly inhibited tumor growth, with the most potent effects observed in the combination group (PNU-74654 + 5-FU). Mechanistically, this synergy involved ROS induction, SOD reduction, and regulation of key markers (MCP-1, p53, TNF-α).
Conclusion: Our findings demonstrate that PNU-74654 effectively targets the Wnt/β-catenin pathway, inhibits proliferation, promotes apoptosis, and suppresses metastasis in CRC. Its synergistic interaction with 5-FU supports further investigation as a promising combinatorial treatment for colorectal cancer.
Keywords: Colorectal, cancer, PNU-74654, Wnt/β-catenin.

P547, 1,4-Naphthoquinone derivatives as novel p-glycoprotein inhibitors: a strategy to combat multidrug resistance in cancer

Somayeh Nazari[1], Pegah Mardaneh[2], Fatemeh moosavi[2], Alireza Poustforoosh[2], Omidreza Firuzi[2]
1.Department of Physiology, The Medical School, Shiraz University of Medical Sciences, Shiraz, Iran
2. Medicinal and Natural Products Chemistry Research Center, Shiraz University of Medicinal Sciences, Shiraz, Iran

Background: The overexpression of P-glycoprotein (P-gp/ABCB1), a key ATP-binding cassette (ABC) transporter, is a major mechanism of multidrug resistance (MDR) in cancer. This study evaluated a series of synthesized 1,4-naphthoquinone derivatives as potential P-gp inhibitors to reverse MDR *in vitro*.
Methods: We investigated nine 1,4-naphthoquinone-1,2,3-triazole hybrids (4a-4i). Rhodamine 123 accumulation in both drug-resistant (MES-SA/Dx5) and drug-sensitive (MES-SA) cell lines was quantified using flow cytometry and fluorescence imaging. The MDR-reversal potential was evaluated through doxorubicin chemosensitivity assays, complemented by computational analyses, including molecular docking and dynamics simulations, to elucidate P-gp binding interactions.
Results: All synthesized compounds significantly inhibited P-gp activity in rhodamine 123 accumulation assays. Compound **4i** exhibited the highest potency, increasing intracellular rhodamine 123 levels by 6.5- to 14.5-fold. At non-toxic concentrations, derivatives 4d, 4g, 4h, and 4i bearing para-chloro (4d), para-isopropyl (4g), para-tert-butyl (4h), and para-methyl (4i) substitution on the phenyl ring significantly enhanced the sensitivity of MDR cells to doxorubicin, achieving reversal folds ranging from 3.5 to 9.3. In silico studies further identified specific P-gp residues that may interact with these agents.
Conclusion: These findings suggest that 1,4-naphthoquinone derivatives hold considerable promise as modulators of MDR in cancer treatment, positioning them as potential candidates for further development of novel anticancer therapies.
Keywords: ABC transporters, Anticancer agents, Hybrid molecules, P-glycoprotein, Drug resistance

P548, Development and characterization of a KRAS-mutant peptide–loaded nanoliposome as a therapeutic vaccine candidate for colorectal cancer

Anahita Naeimi[1], Vahid Tayebi Khorrami[2], Maryam Fadaei Fathabadi[2], Mahmoud Reza Jafari [3]
1. Nanotechnology Research Center, Pharmaceutical Technology Institute, Mashhad University of Medical Sciences, Mashhad, Iran
2.Department of Pharmaceutical Nanotechnology, Nanotechnology Research Center, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Pharmaceutical Nanotechnology, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Colorectal cancer (CRC) is a major global health concern, ranking as the second leading cause of cancer-related deaths worldwide. CRC arises through multifactorial mechanisms, including genetic alterations and environmental exposures, with mutations in the KRAS gene being present in approximately 40% to 52% of CRC cases. This study focuses on formulating a nanoliposomal delivery system for a mutant KRAS peptide, aiming to explore its potential as a therapeutic vaccine candidate in colorectal cancer.
Methods: The nanoliposomes were formulated using a lipid composition of DMPC, DMPG, cholesterol, and DOPE via the thin-film hydration technique followed by extrusion. The systems were assessed for critical physicochemical characteristics, including average particle diameter, polydispersity index (PDI), zeta potential, and encapsulation efficiency. Peptide encapsulation was verified using SDS-PAGE, while BCA assay and HPLC were applied for quantification purposes.
Results: The prepared liposomal formulation demonstrated an average size of 120 nm with a low PDI (0.089) and a zeta potential of −30.2 mV, indicating desirable stability. SDS-PAGE analysis verified the successful encapsulation of the peptide within the liposomal structure. Initial BCA assay results were satisfactory, and HPLC analysis was used to measure encapsulation efficiency.
Conclusion: The experimental outcomes support the potential application of nanoliposomes as delivery systems for tumor-specific peptides. The mutant KRAS-loaded liposomal vaccine presents a promising strategy for further development in colorectal cancer immunotherapy.
Keywords: Colorectal cancer, Nanoliposome, KRAS peptide, Cancer vaccine

P549, Evaluation of gene expression of ATF4 and ATF6 involved in unfolded protein response in endometrial cancer patients

Ali Abedi[1], Sanaz Nourmohammadzade[1], Mojtaba Amani[2], Mohsen Sagha[3], Mohammad Amani[1], Behroz Shokohi[4]

1. Physiology Department, School of Medicine, Ardabil University of Medical Sciences, Ardabil, Iran
2. School of Pharmacy, Ardabil University of Medical Sciences, Ardabil, Iran
3. Anatomy Department, School of Medicine, Ardabil University of Medical Sciences, Ardabil, Iran
4. Pathology Department, School of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran

Background: Endometrial cancer is one of the most common cancers in women and the most common malignancy after breast cancer in the world. The mortality caused by this disease and the increase in the number of patients, endometrial cancer is an important issue regarding women's health, especially in developed countries. In general, several studies related to different types of cancer have shown that the expression of genes and proteins involved in the response of unfolded proteins increases.

This study was conducted with the aim of investigating the expression of ATF6 and ATF4 genes and proteins involved in the unfolded protein response in healthy and cancerous endometrial tissue samples and their correlation with the aggressive characteristics of endometrial cancer as a prognostic and therapeutic marker.

Methods: Gene expressions of ATF4 and ATF6 was investigated by Rael-Time PCR and their proteins by ELISA.

Results: We found that expression levels of ATF6 and ATF4 increase in higher FIGO stage and histopathological grade and are correlated significantly with Lymphovascular invasion and depth of myometrial invasion in endometrial cancer.

Conclusion: The findings showed that targeting ATF6 and ATF4 could suggest a promising method for postponing the progression of the endometrial cancer, providing the background for the use of ATF6 and ATF4 inhibitors as a potential therapeutic strategy in the future.

Keywords: Unfolded proteins response, Endometrial carcinoma, ER stress, Clinicopathological parameters

P550, A Comprehensive overview of cyclin-dependent kinase 7 inhibitors as potential anticancer agents

Elahe Vahedi[1], Razieh Ghodsi[1]
1. Department of Medicinal Chemistry, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Cyclin-dependent kinase 7 (CDK7) plays a dual role in cell cycle regulation and transcriptional control through phosphorylation of key targets such as RNA polymerase II. Its dysregulation has been linked to various cancers, making CDK7 an attractive therapeutic target. The discovery of small-molecule inhibitors, particularly covalent binder like THZ1, has opened new approach in anticancer drug design.
Methods: In this review, we describe recent advances (2020-2025) in the medicinal chemistry of CDK7 inhibitors, focusing on scaffold diversity, covalent inhibitor design, and structure–activity relationship (SAR). We also evaluated novel strategies such as macrocycle inhibitors and PROTAC molecules targeting CDK7.
Results: Several small molecules, including THZ1 and SY-5609 have shown strong CDK7 inhibitory activity preclinical studies. Macrocyclic inhibitors and PROTAC molecules have been explored as promising approaches to enhance selectivity and efficacy. Efforts to optimize covalent inhibitors have led to improved pharmacokinetic properties and anticancer activity in vivo.
Conclusion: Selective CDK7 inhibitors have shown antitumor activity in preclinical studies, both as monotherapies and in combination with other cancer drugs. Continued research at both the biological and clinical levels is essential to facilitate the successful development and application of CDK7- targeted therapies.
Keywords: Cyclin-Dependent Kinase 7, Cancer Therapy, Cell Cycle Regulation, SAR

P551, Pharmacogenomics therapies for gastric cancer

Hanieh Yaghoubi[1], Fatemeh Yaghoubi[1], Fereshteh Asgharzadeh[2]
1. Department of Biology, Faculty of Sciences, Islamic Azad University, Mashhad, Iran
2. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Currently, Pharmacogenomics therapies have improved gastric cancer survival. Genetic variations in metabolism and drug target genes contribute to variable treatment outcomes and toxicities. Here, we aimed to conduct a comprehensive study aiming to identify key biomarkers and therapeutic targets in gastric cancer (GC), a common and deadly malignancy worldwide.
Methods: We conducted a systematic search of electronic databases including PubMed, Scopus, Google Scholar, Cochrane Library, ProQuest, Web of Science, and Gray Literature. We included pharmacogenomics studies that used data from multiple Gene Expression Omnibus (GEO) datasets. This overview synthesizes 51 studies to draw a conclusion. Two independent reviewers carried out data extraction, and they assessed the risk of bias using appropriate tools for each study design.
Results: We identified differentially expressed genes (DEGs), comprising 99 upregulated and 172 downregulated genes that were common across all datasets. Key hub genes, including FN1, COL1A1, INHBA, CST1, ATP4A, and ATP4B, were identified through protein interaction networks and analysis of gene connectivity and expression changes. Notably, FN1, COL1A1, INHBA, and CST1 were upregulated and associated with poorer patient survival, indicating their potential as diagnostic biomarkers and therapeutic targets. Conversely, ATP4A, ATP4B, CDH2, COL4A1, and COL5A2 were downregulated, and their roles warrant further investigation.
Conclusion: Overall, these findings highlight promising molecular biomarkers for early diagnosis and personalized treatment strategies in gastric cancer. However, further validation in larger, multi-center cohorts is crucial to confirm their clinical utility and to establish standardized protocols for their detection and implementation.
Keywords: Pharmacogenomics; Therapies; Gastric cancer

P552, Anticancer activity of *Pseudomonas aeruginosa* derived peptide with iRGD in the colon cancer therapy

Atieh Yaghoubi[1, 2], Aref Movaqar[1], Fereshteh Asgharzadeh[2, 3], Mohammad Derakhshan[1], Kiarash Ghazvini[1], Majid Khazaei[3], Saman Soleimanpour[1]

1. Department of Microbiology and Virology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Student Research Committee, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Colon cancer remains a significant life-threatening disease. Given the limitations of current treatments, novel therapies are needed to improve outcomes and reduce side effects. Therefore, we investigated the therapeutic potential of Azurin-p28, alone or in combination with the tumor-penetrating peptide iRGD (Ac-CRGDKGPDC-amide) and 5-fluorouracil (5-FU), for colon cancer.

Methods: The inhibitory effects of p28, alone or in combination with iRGD/5-FU, were investigated in CT26 and HT29 cells, and in a xenograft cancer model. The impact of these treatments on cell migration, apoptosis, and cell cycle was evaluated. Quantitative RT-PCR was used to assess the expression levels of BAX, BCL2, and tumor suppressor genes (p53, COL1A1, COL1A2).

Results: In tumor tissues, p28, alone or with iRGD and 5-FU, increased p53 and BAX expression while decreasing BCL2 expression, leading to enhanced apoptosis compared to control and 5-FU groups.

Conclusion: P28 shows promise as a novel therapeutic approach to enhance the anti-tumor effects of 5-FU in colon cancer therapy. P28 shows promise as a novel therapeutic approach to enhance the anti-tumor effects of 5-FU in colon cancer therapy. Preclinical studies have demonstrated that combining P28 with 5-FU leads to a synergistic effect, resulting in significantly reduced tumor growth compared to either agent alone. This synergistic action is thought to be mediated by P28's ability to modulate key cellular pathways involved in 5-FU resistance, potentially re-sensitizing cancer cells to the drug's cytotoxic effects.

Keywords: Azurin-p28; Pseudomonas aeruginosa; Bacterial peptide; Colon cancer; iRGD

P554, Molecular crossroads: Unraveling the biochemical pathways of gastrointestinal cancer progression

Fatemeh Yaghoubi[1], Hanieh Yaghoubi[1], Fereshteh Asgharzadeh[2]
1. Department of Biology, Faculty of Sciences, Mashhad Branch, Islamic Azad University, Mashhad, Iran
2. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Colorectal cancer (CRC), a major cause of cancer-related deaths globally, is driven by dysregulated signaling networks that control cell proliferation, survival, differentiation, and apoptosis. Here, we investigate the complex mechanisms underlying colorectal cancer (CRC) progression, role of dysregulated signaling pathways that drive cellular proliferation, survival, differentiation, and apoptosis.
Methods: We conducted a systematic search of electronic databases including PubMed, Scopus, Google Scholar, Cochrane Library, ProQuest, Web of Science, and Gray Literature. We included studies that explore how genetic, epigenetic, and microbial factors contribute to tumor development by altering key signal transduction networks. A total of 43 meet our inclusion criteria. Two independent reviewers carried out data extraction, and they assessed the risk of bias using appropriate tools for each study design.
Results: We found that the key signaling pathways affecting the cellular proliferation and differentiation in CRC were Wnt/β-catenin, MAPK/ERK, and PI3K/AKT/mTOR cascade. Frequent KRAS and BRAF mutations in CRC make them valuable diagnostic and therapeutic biomarkers. Our results indicated that inhibitors of glycolysis, glutaminolysis, the TCA cycle, fatty acid oxidation, LDH, and glucose transport, as well as strategies that target oxidative phosphorylation and lipid synthesis, also can be as therapeutic potential for targeting cancer metabolism.
Conclusion: Our results emphasize the critical need for ongoing translational research, leveraging emerging technologies, such as integrative genomics, artificial intelligence, and advanced biomarker discovery, to enhance precision medicine approaches. Addressing these challenges is essential to optimize therapeutic efficacy, improve patient prognosis, and facilitate the development of truly personalized treatment paradigms in colorectal cancer.
Keywords: Biochemical; Pathways; Gastrointestinal cancer; Progression

P555, The pharmacological role of leptin in cancer targeting therapy: a systematic review study.

Sara Ebrahimi-Mousavi[1,2], Yasaman Aali[1,2], Sara Movahed[1], Majid Ghayour-Mobarhan[3]

1. Department of Clinical Nutrition, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Student Research Committee, Mashhad University of Medical Sciences, Mashhad, Iran
3. International UNESCO Center for Health-Related Basic Sciences and Human Nutrition, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Leptin, a hormone secreted from adipose tissue, has attracted much attention in tumor growth, metastasis, and treatment resistance, especially in cancers such as breast, colon, and ovarian cancer. This systematic review aimed to evaluate the therapeutic potential of leptin and leptin-based drugs in cancer treatment.

Methods: We systematically reviewed articles published up to December 1, 2025 from multiple databases, including PubMed, Scopus, and Embase. We focused on clinical trials that investigated the pharmacological use of leptin and leptin antagonists, as well as their effects on cancer cell proliferation, apoptosis, and metastasis.

Results: Of the 724 studies, 9 were reviewed. The results of the studies showed that leptin promotes tumorigenesis through the activation of key signaling pathways such as JAK/STAT, PI3K/Akt, and MAPK. Several drugs targeting leptin mechanisms in the body, including Ficlatuzumab (a monoclonal antibody), LRA-2 (a leptin receptor antagonist), and AZD5363 (an AKT inhibitor), are currently being evaluated in clinical trials. These drugs have shown the potential to inhibit leptin-induced tumor growth and improve the efficacy of conventional therapies. However, challenges remain regarding specificity, side effects, and the complex interactions between leptin and the tumor microenvironment.

Conclusion: Leptin plays a critical role in cancer development and progression, and targeting its signaling pathways holds promise for cancer therapy. While early clinical trials reported its potential, more thorough and longer-term research is needed to optimize leptin-targeting therapies and address the challenges of their clinical application.

Keywords: Leptin, Cancer, Neoplasm, Leptin receptor antagonist, Targeted therapy

P556, A novel hybrid magnetic nanocarrier for targeted drug delivery in cancer treatment

Tara Akhtarkhavari[1], Hamid Mohammadzadeh Dovvom[2], Mohammad Hassan Mollaei[1], Ahmad Reza Bahrami[1], Amir Shokooh Saljooghi[2], Maryam M. Matin[1]
1. Department of Biology, Faculty of Science, Ferdowsi University of Mashhad, Mashhad, Iran
2. Department of Chemistry, Faculty of Science, Ferdowsi University of Mashhad, Mashhad, Iran

Background: Despite notable advances in nanoparticle-based drug delivery, a significant translational gap persists between preclinical findings and clinical outcomes. This gap is partly driven by nanocarriers that fail to address the dynamic and heterogeneous nature of tumors. Multifunctional hybrid platforms capable of integrating complementary therapeutic and targeting mechanisms may help overcome these limitations. Here, we present a novel multifunctional core–shell nanocarrier designed to address these challenges.
Methods: We fabricated a multifunctional nanocarrier featuring a magnetic core encapsulated by porous ZIF-8, which served as the primary reservoir for epirubicin (the main therapeutic agent). The entire system was coated with polyethyleneimine, enabling loading of a secondary drug, methotrexate, and allowing surface functionalization with an ATP aptamer for active tumor targeting. Comprehensive physicochemical characterizations were performed. Drug-release profiles and hemocompatibility were assessed. Therapeutic efficacy was then evaluated *in vitro* (MTT assay on CT26 cancer cells and NIH/3T3 fibroblasts) and *in vivo* using BALB/c mice.
Results: The synthesized nanocarrier demonstrated a well-defined core–shell architecture, appropriate magnetic responsiveness, controlled dual-drug release, and excellent hemocompatibility. MTT assays revealed markedly enhanced cytotoxicity against CT26 cells compared with free drugs or single-drug controls, while exhibiting lower toxicity toward normal cells. *In vivo* studies further validated the nanocarrier's biocompatibility and therapeutic potential.
Conclusion: This multifunctional hybrid nanocarrier successfully integrates efficient co-delivery, active targeting, and magnetic responsiveness. It represents a promising and versatile platform designed to overcome current barriers and support the translation of nanomedicine into clinical practice.
Keywords: Targeted drug delivery, Theranostic nanomedicine, Neoplasms, Combination therapy

P557, Genetic polymorphisms influencing targeted nanocarrier-based drug delivery in cancer therapy

Tara Akhtarkhavari[1], Niloofar Mohandesi[1], Ahmad Reza Bahrami[1], Mohammad Hassan Mollaei[1], Maryam M Matin[1]
1. Department of Biology, Faculty of Science, Ferdowsi University of Mashhad, Mashhad, Iran

Background: Despite substantial progress in nanoparticle-based drug delivery for cancer therapy, many nanocarriers fail to translate successfully in clinical trials. Multiple factors contribute to this gap, among which inter-individual genetic heterogeneity is particularly critical. Polymorphisms in genes that regulate the pharmacokinetics and pharmacodynamics of nanoparticles may profoundly alter therapeutic response. This study reviews current evidence on how genetic variations influence the performance and clinical outcomes of targeted nanocarriers.
Methods: A comprehensive literature review was conducted using studies published between 2019 and 2024 indexed in PubMed, Scopus, and Web of Science. The search strategy incorporated keywords such as nanocarrier, cancer polymorphisms, targeted therapy, and personalized nanomedicine. Studies that reported associations between genetic variants and nanoparticle behavior or therapeutic efficacy were analyzed.
Results: Genetic polymorphisms influencing nanocarrier performance were identified across several biological pathways. These include variants in drug-metabolizing enzyme genes (e.g., *UGT1A1*, *CYP2A6*); genes encoding targeting ligands (e.g., *EGFR*); angiogenesis-related genes (e.g., *VEGF*); drug efflux transporter genes (e.g., *ABCB1*); immune-modulatory genes; and genes involved in DNA repair and genomic stability (e.g., *MGMT*). Collectively, these polymorphisms may alter drug loading efficiency, targeting specificity, nanoparticle clearance, and therapeutic efficacy.
Conclusion: This study presents a panel of reported polymorphisms that have been identified as influencing nanoparticle performance in cancer therapy. It appears that this aspect has received limited attention so far and should be more thoroughly addressed in clinical studies. Furthermore, it highlights the necessity for further investigations into the discovery of polymorphisms that influence nanoparticle behavior, particularly in the context of personalized medicine.
Keywords: Genetic polymorphisms, Personalized nanomedicine, Nanoparticle, Cancer therapy

P559, The contribution of gut microbiome in progression and treatment of pancreatic cancer

Yasaman Akbarian[1,4], Mahdieh Gheysipour[1,4], Hossein Javid[1,2,3]
1. Department of Medical Laboratory Sciences, Varastegan Institute for Medical Sciences, Mashhad, Iran
2. Department of Clinical Biochemistry, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Surgical Oncology Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
4. Student research committee, Varastegan Institute for Medical Sciences, Mashhad, Iran

Background: Pancreatic cancer is regarded as one of the deadliest cancers due to late diagnosis, the limited surgical treatment options and poor prognosis. A balance and composition of the gut microbiome may also affect the development and even the management of pancreatic cancer.
Methods: In this study, a series of articles published between 2020 to 2025 were reviewed from Google Scholar and PubMed databases, and out of 25 articles found, 15 articles were excluded after reviewing the titles and abstracts, and 10 articles were selected for more detailed study.
Results: The gut microbiome is a community of beneficial microorganisms in the digestive tract, whose dysbiosis can lead to cancer by disrupting metabolism, modulating immune pathways and generating toxic compounds. Research indicates that certain bacterial elements like LPS, predisposing patients to developing pancreatic cancer by inciting inflammatory pathways. Other bacterial toxins also influence cancer cell development by interfering with the cell cycle. Moreover some bacteria can change the degree of effectiveness and resistance of anti cancer drugs by altering the metabolism of the host.
Conclusion: While microbiota dysbiosis is associated with the progression of pancreatic cancer Managing the gut's microbiota may offer a way to prevent or treat pancreatic cancer. Recent studies have demonstrated that leveraging the gut microbiome alongside chemotherapy not only enhances the treatment’s effectiveness but also improves the outcomes of immunotherapy. By shifting the focus to strategies that target the microbiota, innovative treatment options for pancreatic cancer might be formulated in the years to come.
Keywords: Gut microbiome, Pancreatic cancer, Dysbiosis.

P560, Synergistic photothermal and photodynamic metal nanoplatforms for colorectal cancer: Mechanistic insights and clinical translation

Maedeh Eezadi[1], Saba Seyedi[2]
1.Department of Biology, faculty of Science, Islamic Azad University, Mashhad Branch, Mashhad, Iran
2.Department of Biology, faculty of Science, Islamic Azad University, Mashhad Branch, Mashhad, Iran

Background: Colorectal cancer remains a leading cause of cancer mortality, with advanced disease showing poor response to conventional chemotherapy due to tumor hypoxia (5–15% O_2), intrinsic drug resistance, and immunosuppression. Metal nanoparticle–mediated photothermal therapy (PTT) and photodynamic therapy (PDT) provide complementary mechanisms, including localized hyperthermia and reactive oxygen species (ROS) generation, to overcome these limitations.
Methods: This mini-review summarizes advances reported between 2019 and 2025 in metal nanoparticle–based PTT and PDT for colorectal cancer. Preclinical studies on gold, copper, iron, and silver nanoplatforms, as well as stimulus-responsive carriers such as metal–organic frameworks and upconversion nanoparticles, are critically discussed with emphasis on mechanisms of action, tumor microenvironment modulation, and translational feasibility.
Results: Three key mechanistic insights are highlighted: (1) PTT-induced hyperthermia improves intratumoral oxygenation, enhancing hypoxia-limited PDT efficacy; (2) copper- and iron-mediated chemodynamic therapy increases ROS 5-10 fold, triggering ferroptotic and pyroptotic death alongside apoptosis; and (3) phototherapy-induced immunogenic cell death synergizes with immune checkpoint inhibitors, converting “cold” tumors into “hot” microenvironments. Gold, copper, iron, and silver nanoplatforms provide distinct photothermal, photodynamic, and catalytic properties, while advanced carriers enable stimulus-responsive drug delivery. Phototherapy suppresses prosurvival pathways and activates regulated cell-death cascades. Translational barriers limited tissue penetration, long-term biosafety, and regulatory standardization—are discussed with NIR-II excitation, endoscopic light delivery, biodegradable platforms, and harmonized manufacturing strategies.
Conclusion: Synergistic PTT/PDT using engineered metal nanoparticles represents a mechanistically robust and clinically translatable strategy for metastatic colorectal cancer, particularly when integrated with immunotherapy and endoscopic delivery.
Keywords: Colorectal Neoplasms, Nanoparticles, Photochemotherapy, Hyperthermia, Immunotherapy

P561, The effects of curcumin on the oxidative stress status in HepG2 liver cell line

Mohadese Pouryani[1,2], Nasrin Ziamajidi[1], Mahdi Bahmani[1], Fatemeh Ghavamifar[1,2], Maryam Salehzadeh[3], Roghayeh Abbasalipourkabir[1]

1. Department of Clinical Biochemistry, School of Medicine, Hamadan University of Medical Sciences, Hamadan, Iran
2. Student Research and Technology Committee, Hamadan University of Medical Sciences, Hamadan, Iran
3. Department of Community Oral Health, School of Dentistry, Tabriz University of Medical Sciences, Tabriz, Iran

Background: The present study aimed to investigate the effect of curcumin on oxidative stress in HepG2 liver cancer cells.
Methods: HepG2 cell viability was assessed by the MTT assay. Total antioxidant capacity (TAC), total oxidative status (TOS), malondialdehyde (MDA) levels, and superoxide dismutase (SOD) and catalase (CAT) activity were measured calorimetrically.
Results: The results of MTT showed that curcumin can reduce the viability of HepG2 cells and IC50 for this compound was determined at a concentration of 31.25 µM and a time of 48 hours and lower and higher concentrations were selected for further experiments. In addition, TOS levels in treated cells significantly decreased compared to control cells ($p < 0.01$ for 15.6 µM and $p < 0.001$ for 31.25 and 62.5 µM) and in contrast, TAC levels significantly increased ($p < 0.05$ for 15.6 µM and $p < 0.01$ for other concentrations). MDA levels also decreased significantly ($p < 0.01$ for 15.6 µM and $p < 0.001$ for 31.25 and 62.5 µM). The activities of SOD ($p < 0.01$ for 15.6 µM and $p < 0.001$ for higher concentrations) and CAT ($p < 0.01$ for 15.6 µM and $p < 0.01$ for other groups) enzymes also increased in treated groups compared to untreated cells.
Conclusion: Findings of present study exhibited that curcumin effectively reduced oxidative stress in liver cancer cells and may enhance existing cancer therapies and minimize their side effects.
Keywords: Curcumin, Oxidative stress, HepG2 cell line

P562, Design and cloning of the tissue inhibitor of metalloproteinase 4-chlorotoxin like peptide from iranian *Mesobuthus eupeus* fusion protein (TIMP4- MeICT)

Fatemeh sadat Taghavi[1]
1. Students' Research Committee, Faculty of Medicine, Mashhad Branch, Islamic Azad University, Mashhad, Iran

Background: Cancer is one of the major health problems and the main causes of death in the communities. Metastasis is the main cause of death in cancer patients. Therefore new therapeutic approaches to inhibit invasion and metastasis are essential. Recent studies have demonstrated that overexpression and unrestrained activity of matrix metalloproteinases (MMPs) was linked to metastasis of tumor cells. The tissue inhibitor of metalloproteinase-4 (TIMP-4) is one of the intrinsic inhibitors of MMPs that interacts with the active site of MMP and inhibits its proteolytic activity. On the other hand tumor cells need to decrease their volume for metastasis and this was related to the activity of chloride channels. Thus, inhibition of Cl- ion channels with inhibitors such as Chlorotoxin like peptides delay reduction of cell's volume and their metastasis.
Methods: In this study, a bifunctional fusion protein containing tissue inhibitor of metalloproteinase- 4 and Chlorotoxin like peptide from Iranian *Mesobuthus eupeus* (MeICT) for therapeutic purposes was coloned and constructed by overlapping-extension PCR method.
Results: The fusion protein was coloned successfully and the desired fragment was detected in SDS-PAGE gel.
Conclusion: A Fusion protein that we have constructed has two distinct functions for inhibition of metastasis: inhibit the proteolytic activity of MMPs that overexpression in many cancers and delay reduction the volume of the cells and their metastasis. Further studies at the cellular level and in animal models will respond to many questions at the combination of these genes.
Keywords: Metastasis, Matrix metalloproteinase, TIMP-4, MeICT

P563, Evaluation of the effect of titanium dioxide nanoparticles on growth inhibition of cancer cell line K562

Rahele Javaheri[1], Ahamd Reza Raji[1], Hadi Moheb Alian[2]
1.Department of Basic Sciences, Faculty of Veterinary medicine, Ferdowsi University of Mashhad, Iran
2.Department of Pathobiology, Faculty of Veterinary medicine, Ferdowsi University of Mashhad, Iran

Background: Cancer remains a major global health issue. Nanoparticles, owing to their sub-100 nanometer size, have been explored in cancer treatment. TiO2 have been investigated as potential inhibitors of mitosis during the cytokinesis stage of cell division in cancer cells. This study aims to explore the impact of titanium dioxide nanoparticles on the growth inhibition of K562, fibroblast cells, and to evaluate their cellular effects.
Methods: this study, a suspension of TiO2 was prepared. K562 cancer cells and HFF-1 (normal fibroblast cells) were then treated with varying concentrations of the nanoparticles (25, 50, 100, and 200 µg/ml) for 48 and 72 hours. Cytotoxicity was assessed using the MTT assay. Apoptosis was evaluated via flow cytometry. Chromosomal damage and morphological alterations were examined using the micronucleus test. Finally, the intrinsic pathway of apoptosis induction was investigated and tracked using transmission electron microscopy.
Result: Toxicity was observed in both K562 and HFF-1 cells starting at a TiO2 concentration of 200 µg/ml. Apoptosis in these cell lines was confirmed using Annexin V-PI staining and flow cytometry. The study found that TiO2 nanoparticles can be toxic at specific concentrations. Treatment with 200 µg/ml for 48 and 72 hours affected both K562 and HFF-1 cells. Specifically, the nanoparticles caused mitochondrial membrane disruption and rough endoplasmic reticulum dilation. These effects were observed after 72 hours of exposure to the 200 µg/ml concentration.
Conclusion: Despite these observed toxic effects at high concentrations, the results also suggest that TiO2 nanoparticles may have potential as advanced therapeutic agents in nanotechnology.
Keywords: TiO2 nanoparticles, Chronic myeloid leukemia, MTT assay, Flow cytometry technique, TEM

P564, Evaluating the antitumor effects of titanium dioxide nanoparticles on P53 gene expression in CT26 colon carcinoma cells

Romina Javaheri[1], Hadi Mohebalian[1], Alireza Haghparast[1]
1.Department of Pathobiology, Faculty of Veterinary Medicine, Ferdowsi University of Mashhad, Mashhad, Iran

Background: The aim of the present research was to investigate the effect of TiO_2 nanoparticles on the CT26 cell line and to evaluate the changes in *P53* gene expression compared to *Hprt*, a reference gene, in treated cells.
Methods: CT26 cell and STO cell were treated triplicate with TiO_2 at 25, 50, 100, and 200 µg mL^{-1} for 48 and 72 hours, and the cytotoxicity effects were evaluated by the MTT assay. The expression level of the pro-apoptotic gene *P53*, normalized to the reference gene *Hprt*, was analyzed using RT-PCR.
Result: CT26 cell treatment showed that TiO_2 at 25 and 50 µg mL^{-1} after 48 and 72 hours have slight cytotoxicity, and in 100 and 200 µg mL^{-1}, the cytotoxic effect is increased. After 72 hours of cultivation with 200 µg mL^{-1}, more than 20% of the cells have been killed. The effect of TiO_2 on the STO cell shows that it has no cytotoxic impact at 25 and 50 µg mL^{-1} concentrations, and the cytotoxicity in 100 and 200 µg mL^{-1} has increased slightly. Moreover, it was found that *P53* gene expression in CT26 and STO cell was concentration-dependent.
Conclusion: The results of this study showed that TiO_2 significantly affect *P53* gene expression in the CT26 cell. These findings highlight the potential of TiO_2 as an adjuvant in cancer therapies to enhance anticancer effects.
Keywords: Titanium Dioxide Nanoparticles, P53 Gene, CT26 Cell Line, Colon Carcinoma, Gene Expression

P565, Systems pharmacology analysis of apigenin-regulated genes in ovarian cancer

Aseel Kamil Mohammed Al-mosawi[1], Hamid Chehsomi[2]
1. Department of Biology, Faculty of Science, University of Thi Qar, Thi Qar, Iraq
2. Razavi Khorasan Agricultural and Natural Resources Research and Education Center, AREEO, Mashhad, Iran

Background: Ovarian cancer remains one of the most lethal gynecological malignancies, largely because of late diagnosis, chemoresistance, and limited therapeutic options. Apigenin, a natural flavonoid widely distributed in medicinal plants, has shown promising pharmacological properties by modulating apoptosis-related signaling pathways. This study aimed to elucidate the molecular targets and hub genes influenced by apigenin in ovarian cancer using a systems pharmacology framework.
Methods: Genes and proteins associated with apigenin and ovarian cancer were systematically retrieved from the peer-reviewed literature and curated databases. Protein–protein interaction (PPI) networks were constructed and analyzed using Cytoscape and the CytoHubba plugin, with hub genes selected based on topological parameters (degree ≥10 and confidence score ≥0.7). The gene expression profiles of the identified hub genes were then compared between normal and tumor ovarian tissues using Transcripts Per Million (TPM) data obtained from the GEPIA and TCGA databases.
Results: Network analysis identified several apoptosis-related genes, including *CYCS*, *BCL2*, *TP53*, *CASP7*, and *CASP9*, as central nodes potentially modulated by apigenin. Comparative expression analysis revealed higher expression levels of *CYCS* and *TP53* in ovarian tumor tissues than in normal tissues, indicating the potential activation of apoptotic and p53-mediated pathways. In contrast, *BCL2* was downregulated in tumor tissues, suggesting the suppression of anti-apoptotic signaling.
Conclusion: This study suggests that apigenin may modulate apoptotic pathways in ovarian cancer by regulating key hub genes, such as *CYCS* and *TP53*. These findings provide mechanistic insights that support further exploration of apigenin as a potential modulator of tumor cell survival in ovarian malignancies.
Keywords: Apigenin, Ovarian cancer, Systems pharmacology, Apoptosis

P566, Investigating the anticancer effects of thymol: A plant-based compound

Pejman Hosseinzadeh[1], Amir Reza Afshari[2], Somayeh Hessami[1], Elham Zare[1]
1. Student Research Committee, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Clinical Biochemistry, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Glioblastoma multiforme (GBM) is the most commonand aggressive brain tumor associated with a poor prognosis, highlighting the need for new therapeutic strategies for this disease. Thymol (2-isopropyl-5-methylphenol) is a chemical compound with various medicinal properties including analgesic, antibacterial, antispasmodic and anti-inflammatory. Recent research has shown that thymol is an important inducer of apoptosis in cancer cells. Our aim was to evaluate whether thymol has anticancer properties in rat GBM C6 malignant cells.
Methods: We evaluated the effects of thymol on cell viability by MTT test and apoptosis rate by Annexin V kit on C6 cells at different concentrations. This study also examined the production of reactive oxygen species (ROS) with the ROS kit, and the mRNA levels of genes related to apoptosis and cell cycle dynamics with real time PCR.
Results: The half-maximal inhibitory concentration (IC50) of thymol for C6 cells was 350 μM at 24 h and 260 μM at 48 h post-treatment, with no cytotoxic effects observed on normal human foreskin fibroblasts (HFF) cells at these concentrations. Thymol increased Bax and p53 expression while decreasing Bcl2 levels, leading to more apoptotic cell death and higher ROS production. Furthermore, the cytotoxic effects of thymol on C6 cells may be associated with cell cycle arrest in the G2/M phase.
Conclusion: The results show that thymol can induce apoptosis and toxicity in cancer cells while preserving normal cells, indicating its potential as an attractive option for the treatment of GBM.
Keywords: Glioblastoma multiforme, Thymol, Anticancer

P567, Temozolomide induct cellular senescence in neural stem cell by imbalanced oxidant and anti-oxidant activity and inflammatory cytokine

Parisa danaie fard[1], Amir ghanbari[2]
1. Department of Anatomical Sciences, Faculty of Medicine, Sabzevar University of Medical Sciences, Sabzevar, Iran
2. Cellular and Molecular Research Center, Faculty of Medicine, Yasuj University of Medical Sciences, Yasuj, Iran

Background: Cellular senescence is a permanent state of cell cycle arrest in proliferating cells under various stresses and is linked to post-treatment effects of anti-tumor agents. This study aimed to evaluate the ability of temozolomide to induce premature senescence in neural stem cells (NSCs) under in-vitro conditions.
Methods: NSCs were isolated, expanded, and exposed to temozolomide for 24 hours to induce senescence. Cell viability was measured using the MTT assay, and total cell numbers were determined through a cell counting assay. Senescent cells were identified by increased lysosomal β-galactosidase activity. Levels of NO metabolites, oxidative biomarkers, malondialdehyde (MDA), total antioxidant capacity (FRAP), and total thiols (T-SH) were quantified. Inflammatory cytokines and cellular markers were assessed by immunocytochemistry (ICC).
Results: Temozolomide treatment significantly reduced cell viability, neurosphere formation, and total cell counts at 10 and 20 μM compared with controls (***$p<0.001$). A significant decline in NO production was observed at 30 μM (***$p<0.001$). Temozolomide at 20 and 30 μM caused significant reductions in MDA and FRAP levels, while even 10 μM decreased FRAP values (**$p<0.01$, *$p<0.05$, ***$p<0.001$). Additionally, 30 μM temozolomide significantly increased IL-6 production compared with the 2, 5, and 10 μM groups (**$p<0.01$).
Conclusion: Temozolomide inhibits NSC proliferation by reducing viability and neurosphere numbers and induces oxidative imbalance characteristic of senescence. Mild alterations in premature-aging-related genes suggest temozolomide may contribute to aging-associated cellular changes in post-treatment patients.
Keywords: Cell senescence, Temozolomide, Neural stem cell (NSC)

P568, Influence of saffron components and mesenchymal stem cells on immune cells in cancer cases

Ehsan Rastgoo[1], Reyhane Akbari[1], Fahime Lavi[2]
1. Student Research Committee, Mashhad University of Medical Sciences, Mashhad, Iran
2. Immunology Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: This study investigates the effects of crocin, a bioactive carotenoid derived from saffron with antioxidant and anti-tumor properties, on peripheral blood mononuclear cells (PBMCs) from patients with prostate cancer. Mesenchymal stem cells (MSCs) are known not only for their regenerative capacity but also for their immunomodulatory roles through paracrine signaling. Prostate cancer is one of the most common malignancies in men worldwide, and understanding novel immunomodulatory strategies is of high clinical importance. This study aimed to evaluate the impact of crocin on immune cell subsets and antioxidant status of PBMCs, particularly under co-culture conditions with MSCs.
Methods: PBMCs were treated with crocin at concentrations ranging from 3 to 100 µM. Flow cytometry was performed to assess CD3+CD4+ and CD3+CD8+ T-cell populations, while superoxide dismutase (SOD) activity was measured as a marker of antioxidant defense.
Results: Crocin at concentrations of 6, 12, and 25 µM slightly elevated CD4+ and CD8+ T-cell percentages in PBMCs co-cultured with MSCs, although these increases did not reach statistical significance. In contrast, treatment with 25 µM crocin in the absence of MSCs resulted in a highly significant rise in both CD4+ and CD8+ populations ($P \leq 0.0001$).
Additionally, crocin at 6 µM significantly enhanced the antioxidant defense system by increasing SOD enzyme activity ($P = 0.0003$).
Conclusion: Overall, the findings indicate that crocin exerts notable immunomodulatory and antioxidant effects on PBMCs from prostate cancer patients, supporting its potential use as an adjunct approach in cancer immunotherapy research, particularly in combination with MSCs.
Keywords: Saffron, Cancer, Mesenchymal Stem Cells, Peripheral Blood Mononuclear Cells

P569, The impact of DPP-4 Inhibitors on the tumor environment: A narrative review

Sedigheh Shahvali[1], Leila Arabi[1], Mahmoud Reza Jaafari [1]
1.Department of Pharmaceutical Nanotechnology, Nanotechnology Research Center, School of Pharmacy, Institute of Pharmaceutical Technology, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Dipeptidyl peptidase-4 (DPP-4/CD26) inhibitors, initially formulated as agents for glucose reduction, demonstrate significant pleiotropic influences on the tumor microenvironment that transcend mere incretin preservation. This narrative review consolidates emerging evidence indicating that DPP-4 acts as a principal regulator of peptide signaling within the cancer ecosystem, primarily through the enzymatic truncation of chemokines (CXCL10, CXCL12, and CCL22), neuropeptides (NPY), and substrates that modulate growth, alongside non-enzymatic scaffolding interactions.
Methods: In the majority of solid tumors, the stromal and myeloid components predominantly govern pathogenic DPP-4 expression, which facilitates immune exclusion, M2 macrophage and myeloid-derived suppressor cell (MDSC) polarization, cancer-associated fibroblast activation, remodeling of the extracellular matrix, and the formation of pre-metastatic niches.
Results: As a result, pharmacological inhibition often leads to normalization of the desmoplastic barrier, restoration of effector lymphocyte trafficking, and sensitization of immunologically inert tumors to checkpoint inhibitors and chemotherapy, particularly within pancreatic, ovarian, and colorectal carcinomas. Nonetheless, contextually contingent risks associated with tumor promotion may manifest in neoplasms that exhibit GLP-1 receptor expression or those that are responsive to endocrine stimuli, attributable to sustained incretin signaling.
Conclusion: This review reconciles contradictory epidemiological and preclinical findings through a compartment- and substrate-specific paradigm, underscoring DPP-4 inhibition as a prototype strategy directed at the microenvironment that possesses both preventive and therapeutic implications. Ultimately, the repurposing of DPP-4 inhibitors signifies a promising and biologically rational methodology for surmounting stromal and immunological resistance in formidable solid malignancies.
Keywords: Cancer-associated fibroblasts, DPP-4 inhibitors, Tumor microenvironment

P570, Multi-target actions of *Elaeagnus angustifolia*: Integrating evidence from oncology and inflammatory joint disorders

Shima Asgarzadeh[1]
1. Food Engineering Department, Istanbul Aydin University, Istanbul, Turkey

Background: *Elaeagnus angustifolia L*. (oleaster) is a traditional medicinal plant known for its anti-inflammatory, antioxidant, and analgesic properties. Recent findings highlight its potential therapeutic role in chronic diseases, particularly breast cancer, osteoarthritis (OA), and rheumatoid arthritis (RA). However, available evidence is scattered across oncology and rheumatology, underscoring the need for an integrated review.
Methods: This narrative review examined preclinical and clinical studies published between 2009 and 2025. Searches were conducted in PubMed, Scopus, Web of Science, and ScienceDirect using keywords related to *E. angustifolia*, inflammation, cancer, and joint disorders. Data from in vitro studies, animal models, and human trials were synthesized to identify key mechanisms and therapeutic outcomes.
Results: Oleaster extracts exhibited multi-target biological actions. In breast cancer models, they reduced proliferation of HER2-positive and triple-negative cells by activating the p53 pathway, inhibiting STAT3/JNK signaling, modulating the Bax/Bcl-2 ratio, and suppressing epithelial–mesenchymal transition. In OA and RA, clinical evidence demonstrated up to 45% pain reduction, improved functional scores, decreased TNF-α and MMP-1 levels, and increased IL-10. Bioactive compounds such as flavonoids, phenolic acids, tannins, and acidic polysaccharides contributed to antioxidant, anti-inflammatory, and chondroprotective effects.
Conclusion: *E. angustifolia* appears to be a promising complementary therapeutic agent for breast cancer and inflammatory joint diseases. While current evidence is encouraging, variability in extract preparation and a lack of large-scale standardized trials limit definitive conclusions. Further well-designed clinical studies are needed to establish optimal dosing, safety, and the specific bioactive components responsible for its therapeutic effects.
Keywords: *Elaeagnus angustifolia*, Breast Cancer, Osteoarthritis, Rheumatoid Arthritis, anti-inflammatory

P571, Nanoparticle-based targeted therapy as a novel method for esophageal cancer stem cells elimination: A Systematic Review

Pouya Gharavi[1,2], Hossein Javid[1]
1. Department of Medical Laboratory Sciences, Varastegan Institute for Medical Sciences, Mashhad, Iran
2. Student Research Committee, Varastegan Institute for Medical Sciences, Mashhad, Iran

Background: Background: Esophageal cancer stays in the sixth place of cancer-related deaths, with late diagnosis and poor response to classic therapies. Cancer stem cells (CSCs), marked by CD271, ALDH1, and CD133, are believed to correlate with resistance and recurrence. This aim of this study is to review nanoparticle-based targeted therapy as a promising approach to inhibit CSCs and improve treatment outcomes.
Methods: This review article was performed within articles published at PubMed, Science Direct and Google Scholar until March 2025. The Keywords were Nanoparticles; Esophageal Cancer; Cancer Stem Cells. By searching this databases, 4 articles were found. After reading titles and abstracts, all articles were selected under the inclusion criteria. All articles were chosen from English articles.
Results: Cerium Oxide Nanoparticles exhibited significant cytotoxic effect on esophageal CSCs by decreasing ROS levels and increasing antioxidative effects. Nab-Paclitaxel, a nanoparticle-base chemotherapeutic combining paclitaxel and human serum albumin, inhibited the growth of both wild-type and cell spheres in Eca109 cell-line. Let-7b nanoliposomes directly inhibited TCF-4/β-catenin complex activity and blocked Wnt signaling, which suppressed self-renewal by inducing asymmetric division in CSCs. Also, a nano-immuno-conjugate composed of $AlPcS_4Cl$, gold nanoparticles and anti-CD271 antibody induced cytotoxicity in HKESC-1 esophageal CSCs through the photodynamic therapy.
Conclusion: In conclusion, the reviewed nanoparticle-based targeted therapies exhibited significant potentials by inhibiting esophageal CSCs via various mechanisms and inducing low toxicity. However, these studies were designed under in vitro conditions, highlighting the need for additional researches to confirm the therapeutic efficacy of these nanoparticles in future.
Keywords: Cancer Stem Cells, Nanoparticles, Esophageal Cancer

P572, Anticancer effects of borage and its derivatives in breast cancer treatment: A review study

Ali Faraghi dastjerd[1], Neda Ezzeddin[1], Maryam Javadi[1]
1. Department of Community Nutrition, Faculty of Health, Qazvin University of Medical Sciences, Qazvin, Iran

Background: *Borago officinalis (borage*) is an Iranian native plant containing important compounds like polyphenols, flavonoids, saponins, and essential fatty acids (GLA and ALA). Due to its rich antioxidant profile, borage extract exhibits significant antitumor effects.
Methods: The primary aim was to systematically assess the anticancer potential of borage and its derivatives in breast cancer treatment. A comprehensive search was conducted across major databases (including PubMed, Web of Science, Scopus, and Google Scholar) using relevant keywords (such as "Breast cancer," "Borage," and "Borago officinalis"). The search focused on articles published between 2015 and 2025. Ultimately, five highly relevant studies were selected and analyzed.
Results: Findings showed that combining borage oil with the anticancer drug docetaxel (DTX) enhances the drug's efficacy against human breast cancer cells. This formulation reduces the effective dose, potentially minimizing treatment-related toxicity. Additionally, studies indicated that administering borage oil alongside tamoxifen enhances the drug's transdermal absorption and suppresses breast cancer progression due to its GLA content. Other research suggests that borage extract with doxorubicin has a cytotoxic effect on MCF-7 and MDA-MB468 breast cancer cell lines, suggesting its use as an adjunct therapy alongside chemotherapy.
Conclusion: This review highlights that the combination of borage and its derivatives with drugs like tamoxifen and gamma-linolenic acid can be used as an effective and low-risk treatment for breast cancer. These combinations, particularly in nanoemulsion formulations, enhance drug efficacy and reduce the side effects associated with chemotherapy. Given the limited number of studies, further research is recommended for future investigations.
Keywords: Borage, Breast cancer, Anticancer effects, Antioxidant activity

P574, CRISPR-validated genetic vulnerabilities in oral squamous cell carcinoma: a systematic review

Farnaz Mohajertehran[1], Mona Abbasi Pirouz[1]
1. Dental Research Center, Faculty of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Oral squamous cell carcinoma (OSCC) is a therapeutically challenging cancer. Genome-scale CRISPR technologies enable direct functional identification of genetic dependencies in cancer models. We performed a focused systematic review to identify genes that have been experimentally detected or validated with CRISPR in OSCC models.
Methods: We searched PubMed, Web of Science, Scopus and Google Scholar (January 2015–October 2025) for original research articles reporting CRISPR-based screens or CRISPR-mediated perturbations carried out in OSCC cell lines or oral cancer in vivo models. Studies were included if (1) CRISPR (Cas9, dCas9/CRISPRi/CRISPRa, or sgRNA libraries) was used experimentally, and (2) the model system was oral-site (human OSCC lines or oral cancer animal models).
Results: From 312 records identified, 188 unique reports remained after duplicate removal. After title/abstract and full-text screening, 3 studies met the strict inclusion criteria. These studies used CRISPR/Cas9 screening or CRISPR sgRNA knockouts in OSCC models and provided robust experimental validation. The CRISPR-detected/validated genes in OSCC were: YAP1, SUV39H2, and CASP8. Each gene's CRISPR evidence, experimental readouts, and therapeutic implications are summarized.
Conclusions: A stringent, CRISPR-focused review in OSCC identifies a short, high-confidence list of actionable dependencies: YAP1, SUV39H2 and CASP8. These CRISPR-validated genes span oncogenic signaling, epigenetic regulation, and cell-death control, and are promising entry points for targeted or combinatorial strategies in OSCC. We detail limitations (small number of CRISPR-OSCC studies to date) and recommend prioritized validation in patient-derived organoids and in vivo CRISPR screens.
Keywords: CRISPR, YAP1, SUV39H2, CASP8, Oral squamous cell carcinoma

P575, Salivary microRNA and cytokine biomarkers in oral lichen planus and oral squamous cell carcinoma: Systematic review

Farnaz Mohajertehran[1], Mona Abbasi Pirouz[1]
1. Dental Research Center, Faculty of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Oral Lichen Planus (OLP) is a chronic inflammatory oral disorder with potential for malignant transformation to Oral Squamous Cell Carcinoma (OSCC). Non-invasive salivary biomarkers, including microRNAs (miRNAs) and cytokines, offer promise for early detection of high-risk lesions. To systematically review recent evidence on salivary miRNAs and cytokines as biomarkers for identifying OLP lesions with malignant potential and early OSCC.
Methods: A literature search of PubMed, Scopus, and Web of Science (Jan 2020–Aug 2025) identified human studies assessing salivary biomarkers in OLP and OSCC. Data on biomarker expression, diagnostic performance, and correlation with clinical outcomes were extracted.
Results: Twenty-four studies met inclusion criteria. Salivary miR-146a, miR-21, miR-93, and miR-412-3p were consistently upregulated in OLP and OSCC. Elevated salivary IL-6, TNF-α, and IL-8 were observed in high-risk OLP and OSCC patients. Combined biomarker panels, particularly miR-146a + IL-6 and miR-21 + TNF-α, demonstrated superior diagnostic accuracy (AUC 0.89–0.93) compared to individual markers. Expression levels correlated with lesion severity and potential for malignant transformation.
Conclusion: Salivary miRNAs and cytokines capture underlying inflammatory and tumorigenic processes in OLP and OSCC. Multi-marker panels enhance diagnostic sensitivity and specificity, offering a practical non-invasive approach for early detection and risk stratification. Integration of these biomarkers into clinical surveillance could improve early diagnosis and patient outcomes. Large-scale, standardized studies are needed to validate their clinical applicability.
Keywords: Oral Lichen Planus, Oral Squamous Cell Carcinoma, microRNA, Cytokine, Biomarker

P576, Modulatory effects of citrus latifolia plant-derived extracellular vesicles on tumor cell proliferation and migration

Zahra Azadian[1], Narges Bagheri[1], Hosein Shahsavarani[2], Razieh Dalirfardouei [1,3]
1. Department of Medical Biotechnology, School of Sciences and Advanced Technologies in Medicine, Hamadan University of Medical Sciences, Hamadan, Iran
2.Dept. of Cell & Molecular Biology, Faculty of Life Science & Biotechnology, Shahid Beheshti University, Tehran Iran
3. Research Center for Molecular Medicine, Institute of Cancer, Avicenna Health Research Institute, Hamadan University of Medical Sciences, Hamadan, Iran

Background: Current cancer therapies increasingly rely on combination therapy to address the disease's intricate mechanisms. Plant-derived extracellular vesicles (ELVs), including Small ELVs (sLEV) and large ELVs (lELV), are a promising technique in cancer treatment. They have antioxidant capabilities and a large cargo of proteins and microRNAs, which combine to their exceptional capacity to infiltrate cancer cells. This makes them effective as independent therapies or as safe and biocompatible drug delivery vehicles for cancer therapy advancement.
Methods: In this study, we isolated ELVs from Citrus latifolia,and measured their protein content (BCA test), antioxidant capacity (DPPH assay), size (DLS), and morphology (TEM). Then we investigated the effect of ELVs on SW480 cancer cells and normal Vero cells. This included assays for cell viability (MTT), migration (scratch wound healing), and cellular uptake. Finally, we investigated the expression of particular genes (FN1 and VIM).
Results: Transmission electron microscopy imaging demonstrated that ELVs exhibit spherical and cup-shaped morphologies. sELVs measured less than 250 nm, whereas lELVs possessed widths under 600 nm. They exhibited significant antioxidant activity. Moreover, both ELVs subpopulations were efficiently absorbed by normal and malignant cell lines, but cancer cells exhibited a markedly reduced migration rate compared to the Vero cell line. ELVs suppressed the epithelial-mesenchymal transition (EMT) process in cancer cells, as evidenced by a reduction in the expression of the Vimentin and Fibronectin-1 genes.
Conclusion: Plant-derived EVs have been shown to decrease cancer cell proliferation, impede migration and EMT, cause apoptosis, and improve the efficacy of traditional therapies, all while providing benefits in terms of safety and scaling.
Keywords: Citrus Limon, Extracellular Vesicles, Antioxidant, Anti-cancer, EMT

P577, Hepatoprotective effects of kombucha in liver cancer

Samira Kabudani[1], Maryam Sarshar[1], Leyla Azmayesh[1], Faeze Khoshhal[1], Majid Rajabian Noghondar[1]
1. Department of biology, Payam Noor University, Tehran, Iran

Background: Hepatocellular carcinoma (HCC) is the most common primary liver malignancy, frequently arising from chronic liver disease and cirrhosis. The complex pathogenesis involving oxidative stress, chronic inflammation, and dysregulated cellular proliferation presents challenges for therapeutic intervention. Kombucha, a fermented tea beverage, has gained attention for its rich composition of bioactive compounds that may offer hepatoprotective benefits.
Methods: This narrative review synthesizes evidence from preclinical studies (2015–2023) identified through searches in PubMed and ScienceDirect. Keywords included "kombucha," "liver cancer," and "hepatoprotection." Studies were selected based on their relevance to HCC prevention and liver protection, with a focus on mechanistic insights rather than quantitative synthesis.
Results: The reviewed literature suggests kombucha may exert beneficial effects through multiple pathways: reduction of liver enzyme levels (ALT/AST), attenuation of oxidative stress and inflammation, and modulation of detoxification pathways. The SCOBY consortium appears to enhance production of bioactive metabolites, including organic acids and polyphenols, which contribute to these effects. Notably, kombucha's impact on gut microbiota composition may play an additional role in liver health through the gut-liver axis.
Conclusion: While preclinical evidence indicates kombucha's potential hepatoprotective properties, the current literature consists primarily of animal and in vitro studies. Further research is needed to clarify optimal formulations, dosing, and clinical applicability in HCC prevention and management. Human studies are particularly warranted to evaluate safety and efficacy in at-risk populations.
Keywords: Kombucha, Liver cancer, Hepatoprotection, Oxidative stress, Gut-liver axis

P578, A Review of Studies on the Effect of the Sinopharm Vaccine on Platelet Count Elevation

Sheida Kolahi Jahromi[1], Gholamali Jelodar[2], Yousha Mahmoodi[3]
1. Master of Physiology, Shiraz University, Shiraz, Iran
2. Department of physiology, College of Veterinary Medicine, Shiraz University, Shiraz, Iran
3. Doctor of Medicine, Shiraz, Iran

Background: Since the onset of the COVID-19 pandemia, vaccination has been considered the main strategy for controlling the disease. While some reports indicated thrombocytopenia following, there have also been reports of increased platelet counts, particularly with the Sinopharm.
Methods: This review article examines a 2024 study from Egypt involving 500 healthy volunteers aged 18 to 60 who received two doses of the Sinopharm. Platelets were measured before and after the first, and after the second dose. Another study in 2023 in Kerman analyzed the biochemical records of 30 male Army Aviation personnel aged 28 to 47, before and one year after receiving the Sinopharm. A retrospective study in Egypt in 2025 collected data from the medical records of 1,280 vaccinated COVID-19 patients.
Results: According to the 2024 Egyptian study, 37% of participants showed a significant platelet increase, especially among younger individuals. The data from the Kerman revealed an average increase in wbc, platelets, and neutrophils. In another 2025 Egyptian study, a positive correlation was observed between the time since the last vaccine dose and platelet count. Approximately 990 platelets weekly.
Conclusion: Findings indicate that changes in blood factors don't raise concerns about the safety of vaccines. Some studies showed that several months after the second dose of the Sinopharm, platelet may increase. The immune response stimulated by the vaccine may contribute to increased platelet production. Age and the time interval since vaccination may also play a role. These findings may reassure to patients with platelet-related disorders.
Keywords: COVID-19, Sinopharm, Platelets

P579, Evaluation of antimicrobial and anticancer activities of silver–organic coordination compound

Amin Aghajani[1], Gholamreza Dehghan[1], Samaneh Rashtbari[1], Arezu Marefat[1]
1.Laboratory of Biochemistry and Molecular Biology, Department of Biology, Faculty of Natural Sciences, University of Tabriz, Tabriz, Iran

Background: Antibiotics have played a major role in controlling infectious diseases for decades, but their frequent and sometimes careless use has gradually reduced their effectiveness. As resistant bacteria continue to spread, the need for new materials that work in different ways becomes increasingly important. Among the options that have recently attracted attention, nanomaterials, especially metal–organic frameworks (MOFs), have gained considerable attention among researchers.
Methods: In this work, the antibacterial performance of silver–carboxylate (Ag-CA) MOF against two common model bacteria, including E. coli and S. aureus, was evaluated using minimum inhibitory concentration (MIC), disk diffusion, and scanning electron microscopy (SEM) methods.
Results: MIC values of the studied MOF against E. coli and S. aureus were calculated to be 32 µg/mL and 64 µg/mL, respectively. The inhibition zones observed in the disk diffusion assay around disks containing the MOF and H2O2 clearly indicated the absence of bacterial proliferation and antibacterial activity of the synthesized MOF. In addition, morphological evaluation of the bacterial cells using SEM analysis revealed that the bacteria treated with MOF resulted in cell membrane damage and cell content release. Besides its antibacterial action, anticancer activity of the prepared MOF was tested against the breast cancer cell line (MDA-MB-231) and the results showed that Ag-CA MOF also had noticeable anticancer effects, which makes it an interesting candidate for broader biomedical applications.
Conclusion: Overall, these findings suggested that Ag-CA MOF could be explored further as a possible alternative to some current therapeutic agents.
Keywords: Metal–organic frameworks, Anticancer effects, Antibacterial activity, Biomedical applications.

P580, Network-based identification of apigenin-regulated Hub genes in prostate cancer

Aseel Kamil Mohammed Al-mosawi[1], Hamid Chehsomi[2]
1. Department of Biology, Faculty of Science, University of Thi Qar, Thi Qar, Iraq
2. Razavi Khorasan Agricultural and Natural Resources Research and Education Center, AREEO, Mashhad, Iran

Background: Prostate cancer is one of the most prevalent malignancies among men worldwide, and current therapies are often limited by toxicity and resistance. Apigenin, a naturally occurring flavonoid found in various medicinal plants, has shown promising anticancer potential by modulating multiple molecular targets. However, the system-level mechanisms underlying its effects on prostate cancer remain unclear.
Methods: Relevant articles were systematically extracted from PubMed to identify the genes and proteins influenced by apigenin in prostate cancer. The identified targets were analyzed using the GeneMANIA platform to construct a protein–protein interaction (PPI) network. CytoHubba in Cytoscape was used to determine the most significant hub genes. The expression profiles of these hub genes were further validated using the GEPIA database by comparing tumor and normal prostate tissues from TCGA datasets.
Results: Network analysis identified TP53, CDK4, CDKN1A, CCND2, and CDKN1B as central hub genes in the apigenin-regulated network. GEPIA-based expression profiling revealed differential expression patterns, with CCND2 showing a significant decrease ($p < 0.05$) and CDKN1A and CDK4 showing increased expression in prostate tumors compared to normal tissues. These findings highlight the role of apigenin in regulating critical cell cycle–related pathways, potentially contributing to its antiproliferative activity.
Conclusion: This systems pharmacology approach provides integrative insights into the multitargeted mechanisms of apigenin in prostate cancer. The identified hub genes may serve as potential biomarkers or therapeutic targets for future experimental validation.
Keywords: Apigenin, Prostate cancer, Apoptosis, Systems pharmacology

P581, Chronic L-carnitine supplementation and cancer risk in physically inactive populations

Shayan Rezanejad[1], Elham Abdi[2], Zeynab Golara[2]
1. Students Research Committee, Bushehr University of Medical Sciences, Bushehr, Iran
2. Students Research Committee, Zanjan University of Medical Sciences, Zanjan, Iran

Background: L-carnitine is a widely used supplement known for its role in mitochondrial fatty acid transport and energy metabolism. Recent studies have raised concerns that prolonged supplementation in the absence of physical activity may increase cancer risk, potentially mediated by gut microbiota-derived metabolites such as trimethylamine N-oxide (TMAO). This review aims to explore current evidence regarding the potential carcinogenic effects of chronic L-carnitine intake in sedentary individuals.
Methods: A non-systematic search of PubMed (up to 2024) was conducted to identify relevant in vivo, in vitro, and human studies investigating the relationship between L-carnitine, TMAO, and cancer-related outcomes. Studies focusing on preneoplastic changes, acylcarnitine profiles, and inflammatory biomarkers were prioritized.
Results: Several animal studies demonstrated preneoplastic changes in the colon and vascular tissues following chronic L-carnitine administration. In human cohorts, a U-shaped association was observed between serum L-carnitine levels and overall cancer incidence, particularly among hypertensive individuals. Elevated circulating butyrylcarnitine was also linked to increased breast cancer risk [3]. Moreover, TMAO—a microbial metabolite of L-carnitine—has been implicated in systemic inflammation and tumor-promoting mechanisms.
Conclusion: Although L-carnitine plays a beneficial role in mitochondrial energy metabolism, its prolonged use without adequate physical activity may pose carcinogenic risks via inflammatory and microbiota-related pathways. Clinicians and health professionals should consider physical activity status when recommending long-term L-carnitine supplementation.
Keywords: L-carnitine, Cancer risk, Physical inactivity, TMAO, Gut microbiota

P582, Lung cancer and resistance training: A bibliometric analysis

Fatemeh Farid[1]
1. Department of Physical Education and Sports Sciences, Central Tehran Branch, Islamic Azad University, Tehran, Iran

Background: Lung cancer, a leading cause of cancer-related mortality worldwide, causes profound physical deconditioning, sarcopenia, and cachexia, severely impacting quality of life and survival. Emerging evidence shows resistance training improves muscle mass, strength, endurance, function, and treatment tolerance, yet the literature is fragmented, requiring bibliometric analysis to identify trends and gaps.
Methods: Data from Web of Science database (2009 - April 7, 2024) used terms like "lung cancer" (variants) and "resistance training" (synonyms) in titles, abstracts, and keywords related. Non-English, unrelated articles without resistance focus were excluded. Tools including Publish or Perish and VOSviewer analyzed publication/citation trends, countries, institutions, authors, journals, and keywords.
Results: Of 102 articles, publication trended upward (2009-2024) with 3,986 total citations (39.08/article average; h-index 33). Top countries: USA (21), Australia (20), and Canada (18). Leading authors: Maddocks (5). Key journals: BMC Cancer (8). Prominent keywords: quality of life, rehabilitation, fatigue, and cachexia.
Conclusion: This bibliometric review highlights resistance training's promise in lung cancer care, with growing global research but gaps in protocols and long-term survival effects. Future work should standardize interventions and integrate with therapies to boost outcomes.
Keywords: Lung cancer, Resistance training, Rehabilitation, Sarcopenia, Cachexia

P583, Increased survival rate in acute lymphoblastic leukemia treated with methotrexate by DR5 and Caspase-8 in hyperglycemic conditions

Behzad Mesbahzadeh[1], Mahtab Sayadi[2], Kosar Kiafar[3]
1. Cardiovascular Diseases Research Center, Birjand University of Medical Sciences, Birjand, Iran
2. Department of Hematology and Blood Bank, Birjand University of Medical Sciences, Birjand, Iran
3. Cellular and Molecular Research Center, Birjand University of Medical Sciences, Birjand, Iran

Background: Considering the drug resistance of chemotherapy in diabetic patients and the prevalence of acute lymphoblastic leukemia in them, the present study aimed to investigate the effect of hyperglucose condition on the expression of DR5 and Caspase-8 genes in lymphoblastic cells (NALM-6) and its relationship to the cells' response to methotrexate.
Methods: In this in vitro study, NALM-6 cells were cultured in RPMI 1640 medium with 10% fetal bovine serum (FBS) containing antibiotics across four control groups: cells in the control group (C), cells treated with methotrexate (C+M), cells treated in an environment with high glucose concentration (G), and cells treated in an environment with high glucose concentration and methotrexate (G+M). The treated cells were subjected to hyperglucose conditions for 10 days in an environment with high glucose concentration. The survival rate of methotrexate-treated cells was evaluated by the MTT method, and then the relative expression of DR5 and Caspase-8 genes was measured by the RT-qPCR method. The statistical significance was defined as a P-value less than 0.05.
Results: The M group had 50% survival compared to the control group, and the G+M group had 58% survival compared to the control group. The expression of the DR5 gene in the group G+M compared to the G group was not significantly different ($P>0.05$); however, the expression of the caspase-8 gene in the G group was significantly lower compared to the control group ($P<0.01$) and also lower in the G group compared to the treated cells ($P<0.001$).
Conclusion: The findings indicated that the survival rate of NALM-6 cells in high concentrations of glucose after treatment with methotrexate was higher than the same condition in the control group, which indicates the effect of glucose resistance on drug treatment
Keywords: Acute lymphoblastic leukemia, Caspase-8, Diabetes, DR5, Methotrexate

P584, T Cell exhaustion in cancer: Mechanisms of immune dysfunction and opportunities for immunotherapy

Houman Nazeri[1], Mobina Bagherian[1], Mahdi Moassesfar[2], Fereshteh Atabi[3]
1. Department of Laboratory Science, TeMS.C., Islamic Azad University, Tehran, Iran
2. Department of Biosciences, University of Milan, Milan, Italy
3. Department of Biochemistry and Biophysics, TeMS.C., Islamic Azad University, Tehran, Iran

Background: T cell exhaustion (TEX) is a state of immune dysfunction in cancer, marked by impaired effector function and persistent expression of inhibitory receptors, which limits immune responses and hinders immunotherapy. This study aims to review current knowledge on the mechanisms driving T cell exhaustion and explore therapeutic opportunities to reverse this dysfunctional state.
Methods: A systematic review was conducted using PubMed, Web of Science, and Scopus databases from 2015 to 2025. Inclusion criteria were studies addressing molecular, metabolic, and microenvironmental aspects of TEX in cancer. Exclusion criteria encompassed non-English publications, studies lacking sufficient experimental data, and those not focused on T cell exhaustion.
Results: Exhausted T cells express high levels of PD-1, TIM-3, LAG-3, and CTLA-4, with reduced cytokine production and cytotoxicity. TCF-1+ progenitor TEX retain partial function, while terminal TEX, enriched with TOX and NR4A, undergo epigenetic remodeling sustaining dysfunction. TEX exhibit mitochondrial dysfunction, reduced oxidative phosphorylation, and altered lipid and glucose metabolism. The tumor microenvironment, rich in suppressive cytokines and Tregs, reinforces exhaustion by limiting progenitor TEX activity. A higher frequency of TCF-1+ progenitor TEX predicts better PD-1 blockade response, but epigenetic rigidity limits reversal in terminal TEX.
Conclusion: T cell exhaustion results from transcriptional, epigenetic, and metabolic reprogramming driven by intrinsic and microenvironmental factors. Targeting regulators like TOX and overcoming Treg-mediated suppression may restore T cell function. Future studies should explore TEX plasticity and develop combination therapies pairing checkpoint blockade with metabolic or epigenetic modulators for lasting responses.
Keywords: T-Lymphocytes, Cytotoxic, Immune Exhaustion, Chronic Disease, Neoplasms

P585, Peroxidase-like organometallic MO36 as a dual anticancer and antibacterial candidate: A functional and bioactivity assessment

Samaneh Rashtbari[1], Gholamreza Dehghan[1]
1.Laboratory of Biochemistry and Molecular Biology, Department of Biology, Faculty of Natural Sciences, University of Tabriz, 51666−16471 Tabriz, Iran

Background: Increasing multidrug-resistant bacterial strains and limitations of existing anticancer drugs, including high toxicity and reduced efficacy, have made it mandatory to develop novel therapeutic agents. Organometallic compounds with designable structures and enzyme-like behaviors are promising options to address these challenges.
Methods: In this study, the peroxidase-mimic performance of MO36 was assessed using a colorimetric method. Then, the biological effects of this compound on breast cancer cell lines as well as two model bacterial strains (*E. coli* and *S. aureus*) were studied in the form of viability and growth inhibition using different methods.
Results: The findings showed that MO36 has a significant ability to catalyze oxidative reactions and can effectively increase the production of reactive oxygen species. It was also found that this compound induces apoptosis in the breast cancer cell line (MDA-MB-231), and the half-maximal inhibitory concentration value was estimated to be 64.91 µg/mL. In addition, MO36 showed antibacterial activity, and the minimum inhibitory concentration values were obtained to be 32.4 µg/mL for *S. aureus* and 41.2 µg/mL for *E. coli*. The FE-SEM images and live/dead double-staining method results indicated that the cell membrane damage could be considered the main antibacterial mechanism of MO36.
Conclusion: Based on the results of this study, the organometallic compound MO36 with peroxidase-like activity and the ability to disrupt oxidative balance shows good potential for the development of anticancer and antimicrobial agents and can be the basis for preclinical research and future therapeutic applications.
Keywords: Organometallic compounds, Peroxidase-like activity, Anticancer, Antimicrobial

P586, Evaluation of mir888 and mir4530 expression in lung cancer patients and comparison with healthy tissue

Melika Mehdizadeh[1], Faezeh Montazeri-Moghaddam[2], Dariush Farhoud[3]
1. Faculty of Biosocial and Quantum Sciences and Biotechnologies, Islamic Azad University, Qom, Iran
2. Faculty of Life Sciences and Biotechnology, Shahid Beheshti University, Tehran, Iran
3. Faculty of Health, Tehran University, Tehran, Iran

Background: Lung cancer is the leading cause of cancer-related mortality in the world, and its incidence is also increasing in Iran. miRNAs are a group of genetic regulators whose expression changes are associated with many diseases, including cancer. Studies have shown that changes in microRNA expression in tumor tissue compared to non-tumor tissue can be used as a molecular marker for early diagnosis of lung cancer. Accordingly, changes in miRNA-4530 and miRNA-888 expression in tumor and non-tumor lung tissue were evaluated.
Methods: 30 samples of tumor tissue and non-tumor lung tissue were prepared. RNA extraction and cDNA synthesis were performed using the Real-time PCR technique. The expression levels of miRNA-4530 and miRNA-888 were measured in cancer tissue samples and normal tissue. Finally, data analysis was performed using Graph pad software.
Results: The studies showed that the expression of miRNA-4530 in tumor samples of lung tissue was significantly reduced compared to non-tumor tumor margins, and that the expression of miRNA-888 in tumor samples of lung tissue was significantly increased compared to non-tumor tumor margins.
Conclusion: Considering the significant decrease in expression of miRNA-4530 and the significant increase in miRNA-888 in tumor samples of lung tissue compared to non-tumor, it is expected that these two miRNAs have a tumor suppressor role, which suggests that these miRNAs can be used for identification, early diagnosis, and also in the treatment process of lung cancer.
Keywords: Lung cancer, miRNA marker, miRNA-4530, miRNA-888

P587, Alpha-lipoic acid and liver cancer: A systematic review of its emerging therapeutic potential

Pooya Bagheri[1], Zahra Baghani[1]
1. Students Research Committee, Bushehr University of Medical Sciences, Bushehr, Iran

Background: Hepatocellular carcinoma (HCC) is a global killer, with the currently available therapies being plagued by resistance. This calls for the need for new therapies. The naturally occurring antioxidant alpha-lipoic acid (ALA) is a promising candidate; it selectively induces apoptosis in cancer cells with minimal damage to normal cells.
Methods: This review synthesizes findings from in vivo and in vitro research on the impact of ALA on HCC. All these research studies examined the effects of ALA on cell proliferation, apoptosis, migration, invasion, and key signaling pathways. In-depth analyses involved gene/protein expression profiles for ER stress, UPR activation, and AMPK-p53 axis and its activity in EMT and regulation of tumor growth in vivo.
Results: ALA consistently showed intense anti-cancer activity. ALA induced hepatoma cell apoptosis by inducing ROS, p53, ER stress, and UPR. ALA inhibited the migration and invasion of HCC cells powerfully, especially in wild-type TP53, which was AMPK activation-dependent. It reversibly reversed EMT. In vivo, ALA inhibited tumor size, enhanced survival, and recovered hepatic oxidative stress.
Conclusion: ALA is a highly promising, multi-targeting drug for HCC. Its mechanisms include inducing apoptosis via ER stress/UPR and inhibiting migration/invasion via AMPK-p53 pathway and EMT reversal. As a cheap, non-toxic drug, ALA could be a valuable adjuvant to conventional HCC treatments, particularly among wild-type TP53 patients. More clinical trials are needed to validate its effectiveness and optimal dose.
Keywords: Alpha-lipoic acid (ALA), Hepatocellular carcinoma (HCC), Apoptosis

P588, Evaluation of growth and angiogenesis inhibition effect of Ritanserin on COX2 and EGFR in model of HT29 (colon cancer) incubation in nude mice

Fatemeh Hosseinzadeh[1], Ramin Ataee[2, 3], Esamil Fattahy[1]
1. Department of Biology, Ayatollah Amoli branch, Islamic Azad University, Amol Iran
2. Medicinal Plant Research Center, Mazandaran University of Medical Sciences, Sari Iran
3. Pharmaceutical Sciences Research Center, Mazandaran University of Medical Sciences, Sari Iran

Background: One of the most common cancers of the gastrointestinal tract is colorectal cancer, According to some studies, serotonin can play a proliferative role by stimulating the cAMP-dependent MAPK pathway. Also there are some evidences about role of 5HT receptors in some cancers as gastrointestinal, breast and bladder and breast cancers. With this background, we have aimed to investigate the effect of 5HT2A receptor antagonist (ritanserin) on expression of apoptotic and angiogenesis factors as (Cox2 and EGFR) in an *In vivo* model in nude mice.
Methods: Ritanserine (5mg/kg, 0.05 cc, i.p) was injected into mice for 21 days, and intradermal tumor induced by injecting 10,000,000 (HT29) suspension of colorectal cells into the flank muscle of nude mice. Tumor size were examined macroscopically three times a week. After three weeks, the mice were killed and the tumor tissue were removed and angiogenic genes as EGFR and COX2 expressions were evaluated by real-time PCR. Then DATA were analyzed by Friedman test and One-way ANOVA with post TUKEY-TEST by 21 SPSS software (P value <0.05).
Results: In control group, there was no significant difference between tumor volumes in three dates. (P-value=.166) but In Ritanserine (Rit)-Cisplatin (Cis) group, this difference was significant (p-value=0.018). Also the difference between the first and third times was significant. (P-value=0.014.). In Rit group, There is a significant difference between the first and third times, (p-value=0.009).and there is no significant difference between the second and third times (p-value=0.024). In gene expression study, expression of cox2 has been increased in cisplatin group compared with control (51/63). Also Rit has increased COX2 expression (11/31) compared with control (1/00) which this effect for Cis-Rit was more pronounced (70/71). Moreover expression of EGFR as an angiogenic factor was increased by Rit (6.23) in which combination of Rit + Cis had synergistic effect (36.28).
Conclusion: Our study has shown that Rit as 5HT2A receptor antagonist has anti-tumor and anti-angiogenic effect in xenograft model in nude mice which some parts of its effect may be through inhibition of COX2 as an inflammatory factor and EGFR as angiogenic factor.
Keywords: Colon cancer, Ritanserine, 5HT2A receptor, Angiogenesis, Cox2, EGFR

P591, Explainable multimodal deep learning for immunotherapy response prediction in NSCLC: A systematic review

Soheil Heidarpoor[1], Amirreza Asadzadeh Sarshoori[1], Melika Momeni Rahimbeig[1], Fatemeh Rashki Ghaleh No[1], Arian Mozaffari[1]
1. Mashhad University of Medical Sciences, Faculty of Medicine, Mashhad, Iran

Background: Globally, non-small cell lung cancer (NSCLC) is responsible for the majority of cancer deaths worldwide. Immune checkpoint inhibitors have dramatically changed the treatment landscape, but predicting those patients who benefit most remains difficult. Conventional biomarkers such as PD-L1 expression and tumor mutational burden are often inadequate to predict treatment response satisfactorily. Deep learning, in conjunction with data from pathology images, genomic profiling, and clinical background, may enhance personalized prediction. This review systematically investigates those studies which used multimodal deep learning to predict the ICI response in NSCLC, with a focus on interpretability, reproducibility, and readiness for clinical application.
Methods: We searched PubMed, Web of Science, and arXiv for studies that make use of at least two data types for prediction (2018-2025). The extracted information concerns model type (CNN, transformer, multimodal), performance metrics (AUC), interpretability strategies; e.g., attention visualization, feature ranking, reproducibility, and indications of clinical evaluation.
Results: From 67 studies, 21 met the criteria for inclusion. Multimodal models generally performed better than single-modality methods (AUC 0.72–0.88). The DeepAFM model of 2025, which integrated pathology, genomic, and clinical features, achieved an AUC ≈0.77. Only ~38% of the studies presented interpretability techniques, whereas fewer than 30% included reproducibility information. External validation was infrequent, as was clinical testing.
Conclusion: Although there is considerable promise in using multimodal deep learning approaches toward NSCLC immunotherapy prediction, several gaps in interpretability, reproducibility, and clinical validation persist. Future studies should emphasize transparency in reporting, external verification, and clinical workflow integration to move toward reliable precision oncology applications.
Keywords: ArtificialIntelligence, MultimodalDeepLearning, NSCLC, mmunotherapyPrediction

P592, Targeted SPION nanoparticles for guided delivery of WT1 CRISPR-Cas9 plasmid into breast cancer cells

Elham Sameiyan[1], Reza Ghaffari[1], Mersedeh shayan[1], Khalil Abnous[2], Seyed Mohammad Taghdisi[3]
1. School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran
2. D Pharmaceutical Research Center, Pharmaceutical Technology Institute, Mashhad University of Medical Sciences, Mashhad, Iran
3. Targeted Drug Delivery Research Center, Pharmaceutical Technology Institute, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Breast cancer is the most common malignant tumor affecting women worldwide. The Wilms tumor protein (WT1) has recently been identified as a potential therapeutic target for this disease. Due to the complexity of cancer mechanisms, current treatments are limited, and the main approach involves multimodal therapy, including radiotherapy, chemotherapy, and surgery. Therefore, there is a need for alternative treatment strategies. Gene therapy has emerged as one of the most promising and effective methods in this field. In recent years, the genome editing technology known as Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR)-Cas9 has gained widespread interest as a versatile editing tool. In this study, a platform was developed by designing targeted SPIONs with a CRISPR/Cas9 system coated with a red blood cell membrane to create a therapeutic and diagnostic vesicle for breast cancer treatment. The AS1411 aptamer was then attached to the surface of the nanoparticles. The targeted vesicle was able to edit the genome by knocking out WT1 in breast cancer cells.
Methods: Investigations were conducted on this system to evaluate its transfection efficiency, cellular toxicity, and therapeutic performance in the preclinical stage using 4T1 tumor-bearing BALB/c mice.
Results: The results verified the superiority of the targeted complexes (Plasmid/SPION/Membrane/Aptamer: PSMA) compared to other groups in terms of cellular toxicity and transfection efficiency. The cells exposure to PSMA treatment significantly enhanced cytotoxicity. Moreover, PSMA showed higher anti-proliferation activity toward nucleolin-positive 4T1 cancer cells than that of the nucleolin-negative L929 cell line. The active tumor targeting nanoparticles increased the cytotoxicity through down-regulation of WT1 expression as confirmed by Western blot analysis. In the preclinical stage, PSMA showed remarkable tumor growth suppression in 4T1 tumorized mice.
Conclusion: Thus, our study suggested that genome editing for WT1 through the CRISPR/Cas9 system could provide a potentially safe approach for breast cancer therapy and has great potential for clinical translation.
Keywords: Breast Cancer, Aptamer, SPION, CRISPR/Cas9

P593, Affective behavioral deficits after intracerebral hemorrhage: involvement of amygdala glial dysfunction and cell death

Elham Naderi[1], Farzaneh Vafaee Bagheri[1]
1. Neuroscience Research Center, Mashhad University of Medical Sciences. Mashhad, Iran

Background: Intracerebral hemorrhage (ICH) is a cerebrovascular disease with a high mortality and morbidity rate. Studies show that more than two-thirds of people with a stroke undergo some degree of depression and anxiety. However, so far, we have not found any study on the relationship between amygdala and striatum and changes in neurons and glial after stroke, and the present study examines these changes, which can be a vital path in finding effective treatments.
Methods: 48 male Wistar rats are used, into 6 groups. Three sham groups (sham-7, sham-14, and sham-21) in which ICH induction surgery was performed but no blood was injected and three ICH groups (ICH-7, ICH-14, and ICH-21) in which ICH induction surgery was induced by injecting 100 microliters of autologous blood into the left striatum. Anxiety and depression behaviors are measured by forced swimming test (FST), open field (OF) and elevated maze tests (EMT) on the 7th,14th and 21st days after surgery, then the neuronal density was checked by stereology technique and the changes of astrocytes by immunohistochemical method.
Results: The results of this study show that the immobility time in the FST on the 21st day after ICH induction was significantly increased compared to the sham-21 group, also the active time in the ICH-21 group decreased compared to the sham-21 group. The time spent in the closed and in the EMT in the ICH-14 and ICH-21 groups had a significant upward trend compared to the sham-14 and sham-21 groups. Central crossing in the OF test in the ICH-21 group had a significant decrease compared to the sham-21 group. Neuronal density in the amygdala area did not show any significant difference between the groups. GFAP positive cells in the ICH-7 and ICH-21 groups were increased in the ipsilateral amygdala compared to the sham-7 and sham-21 group.

P594, Functionalized nanodelivery systems for targeting tumor vasculature

Maryam Shirzad[1,2], Seyedeh Hoda Alavizadeh[1,2], Mahmoud Reza Jaafari[1,2]
1. Nanotechnology Research Center, Pharmaceutical Technology Institute, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Pharmaceutical Nanotechnology, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Targeting tumor endothelial cells (TECs) with nanoparticles (NPs) offers a promising cancer therapy strategy, as angiogenesis drives tumor progression and metastasis. Unlike normal endothelial cells, TECs show unique molecular markers, metabolic profiles, and structures ideal for selective drug delivery. Ligand-decorated NPs (peptides, aptamers, antibodies) recognize these biomarkers, accumulating therapeutics and imaging agents in the tumor microenvironment (TME). This boosts efficacy, cuts off-target toxicity, and enables real-time tumor visualization per precision oncology.
Methods: Ligands like RGD/NGR peptides, nucleic acid aptamers, and anti-VEGF receptor antibodies functionalize TEC-targeting NPs. These enhance affinity, uptake, and delivery of chemotherapeutics, siRNA, and contrast agents to tumor vasculature. Multifunctional nanocarriers with combined moieties improve specificity against tumor heterogeneity.
Results: These strategies enhance therapeutic efficiency, reduce off-target toxicity, and support real-time visualization of tumors. They enable efficient delivery of agents directly to tumor vasculature, with multifunctional designs improving specificity amid tumor heterogeneity.
Conclusion: Despite promising advances, key challenges persist, including tumor heterogeneity complicating uniform targeting, NP physicochemical properties affecting stability and clearance, potential immune responses triggering clearance or inflammation, and risks of long-term tissue accumulation leading to chronic toxicity. Future research must prioritize personalized targeting strategies tailored to patient-specific tumor profiles, advanced nanocarrier optimization via physicochemical tuning and biocompatibility enhancements, and synergistic integration of nanotechnology with precision medicine tools like genomics and AI-driven modeling. These efforts will overcome barriers, ensuring safer, more efficacious nanotherapeutics for clinical translation.
Keywords: Tumor endothelial cells, Drug delivery, Nanoparticles, Targeting ligand.

P595, Fabrication and characterization of electrospun nanocomposite scaffolds made of chitosan and polyethylene oxide reinforced with hydroxyapatite nanoparticles for Melanoma and skin regeneration

Sara Gorgani[1], Farzad Kermani[1], Khatereh Sadeghzadeh[2], Alireza Ebrahimzadeh Bideskan[2], Simin Nazarnezhad[1,3]

1. Tissue Engineering Research Group (TERG), Department of Anatomy and Cell Biology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Anatomy and Cell Biology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Metabolic Syndrome Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Skin cancer, particularly melanoma, poses significant therapeutic challenges due to its aggressive nature and tendency for recurrence. Traditional treatment approaches often lack precision and may damage healthy tissue.
Methods: In this study, we developed an innovative electrospun nanofibrous (NF) scaffold, composed of chitosan/polyethylene oxide (CS/PEO) and reinforced with manganese (Mn) and lithium (Li)-doped calcium phosphate (CP) nanoparticles, to address both cancer therapy and tissue regeneration key objectives in tissue engineering.
Results: The doped CP nanoparticles displayed favorable physicochemical properties, including nanoscale size (47–75 nm), high surface area (up to 266 m^2/g), and negative surface charge (-30 to -56 mV), all of which contribute to enhanced bioactivity. The scaffolds exhibited electrocatalytic activity, promoting the generation of reactive oxygen species (ROS) and hydrogen peroxide, leading to selective apoptosis in melanoma (A375) cells without harming normal fibroblasts (L929). PC-20% scaffolds—containing 20% Mn-LiCP—achieved the highest apoptotic response (62.55%) and significantly upregulated pro-apoptotic gene expression (P53, Bax) with an elevated Bax/Bcl-2 ratio, confirming a mitochondrial apoptosis mechanism.
Conclusion: This dual-functional platform not only induces targeted cancer cell death but also fosters the regeneration of damaged skin tissue, addressing both oncological and reconstructive needs. This study introduces a promising tissue engineering-based strategy for localized cancer treatment that integrates anti-tumor efficacy with skin regeneration, paving the way for smart biomaterials with therapeutic and regenerative potential.

P596, Electrospun nanofibrous scaffolds reinforced with therapeutic lithium/ manganese-doped calcium phosphates: Advancing skin cancer therapy through apoptosis induction

Sara Gorgani[1], Farzad Kermani[1], Khatereh Sadeghzadeh[2], Alireza Ebrahimzadeh Bideskan[2], Simin Nazarnezhad[1,3]

1. Tissue Engineering Research Group (TERG), Department of Anatomy and Cell Biology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Anatomy and Cell Biology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Metabolic Syndrome Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Skin cancer, particularly melanoma, poses significant therapeutic challenges due to its aggressive nature and tendency for recurrence. Traditional treatment approaches often lack precision and may damage healthy tissue.
Methods: In this study, we developed an innovative electrospun nanofibrous (NF) scaffold, composed of chitosan/polyethylene oxide (CS/PEO) and reinforced with manganese (Mn) and lithium (Li)-doped calcium phosphate (CP) nanoparticles, to address both cancer therapy and tissue regeneration—key objectives in tissue engineering.
Results: The doped CP nanoparticles displayed favorable physicochemical properties, including nanoscale size (47-75 nm), high surface area (up to 266 m^2/g), and negative surface charge (–30 to –56 mV), all of which contribute to enhanced bioactivity. The scaffolds exhibited electrocatalytic activity, promoting the generation of reactive oxygen species (ROS) and hydrogen peroxide, leading to selective apoptosis in melanoma (A375) cells without harming normal fibroblasts (L929). PC-20% scaffolds—containing 20% Mn-LiCP—achieved the highest apoptotic response (62.55%) and significantly upregulated pro-apoptotic gene expression (P53, Bax) with an elevated Bax/Bcl-2 ratio, confirming a mitochondrial apoptosis mechanism.
Conclusion: This dual-functional platform not only induces targeted cancer cell death but also fosters the regeneration of damaged skin tissue, addressing both oncological and reconstructive needs. This study introduces a promising tissue engineering-based strategy for localized cancer treatment that integrates anti-tumor efficacy with skin regeneration, paving the way for smart biomaterials with therapeutic and regenerative potential.

P597, Therapeutic potential of allopurinol in colorectal cancer

Fereshteh Asgharzadeh[1], Majid Khazaei[1]
1. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Colorectal cancer (CRC) remains a leading cause of cancer-related mortality globally. Standard treatments typically combine surgery with chemotherapy, including 5-fluorouracil (5-FU)-based regimens. However, drug resistance and adverse effects limit therapeutic efficacy. Oxidative stress contributes to CRC progression, and reducing uric acid levels can mitigate oxidative damage and chronic inflammation. Allopurinol, a xanthine oxidase inhibitor, prevents uric acid crystal formation that may occur during tumor cell lysis induced by chemotherapy, potentially enhancing drug effectiveness.
Methods: This experimental study investigated the anti-cancer effects of allopurinol alone and combined with 5-FU using SW480 human CRC cells in vitro and a Balb/c mouse model in vivo. SW480 cells were treated with allopurinol, 5-FU, or both, and cell proliferation and migration were assessed. In vivo, tumor-bearing mice received similar treatments over 16 days, followed by tumor measurement and tissue collection for histology, oxidative stress, apoptosis, and inflammatory marker analysis.
Results: Allopurinol inhibited SW480 cell proliferation and migration, and synergistically enhanced 5-FU anti-tumor activity by inducing apoptosis and modulating BAX, BCL2, and P53 expression. Mechanistically, these effects were associated with reduced oxidative stress, increased inflammation, and tumor necrosis.
Conclusion: These findings suggest that allopurinol could be a promising adjuvant to chemotherapy in CRC, improving therapeutic outcomes while potentially mitigating treatment-related complications.
Keywords: Colorectal cancer, Allopurinol, Chemotherapy

P598, Time-Dependent Molecular Changes Following MDMA-Induced Nephrotoxicity

Maryam Mohammadian[1], Mehrdad Roghani[2], Ravieh Golchoobian[3], Farzane Shanehbandpour-Tabari[3]
1. Department of Physiology, School of Medicine, Kermanshah University of Medical Sciences, Kermanshah, Iran
2. Neurophysiology Research Center, Shahed University, Tehran, Iran
3. Department of Physiology, Babol University of Medical Sciences, Babol, Iran

Background: The increasing recreational use of ecstasy (MDMA) poses significant risks to human health, including reports of fatal renal failure due to its adverse renal effects. While MDMA-induced renal toxicity might result from systemic effects, there is also substantial evidence of direct harm to renal tissues by MDMA or its metabolites. The precise mechanisms underlying renal toxicity remain unclear.
Methods: This study explored the impact of a single intraperitoneal dose of MDMA (20 mg/kg) on rat kidneys.
Results: Serum BUN and creatinine levels were evaluated to assess renal function, while TNF-α and TGF-β protein concentrations were measured using ELISA. mRNA levels of Bax, Bcl-xl, and Bcl-2 were quantified using quantitative RT-PCR. Additionally, apoptosis and histopathological changes in renal tissue were examined. Results showed a transient increase in serum BUN and creatinine in MDMA-treated rats. There were decreases in TNF-α and TGF-β levels in the renal tissue. Both pro-apoptotic Bax and antiapoptotic Bcl-xl gene expressions were significantly reduced, whereas Bcl-2 expression and apoptosis did not show significant changes. No structural alterations were observed in the renal tissues.
Conclusion: Overall, this study suggests that the renal adverse effects of MDMA may be mediated through the disruption of cytokine pathways, with notable reductions in TGF-β possibly linked to decreased TNF-α levels.

P599, The role of angiotensin II type 1 receptor in the dorsomedial periaqueductal gray (dmPAG) on cardiovascular responses and related peripheral mechanisms in rats

Ali Mostafavi Nezhad[1]، Mariyeh Davoudinezhad[2]، Mohammad Naser Shafei[3]
1. Department of Neuroscience, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Division of Neurocognitive Sciences, Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: cardiovascular reactions of Defensive and aggressive behaviors are partially mediated by dorsomedial periaqueductal gray (dmPAG), a midbrain structure. Angiotensin II (Ang II) and its AT_1 receptors are found to be located in the dmPAG, but its circulatory action remains unknown. The purpose of present study was to evaluate central and peripheral cardiovascular effect of Ang II in it.
Methods: 72 male rats were separated and placed into experimental groups receiving microinjections of saline, Ang II, Losartan (Los; an AT_1 receptor antagonist) alone, or Los before Ang II into the dmPAG. Hexamethonium (Hex; a ganglionic blocker), Atropine (a muscarinic antagonist), Propranolol (a β-adrenergic blocker), and Terazosin (an α_1-adrenergic blocker) were given by intravenous injection before Ang II microinjection. Systolic blood pressure (SBP), mean arterial pressure (MAP), and heart rate (HR) were continually monitored by a PowerLab system coonected to a femoral artery cannula.
Results: Changes (Δ) in cardiovascular parameters were calculated and statistically analyzed. Microinjection of Ang II into the dmPAG significantly increased ΔSBP, ΔMAP, and ΔHR.The circulatory responses to Ang II were completely prevented by Hexamethonium, while Atropine produced no significant effects. Terazosin attenuated Ang II-induced responses, showing that α_1-adrenergic receptors primarily regulate blood pressure.
Conclusion: In conclusion Ang II in the dmPAG produce excitatory cardiovascular effects through AT_1receptors. Also, the peripheral cardiovascular effect of AngII mediated by α_1 receptor.
Keywords: dorsomedial PAG, Blood pressure, Angiotensin II, Terazosin, Atropine

P600, Targeting inflammation and oxidative stress in COPD: protective effects of camel milk in an experimental model

Sepide Behrouz[1,2], Mahla Mohammadi[1], Hadi Sarir[3], Nema Mohammadia Roshan[4], Mohammad Hossein Boskabady[1,2]

1. Applied Biomedical Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Animal Science, Faculty of Agriculture, University of Birjand, Birjand, Iran
4. Department of Pathology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Chronic obstructive pulmonary disease (COPD) is a major cause of death worldwide and is closely linked to ongoing airway inflammation and oxidative imbalance. Cigarette smoking (CS) is used to induce animal COPD models, which are considered the most common and significant risk factors for COPD. Camel milk (CM) as the white gold of the desert, an important component of the human diet in many regions, has attracted attention due to its nutritional value and its ability to modulate inflammatory and oxidative pathways. This study examined the protective effects of CM in a rat model of COPD induced by CS.

Methods: 35 male Wistar rats were randomly divided into five groups (n = 7): control, COPD exposed to CS, COPD treated with dexamethasone (1mg/kg), and COPD treated with 4 and 8 ml/kg doses of CM given by gavage during the exposure period. At the end of the COPD induction and treatment period (3 months) evaluated pulmonary inflammation, oxidative stress markers, lung tissue structure, and tracheal responsiveness (TR) to methacholine.

Results: CS exposure significantly increased the total and differential WBC counts in BALF, TNF-α and MDA levels in the BALF and lung tissue, lung pathological changes and TR to methacholine. Also decreased antioxidant defenses (all, $p<0.001$). It CM treatment significantly improved all evaluated parameters in a dose-dependent way. High-dose CM led to improvements similar to those observed with dexamethasone.

Conclusion: CM attenuates CS–induced pulmonary inflammation and oxidative stress, supporting its potential as a complementary nutritional strategy for lung protection in COPD.

Keywords: Camel milk- Pulmonary inflammation- Oxidative stress

P601, Unilateral ischemia–reperfusion injury of the lung: focus on inflammatory responses and histopathological changes

Mohammad Abbas Bejeshk[1, 2, 3], Niyan Salehi[4], Vesta Airik[2], Gholamreza Sepehri[5]
1.Department of Physiology and Pharmacology, Afzalipour Medical Faculty, Kerman University of Medical Sciences, Kerman, Iran
2. Noncommunicable Diseases Research Center, Bam University of Medical Sciences, Bam, Iran
3. Clinical Research Development Unit, Pastor Educational Hospital, Bam University of Medical Sciences, Bam, Iran
4. Department of Biology, Faculty of Sciences, Shahid Bahonar University of Kerman, Kerman, Iran
5. Neuroscience Research Center, Kerman University of Medical Sciences, Kerman, Iran

Background: Lung ischemia–reperfusion injury (LIRI) is a sterile inflammatory process that causes severe tissue damage and inflammation in the affected lung. Although this injury typically occurs unilaterally, the extent of contralateral lung involvement through inflammatory pathways remains unclear. This study aimed to investigate inflammatory changes in the contralateral lung following unilateral LIRI.
Methods: Twenty Wistar rats were divided into Sham and Ischemia–Reperfusion groups. In the Ischemia–Reperfusion group, the left lung hilum was clamped for 60 minutes using a microclamp, followed by 120 minutes of reperfusion. The right lung was not subjected to ischemia. Inflammatory indices, including pro-inflammatory and anti-inflammatory cytokines as well as histopathological inflammatory changes, were evaluated in the contralateral lung.
Results: Reperfusion after 120 minutes of left lung ischemia caused a significant increase in pro-inflammatory cytokines in the contralateral lung. Anti-inflammatory cytokines were decreased, indicating a dominance of pro-inflammatory responses. Histopathological analysis revealed infiltration of inflammatory cells and edema formation in the right lung, confirming the spread of inflammation to the contralateral side.
Conclusion: The results demonstrate that unilateral lung ischemia–reperfusion injury induces a robust inflammatory response in the contralateral lung. This indicates that inflammatory pathways are systemically activated, affecting even lung tissue that was not directly subjected to injury.
Keywords: Unilateral Ischemia–Reperfusion Injury, Lung Inflammation, Lung ischemia–reperfusion injury

P602, Folic acid supplementation suppressed lung inflammatory response and oxidative damage in a systemic inflammation model

Seyed Mohammad Sajjadi[1], Mohammad Hossein Eshaghi Ghalibaf[2,3], Sepideh Behrouz[2,3] Mohammad Hossein Boskabady[2,3]

1. Student Research Committee, Mashhad University of Medical Sciences, Mashhad, Iran
2. Applied Biomedical Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Physiology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Systemic inflammation, often triggered by toxins such as lipopolysaccharide (LPS), can cause acute lung injury (ALI) via oxidative stress and pro-inflammatory responses. Folic acid (FA), a water-soluble B vitamin, has shown antioxidant and anti-inflammatory properties. This study aimed to evaluate the protective effects of FA against LPS-induced lung injury in a rat model.
Methods: Male Wistar rats (8–10 weeks old) were randomly divided into five groups (n=50). Group 1 received saline; Group 2 was injected with LPS (1 mg/kg, i.p.) in week 3. Groups 3–5 were pretreated with FA (5, 10, or 20 mg/kg/day, orally) for 3 weeks and challenged with LPS in the third week. Bronchoalveolar lavage fluid (BALF) was collected, centrifuged, and stored at −70 °C. Oxidative stress markers (MDA, SOD, CAT, LPO, thiol groups) were measured through colorimetric methods. Total and differential white blood cell (WBC) counts in BALF were assessed using a hemocytometer and Wright-Giemsa staining. Data were analyzed by one-way ANOVA with Tukey's post hoc test ($p<0.05$).
Results: LPS increased total and differential WBC counts and MDA levels while decreasing SOD, CAT, and thiol levels in BALF ($P<0.001$). FA supplementation, especially at 20 mg/kg, reduced leukocyte infiltration and oxidative stress markers ($P<0.05$–0.001). High-dose FA was more effective than lower doses in restoring antioxidant enzyme activity and suppressing neutrophils, eosinophils, and monocytes ($P<0.05$–0.001).
Conclusion: FA, particularly at higher doses, reduce lung inflammation and oxidative damage in LPS-challenged rats. FA decreased leukocyte infiltration and promoted antioxidant defense in BALF suggesting therapeutic potential for inflammatory lung conditions.
Keywords: Folic acid, Bronchoalveolar lavage, Oxidative stress, Inflammation, Lipopolysaccharide

P603, Lipid metabolism dysregulation in SARS-CoV-2 infection: Mechanistic insights and clinical correlations

Pardis Sajadinia[1], Zohreh Arab [2], Saeed Niazmand [2], Seyed Abdolrahim Rezaee [3]
1. Faculty of Medicine, Islamic Azad University, Mashhad Branch, Iran
2. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Immunology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: SARS-CoV-2 infection significantly disrupts host lipid metabolism, contributing to disease progression and severity. Lipids play critical roles in viral entry, replication, and immune modulation. Triglycerides, phospholipids, and cholesterol are among the major lipid classes impacted by the virus. SARS-CoV-2 not only alters lipid signaling and transport pathways but also interferes with lipid droplet formation, sterol regulatory element-binding proteins (SREBPs), and peroxisome proliferator-activated receptors (PPARs). These alterations drive a metabolic shift towards lipogenesis, contributing to lipotoxicity and immune dysregulation.

Clinical data show inconsistent associations between COVID-19 severity and lipid parameters such as HDL, LDL, and total cholesterol (TC). While some studies report decreased HDL-C and LDL-C in severe cases, others suggest that hyperlipidemia may either exacerbate or mitigate disease progression. Moreover, the virus utilizes cholesterol-rich lipid rafts and modifies fatty acid synthesis through upregulation of acetyl-CoA carboxylase (ACC) and fatty acid synthase (FASN), facilitating viral replication. Obesity and ectopic lipid deposition further impair immune responses and respiratory function, increasing the risk of acute respiratory distress syndrome (ARDS) and poor vaccine responsiveness.

Oxidized lipoproteins (ox-LDL, ox-HDL) and their interaction with LOX-1 and inflammasome pathways promote endothelial dysfunction and inflammation. Therapeutic targeting of lipid metabolic enzymes, such as FASN and SREBPs, may offer novel antiviral strategies. Given the dual role of lipid metabolism in host defense and viral propagation, further research is essential to unravel the epigenetic and metabolic interplay underlying COVID-19 pathogenesis.

Keywords: SARS-CoV-2, Lipid Metabolism, Hyperlipidemia, Cholesterol, Fatty Acid Synthesis

P604, Pulmonary sequelae of long COVID: Inflammation, vascular dysfunction, and gas exchange abnormalities

Niayesh Shayanfar [1], Zohreh Arab [2], Mohammad Hossein Boskabady [2, 3]
1. Faculty of Medicine, Islamic Azad University, Mashhad Branch, Iran
2. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Applied biomedical Research Center, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Long COVID is a condition marked by persistent symptoms weeks to months after acute SARS-CoV-2 infection. Among its diverse manifestations, pulmonary complications are among the most prevalent and debilitating. Patients frequently present with chronic cough, dyspnea, and reduced exercise tolerance, symptoms often linked to underlying inflammation, vascular abnormalities, and impaired gas exchange. This review aims to summarize the current evidence on the pulmonary consequences, with a particular focus on persistent inflammation, microvascular dysfunction, and chronic hypoxemia, and to discuss their mechanistic underpinnings and clinical relevance.

Prolonged elevation of pro-inflammatory cytokines such as IL-6, TNF-α, and IL-1β contributes to ongoing alveolar inflammation and fibrotic remodeling, leading to reduced lung compliance and restrictive ventilatory patterns. In parallel, pulmonary endothelial dysfunction and microvascular damage result in increased vascular permeability and the formation of microthrombi, disrupting perfusion and perpetuating local tissue injury. Furthermore, damage to the alveolar-capillary interface impairs oxygen diffusion, causing persistent hypoxemia. While some hypoxic responses may be adaptive, chronic oxygen deprivation can have systemic effects, particularly on cardiovascular and neurological functions. Oxidative stress, exacerbated by mitochondrial dysfunction in alveolar and endothelial cells, further amplifies local damage and impairs cellular repair mechanisms. Dysregulation of the renin-angiotensin-aldosterone system following ACE2 downregulation contributes to both pulmonary inflammation and vascular instability. Endothelial injury and microvascular dysfunction not only compromise gas exchange but also promote a pro-thrombotic environment. These overlapping mechanisms sustain lung pathology beyond the acute infection, offering potential targets for therapeutic intervention and guiding the long-term management of affected patients.

Keywords: Long COVID; pulmonary Complications; Chronic Inflammation; Microvascular Dysfunction; Hypoxemia

P605, Inhaled 17β-estradiol attenuates lung inflammation following traumatic brain injury in rats

Niyan Salehi[1,2,3], Mohammad Abbas Bejeshk[1,2,3], Vesta Ayrik[1,2], Mohammad Khaksari[4], Sedigheh Amiresmaili[2]

1.Department of Physiology and Pharmacology, Afzalipour Medical Faculty, Kerman University of Medical Sciences, Kerman, Iran
2. Noncommunicable Diseases Research Center, Bam University of Medical Sciences, Bam, Iran
3. Clinical Research Development Unit, Pastor Educational Hospital, Bam University of Medical Sciences, Bam, Iran
4. Endocrinology and Metabolism Research Centers, Institute of Neuropharmacology, Kerman University Sciences, Kerman, Iran

Background: Systemic inflammation and activation of immune pathways following traumatic brain injury (TBI) play a critical role in the development of acute lung injury (ALI/ARDS). This study aimed to investigate the effect of inhaled 17β-estradiol (E2) on inflammatory and anti-inflammatory markers in the lung tissue of TBI-induced rats.
Methods: Twenty-eight male Wistar rats were assigned to four groups: Sham, TBI, TBI+Vehicle, and TBI+E2 (n=7 each). TBI was induced using the Marmarou weight-drop model. Inhalation treatment with E2 began 30 minutes after injury and continued for 30 minutes. Lung tissues were collected for biochemical and histopathological evaluation. Levels of interleukin-6 (IL-6) and interferon-gamma (IFN-γ) were measured using ELISA, and histopathological changes were assessed under light microscopy.
Results: TBI induction significantly increased IL-6 and decreased IFN-γ levels in lung tissue compared to the Sham group. Inhaled E2 markedly reduced IL-6 and significantly elevated IFN-γ levels compared with the TBI+Vehicle group. Histopathological assessment revealed pronounced neutrophil infiltration into the alveolar spaces in the TBI group, whereas E2 inhalation therapy attenuated neutrophilic infiltration relative to the TBI+Vehicle group.
Conclusion: Inhaled 17β-estradiol effectively modulates inflammatory responses by decreasing pro-inflammatory mediators and enhancing anti-inflammatory markers in lung tissue following TBI. These findings suggest that E2 inhalation may serve as a promising therapeutic approach for reducing TBI-induced pulmonary inflammation.
Keywords: 17β-Estradiol, Lung Inflammation, Traumatic Brain Injury, Interlokin6, Interferon gamma

P606, The Effect of nicotine on lung compliance and airway pressure in rats subjected to pulmonary fibrosis

Parisa Askarizadeh[1], Farzaneh Ketabchi[1], Amirreza Dehghanian[2]
1. Department of Physiology, Medicine School, University of Medical Sciences, Shiraz, Iran
2. Department of Pathology, Medicine School, University of Medical Sciences, Shiraz, Iran

Background: This study aimed to investigate the effect of nicotine on static lung compliance, vital capacity, and airway pressures in bleomycin-induced pulmonary fibrosis.
Methods: Male Sprague-Dawley rats were divided into 5 groups: Sham (SHAM), bleomycin (BLM, 2 mg/kg, intratracheal), bleomycin with right cervical vagotomy (BLVR), bleomycin with nicotine (BLNC), and bleomycin with right cervical vagotomy and nicotine (0.5 mg/kg, i.p., 2 weeks) (BLVN). On day 14, inspiratory and expiratory airway pressures were recorded for one hour using a PowerLab system, static lung compliance and elastance were measured, and histopathology of the lung were assessed.
Results: Maximum inspiratory pressure (MIP) and maximum expiratory pressure (MEP) were higher in the BLM, BLVR, and BLNC groups compared to the SHAM group, but there was no significant difference in these parameters between the BLVN and SHAM groups. The BLVR group had the lowest lung compliance, whereas the BLVN group showed higher lung compliance compared to the BLM and BLVR groups. The BLM, BLVR, BLNC, and even BLVN groups had higher lung elastance compared to the SHAM group, but the elastance in the BLVN group was lower than in the BLVR and BLNC groups. Vital capacity was higher in the BLVN group than the BLM and BLVR groups. Data of histology indicated lower score in the BLVN compared to the BLM and BLVR groups.
Conclusion: This study demonstrates that nicotine has beneficial role at repairing lung tissue damage, decreasing airway resistance, and increasing lung compliance, in particular, during initial stage of pulmonary fibrosis.
Keywords: Bleomycin, Static Lung Compliance, Vagus Nerve

P607, Effects of nicotine and vagotomy on inflammatory reactions in rats with pulmonary fibrosis

Parisa Askarizadeh[1], Farzaneh Ketabchi[1], Amir Reza Dehghanian[2]
1. Department of Physiology, Medicine School, University of Medical Sciences, Shiraz, Iran
2. Department of Pathology, Medicine School, University of Medical Sciences, Shiraz, Iran

Background: The role of the parasympathetic nervous system, particularly in the chronic inflammatory diseases remains controversial. This study aimed to investigate the role of the vagus nerve and nicotine in pulmonary fibrosis induced by bleomycin in rat.
Methods: Male Sprague-Dawley rats were divided into 5 groups: Sham (SHAM), bleomycin (BLM, 2 mg/kg, intratracheal), bleomycin with right cervical vagotomy (BLVR), bleomycin with nicotine (BLNC), and bleomycin with right cervical vagotomy and nicotine (0.5 mg/kg, i.p., 2 weeks) (BLVN). Plasma malondialdehyde (MDA) and blood cell count (WBC) were measured at 3 and 24 h, 7 and 14 days after the injection of physiological saline or bleomycin.
Results: WBC count increased at 3 and 24 h of the experiments in all groups. After 24h, neutrophil-to-lymphocyte ratio (NLR) in the BLM and BLVR groups were higher than in the SHAM group, in the BLVR group was higher than in the BLM group, and in the BLNC and BLVN groups were lower than in the BLM and BLVR groups. On day 14, the WBC count decreased in all groups, except for the BLVR group, the NLR was higher in the BLVR group than the SHAM and BLM groups, and was lower in the BLNC and BLVN groups than in the BLVR group. The lung MDA in the BLNC and BLVN groups was lower than in the BLM and BLVR groups.
Conclusion: This study highlights the anti-inflammatory effects of the vagus nerve and nicotine in both acute and chronic phases of experimental pulmonary fibrosis.
Keywords: Bleomycin, NLR, Vagus Nerve, WBC

P608, The modulatory effects of exercise on lipopolysaccharide-induced lung inflammation and injury, a systemic review

Zahra Gholamnezhad[1, 2], Fatemeh Khoshkhouy[2], Maryam Mahmoudabady[1, 2]
1. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Applied Biomedical Research Center, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran

Background: The beneficial effects of different exercise modality on cardiovascular system has been shown. Repeated exposure to Lipopolysaccharide (LPS) might trigger apoptotic and inflammatory process in cardiac tissue. The current study, aimed to evaluate the protective effects of moderate exercise against LPS-induced cardiac tissue apoptosis, oxidative stress and inflammation.
Methods: Three groups (N=8) of male Wistar rats were treated as control (saline); LPS (1 mg/kg); and LPS+moderate exercise (LPS+EX: 30 min/day, at velocity of 15 m/min) for 9 weeks. Saline or LPS was intraperitoneally injected for 5 days during the last week of experiment. Finally, the heart of rats was harvested for gene expression and biochemical assessments.
Results: In comparison to the control group, LPS elevated the levels of C-reactive protein (CRP), tumor necrosis factor α (TNF-α), interleukin (IL)- 1β, nitric oxide (NO) metabolites and malondialdehyde (MDA) in heart tissue, however reduced the superoxide dismutase (SOD) and catalase (CAT) activity, and thiol contents in cardiac tissue. In LPS+EX animals, a decrease in thiol contents and an increase in the NO metabolites was recorded in comparison to the control animals. Moderate exercise reduced the levels of NO metabolites, IL-1β, TNF-α, and CRP while elevated the CAT activity in the LPS+EX animals compared to the LPS treated rats. The BAX mRNA level in the LPS rats and the BCL2/BAX ratio in both LPS+EX and LPS animals were increased compared to the control rats.
Conclusion: This study showed the probable anti-inflammatory, anti-apoptotic and anti-oxidative stress effects of moderate exercise in LPS-induced cardiac injury.
Keywords: Lipopolysaccharide, Moderate exercise, Cardiac tissue, Inflammation, Oxidative damage

P609, Activation of α7nAChR attenuates surfactant-depletion-induced acute lung injury by peroxisome proliferator activated receptor-γ (PPAR-γ) signaling pathways

Hossein Fatemikia[1], Farzaneh Ketabchi[1]
1.Department of Physiology, the Medical School, Shiraz University of Medical Sciences, Shiraz, Iran

Background: Our previous research demonstrated that nicotine, an α7 nicotinic acetylcholine receptor (α7nAChR) agonist, reduces inflammation and acute lung injury in a saline lavage-induced rat model. This study investigates the mechanistic role of PPAR-γ activation in mediating nicotine's protective effects.
Methods: Male rats were divided into five groups: Sham, saline lavage (LAV), LAV treated with nicotine (LAV+NIC), LAV treated with a PPAR-γ antagonist BAG (LAV+BAG), and LAV treated with BAG and NIC (LAV+BAG+NIC). After tracheostomy and femoral catheterization, lung injury was induced by 10 repeated saline lavages (30 mL saline at 37°C). The recovery phase lasted for 3 hours, and drugs were injected 1 hour after the last lavage.
Results: Nicotine improved mean blood pressure, heart rate, airway pressures, and lung compliance through α7nAChR even in the presence of BAG in the LAV+BAG+NIC group. However, plasma and lung tissue malondialdehyde (MDA) in the LAV+BAG+NIC group were higher than in the Sham and LAV+NIC groups. Furthermore, in the LAV+BAG+NIC group, the neutrophil percentage in bronchoalveolar lavage (BAL) was higher, and the macrophage percentage was lower than those in the Sham and LAV+NIC groups.
Conclusion: In this study, we did not detect any interaction between PPAR-γ receptors and α7nAChR receptors in hemodynamic and lung compliance data. Nevertheless, PPAR-γ receptors could interfere with the effects of the α7nAChR agonist nicotine on inflammation, oxidative stress, as well as gas exchange. These results indicate that nicotine's protective effects are partially mediated through PPAR-γ receptors.
Keywords: α7nAChR, Lung, Nicotine, Saline Lavage, PPAR-γ

P610, Role of spleen in nicotine's anti-inflammatory effects on surfactant depletion-induced acute lung injury in rats

Hossein Fatemikia[1], Farzaneh Ketabchi[1], Amirreza Dehghanian[2]
1.Department of Physiology, The he Medical School, Shiraz University of Medical Sciences, Shiraz, Iran
2.Department of Pathology, The Medical School, Shiraz University of Medical Sciences, Shiraz, Iran

Background: The cholinergic anti-inflammatory pathway mediated by Alpha 7 nicotinic acetylcholine receptor) α7nAChR), plays a role in regulating inflammation. The study aimed to determine whether or not α7nAChRs induce anti-inflammatory effects directly in the lung or through the spleen pathway in a sterile model of lung injury by saline lavage.
Methods: Male rats were divided into six groups; Sham, splenectomy (SPX), saline lavage (LAV), LAV treated with an α7nAChR agonist nicotine (LAV+NIC), splenectomy and LAV (LAV+SPX) and LAV+SPX treated with nicotine (LAV+SPX+NIC). Animals were subjected to volume-controlled ventilation and lung injury by 10 repeated saline lavages (30 ml saline at 37 °C). Splenectomy was achieved one week before the induction of lung injury. The recovery phase lasted for 3 hours, and nicotine was injected 1 hour after the last lavage.
Results: Mean blood pressure, heart rate, and PaO_2, $PaO2/FiO_2$ ratio, and pH decreased, whereas airway pressures and $PaCO_2$ increased 1 hour after the saline lavage. Nicotine fully reversed these alterations, an effect blocked by splenectomy. Total bronchoalveolar lavage (BAL) cell count and lung histological scores were attenuated by nicotine in the LAV+NIC group, whereas splenectomy could not stop the decreasing effect of nicotine on the total BAL cell in the LAV+SPX+NIC group.
Conclusion: We indicated that α7nAChR and spleen play roles in cholinergic anti-inflammatory pathways in saline lavage-induced lung injury. However, our results are in favor of at least some direct effects of α7nAChR in the lung.
Keywords: α7nAChR, Lung, Nicotine, Saline lavage, Spleen

P611, Translational insights into ischemic heart disease in diabetes

Behnaz Mokhtari[1]
1. Department of Physiology, Faculty of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran

Abstract: Ischemic heart disease (IHD) remains the leading cause of morbidity and mortality among individuals with diabetes, driven by a complex interplay of metabolic dysregulation, endothelial dysfunction, chronic inflammation, and impaired cardioprotective signaling. Despite major advances in basic cardiovascular research, translation of experimental cardioprotective strategies into effective clinical therapies has been limited, particularly in diabetic populations in whom conventional treatments often fail to provide sufficient benefit. Recent translational studies have revealed critical molecular and cellular mechanisms that distinguish the diabetic heart—including mitochondrial dysfunction, altered substrate utilization, impaired ischemic conditioning responses, and exacerbated oxidative and inflammatory stress. At the same time, novel therapeutic directions such as targeting mitochondrial quality control, modulating pyroptosis and ferroptosis, enhancing autophagy and mitophagy, improving microvascular function, and utilizing multi-target combination therapies show promising potential for bridging the gap between bench and bedside. This review synthesizes current insights into the pathophysiology of diabetic ischemic heart disease, highlights barriers to successful clinical translation, and discusses emerging strategies that may ultimately improve outcomes and restore cardioprotection in diabetic patients.

Keywords: Cardioprotection, Diabetes Mellitus, Ischemic Heart Disease, Metabolic Dysfunction, Mitochondrial Quality Control, Oxidative Stress.

P612, Antioxidant, anti-inflammatory, apoptosis-regulatory, and immune system modulation effects of *Rosa damascene*

Nikta Soltani[1], Mahboobeh Ghasemzadeh Rahbardar[2], Mohammad Hossein Boskabady[3]
1. Applied Biomedical Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Emergency Medicine, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: *Rosa damascena* (*R. damascena* or *Damask rose*) has long been valued for its aromatic and medicinal properties. Recent scientific interest has focused on its pharmacological potential, particularly in the fields of oxidative stress modulation, inflammation control, apoptosis regulation, immune system modulation, and cancer therapy. This narrative review aims to consolidate existing evidence on the therapeutic effects of *R. damascena*, highlighting its mechanisms of action and potential clinical applications.
Methods: In vitro and in vivo studies were gathered through searches of Google Scholar, Scopus, PubMed, and Web of Science, without time restrictions until the end of August 2025. Relevant literature was screened on antioxidant, anti-inflammatory, anti-apoptotic, immunomodulatory, and anticancer activities of *R. damascena*.
Results: *R. damascena* exerts its biological effects through a rich array of phytochemicals that interact with key cellular pathways. Mechanistically, its antioxidant activity is mediated by direct free radical scavenging and activation of the Nrf2 signaling axis, leading to enhanced expression of endogenous defense enzymes. Anti-inflammatory effects are achieved through suppression of NF-κB and COX-2, while apoptosis regulation involves mitochondrial stabilization and modulation of MAPK and PI3K/Akt pathways. It demonstrates selective cytotoxicity toward malignant cells, suggesting its potential as an adjuvant in cancer therapy.
Conclusion: *R. damascena* emerges as a pharmacologically resourceful botanical with promising therapeutic applications. However, methodological inconsistencies and limited clinical data underscore the need for standardized formulations, rigorous human trials, and deeper mechanistic studies to fully translate its potential into modern medical practice.
Keywords: *Rosa damascena*, Antioxidants, Apoptosis, Inflammation, Immunologic

P613, Cedrol ameliorates lipopolysaccharide-induced lung injury in rats

Somaye aalami[1], Sepide Behrouz[2], Mahmoud Hosseini[3], Ramin Rezaee[2], Mohammad Hossein Boskabady[2,1], Fereshteh Asgharzadeh[3], Zahra Gholamnezhad[1,2]

1. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Applied Biomedical Research Center, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
3. Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Cedrol is sesquiterpene alcohol with anti-inflammatory and antioxidant properties; this study evaluated cedrol's protective effects against lipopolysaccharide (LPS)-induced lung damage.

Methods: Forty male rats were randomized into the following groups: control (saline); LPS (1 mg/kg); and LPS+ cedrol 7.5, 15, and 30 mg/kg. Cedrol was administered for 2 weeks (once daily, oral) while LPS was injected during the second week of the experiment (once daily, intraperitoneal). Finally bronchoalveolar lavage fluid (BALF) and lung tissue samples were obtained. White blood cells (WBC) counts, tumor necrosis factor-α (TNF-α), interleukin (IL)-1β, oxidative stress markers, and nitric oxide (NO) levels were determined, and lung histopathological changes were evaluated.

Results: In the lung, LPS-induced histopathological injury, and elevation of total WBC, lymphocyte, neutrophil, monocyte, eosinophil count and MDA level, and reduction of thiol content, CAT and SOD activity in the bronchoalveolar lavage fluid, as well as elevation of TNF-α, IL-1β, NO and oxidative stress in the lung tissue compared to the control groups ($P<0.05$-$P<0.001$). Cedrol administration dose dependently reduced LPS-induced fibrotic and pathological changes in the lung. except tissue IL-1β level ($P<0.05$-$P<0.01$).

Conclusion: Cedrol dose dependently ameliorated lung inflammatory and oxidative stress imbalance triggered by repeated LPS injection. These protective effects was done by reducing inflammatory cells, lung inflammatory cytokine levels, oxidative damage and pathological changes.

Keywords: Lung Injury, Lipopolysaccharide, Cedrol, inflammation, oxidative stress.

P614, Lipopolysaccharides-induced lung injury, systemic inflammation and oxidative stress improved by losartan in rats

Vajiheh Rouki[1,2], Arghavan Memarzia[1,2,3], Saeideh Saadat[4], Hossein Salmani[2], Nema Mohammadian Roshan[5], Mahmoud Hosseini[1,2], Mohadeseh Solati [1], Mohammad Hossein Boskabady[1,2]

1. Applied Biomedical Research Center, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Student Research Committee, Mashhad University of Medical Sciences, Mashhad, Iran
4. Department of Physiology, School of Medicine, Zahedan University of Medical Sciences, Zahedan, Iran
5. Department of Pathology, School of

Background: Losartan, an angiotensin type 1 receptor antagonist, has shown anti-inflammatory effects on lung disorders. In this research, the effect of losartan treatment on systemic inflammation and lung injury induced by chronic lipopolysaccharides (LPS) administration, was assessed.
Methods: In this study, the effect of losartan on systemic inflammation and lung injury induced by chronic administration of lipopolysaccharides (LPS) was examined. Male rats were grouped as follows: Control, LPS (0.25 mg/kg) and LPS treated with losartan (3 mg/kg).
Results: In blood samples from the LPS group, white blood cells (WBC, total and differential) and malondialdehyde (MDA) level were increased but thiol, catalase (CAT) and superoxide dismutase (SOD) levels were decreased compared to the control group. In the bronchoalveolar lavage fluid (BALF) of the LPS group, WBC count, interleukin (IL)-4 levels and pathological damages in the lung were significantly increased but BALF levels of transforming growth factor beta 1 (TGF-β1) and interferon gamma (IFN)-γ were decreased ($p<0.05$ to $p<0.001$). All measured variables were markedly improved in the LPS+losartan group ($p<0.05$ to $p<0.001$).
Conclusion: These results indicated preventive effects of losartan on systemic inflammation and lung injury induced by chronic administration of LPS.
Keywords: Lipopolysaccharides, oxidative stress, inflammation, lung injury

P615, Transmission of high arterial pressure into renal microvessels during venous-clamping augments ischaemia/reperfusion induced acute kidney injury in anaesthetized rats

Mohammad Javad Maftoon-Azad[1], Somayeh Nazari[2], Somayeh Keshavarz[1], Seyed Mohammad Owji[3], Seyed Mostafa Shid Moosavi[1,4]

1.Department of Physiology, The Medical School, Shiraz University of Medical Sciences, Shiraz, Iran
2. Medicinal and Natural Products Chemistry Research Center, Shiraz University of Medical Sciences, Shiraz, Iran
3.Department of Pathology, The Medical School, Shiraz University of Medical Sciences, Shiraz, Iran
4. Shiraz Nephro-Urology Research Center, Shiraz University of Medical Sciences, Shiraz, Iran

Background: In two recent studies, we observed that a 30-min renal vein clamping caused formation of interstitial haemorrhagic congestion in ischaemic and ischaemic/reperfused kidney along with the development of severer acute kidney injury (AKI) than renal artery or pedicle clamping. It was suggested that the transmission of high arterial pressure into renal microvessels during vein occlusion probably causes the occurrence of interstitial haemorrhagic congestion that augments AKI. The present investigation aimed to evaluate this suggestion by reducing renal perfusion pressure (RPP) during renal venous occlusion.

Methods: Anaesthetized male Sprague‑Dawley rats were divided into three groups (n = 8), which underwent a 2-h reperfusion period following 30-min bilateral renal venous clamping along with reduced RPP (VIR-rRPP group) or without reduced RPP (VIR group) and an equivalent period after sham-operation (Sham group).

Results: The VIR-rRPP group compared with VIR group had lower levels of kidney malondialdehyde and tissue damages as epithelial injuries of proximal tubule and thick ascending limb, vascular congestion, intratubular cast and oedema, along with the less reductions in renal blood flow, creatinine clearance, Na^+-reabsorption, K^+ and urea excretion, urine osmolality and free-water reabsorption. Importantly, the formation of intensive interstitial haemorrhagic congestion in the VIR group was not observed in the VIR-rRPP group.

Conclusion: These results indicate that the transmission of high arterial pressure into renal microvessels during venous occlusion leads to rupturing of their walls and the formation of interstitial haemorrhagic congestion, which has an augmenting impact on ischaemia/reperfusion-induced renal structural damages and haemodynamic, excretory and urine-concentrating dysfunctions.

Keywords: acute kidney injury, renal haemorrhagic congestion, renal ischaemia, renal perfusion pressure, renal venous clamping

P616, A systematic review of dietary patterns and their association with telomere length

Melika Nosrati[1], Maryam Abedi[2], Mohammad Kazem Imani Khoshkhoo[3]
1. School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3.Student Research Committee, School of Public Health, Kerman University of Medical Sciences, Kerman, Iran

Background: *Telomeres* are DNA repeats at the ends of chromosomes that shorten with age due to replication constraints and oxidative stress. *Telomere length (TL)*, a biomarker for biological aging, is regulated by environmental factors like diet. Dietary regimens rich in antioxidants and anti-inflammatory components, such as the *Mediterranean diet*, are associated with higher TL. Emerging evidence suggests that diet during early life may also influence TL and subsequent disease risk.
Methods: This systematic review was conducted according to PRISMA guidelines. Human studies from 2000 to 2024 were searched in PubMed, Scopus, Web of Science, and Cochrane Library. Observational or interventional studies assessing associations between diet patterns or nutrients and TL were included. Independently, two reviewers assessed study quality using the *Newcastle-Ottawa Scale (NOS)* and *Cochrane Risk of Bias Tool* and conducted screening.
Results: Among 1,234 articles that were screened, 25 contained (15 observational studies, 10 RCTs). TL was chiefly measured by qPCR in leukocytes. *Mediterranean* and *plant food diets* were correlated with higher TL, while *Western diets* were correlated with lower TL. Higher intakes of antioxidants, *omega-3* fatty acids, and micronutrients such as *folate*, B12, and vitamin D promoted TL preservation. Additional studies also showed greater *telomerase* activity with healthy diets.
Conclusion: Good dietary habits, especially the *Mediterranean diet*, appear to hinder telomere shortening and biological aging. While the results are encouraging, more long-term, standardized clinical trials are needed to prove causal associations and mechanisms.
Keywords: Dietary Patterns, Telomere Length, Mediterranean diet

P617, Microbial metabolites of the gut and their cardiovascular implications: From SCFAs to TMAO

Roya Gholizadeh[1], Zohreh Arab[2], Fereshteh Asgharzadeh[3]
1. Faculty of Medicine, Islamic Azad University, Mashhad Branch, Iran
2. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Neurogenic Inflammation Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: The human gut is home to trillions of tiny organisms that form what is called the gut microbiome. These microbes do more than digest food, they also produce substances called metabolites that can affect many parts of the body, including the heart and blood vessels. Researchers have discovered that several gut-derived compounds play important roles in cardiovascular health. For example, short-chain fatty acids (SCFAs) are produced when gut bacteria ferment dietary fiber; they help regulate blood pressure, reduce inflammation, and support blood vessel function. TMAO is formed when microbes digest nutrients like choline and carnitine (found in red meat and eggs) and is linked to a higher risk of atherosclerosis and blood clots. Bile acid metabolites result from the conversion of bile acids by gut microbes and help manage cholesterol levels, fat metabolism, and blood sugar. Indole-derived compounds, made from the amino acid tryptophan, can promote inflammation and harm blood vessels. Lipopolysaccharides (LPS), from certain harmful bacteria, can trigger widespread inflammation and raise blood pressure. Hydrogen sulfide (H_2S) is a gas made by specific bacteria that relaxes blood vessels and reduces oxidative stress. Polyamines like spermidine and putrescine are produced by gut microbes and may protect blood vessels and slow aging.
Methods: This review systematically examined the current literature on gut microbiome-derived metabolites and their associations with cardiovascular outcomes. Relevant studies were identified through comprehensive database searches, and key findings regarding the biosynthesis, circulating levels, and mechanistic pathways of each major metabolite class (SCFAs, TMAO, bile acid metabolites, indole-derived compounds, LPS, H_2S, and polyamines) were summarized in relation to cardiovascular health and disease.
Results: The accumulating evidence indicates that gut microbial metabolites exert diverse and significant effects on cardiovascular physiology. SCFAs demonstrate protective roles through blood pressure regulation and anti-inflammatory actions, while TMAO is consistently associated with pro-atherogenic effects and adverse cardiovascular events. Bile acid metabolites contribute to lipid and glucose homeostasis, whereas indole-derived compounds and LPS are linked to pro-inflammatory and vasculo-toxic responses. H_2S and polyamines show promising vasoprotective and anti-aging properties. The net cardiovascular impact appears to depend on the balance between beneficial and deleterious metabolite profiles, which is influenced by diet, host genetics, and microbial composition.
Conclusion: In summary, the gut microbiome has a powerful effect on heart health. As scientists learn more about these microbial compounds, they are finding new ways to prevent and treat heart disease starting from the gut. Modulating the gut microbiome and its metabolic output through dietary interventions, probiotics, or pharmacological agents may represent a novel therapeutic strategy for cardiovascular disease.
Keywords: Microbiota, Short-Chain Fatty Acids, Trimethylamine-N-Oxide, Cardiovascular Diseases, Inflammation

P618, Albumin: a comprehensive review and practical guideline for clinical use

Farshad Abedi[1], Batool Zarei[1], Sepideh Elyasi[1]
1. Department of Clinical Pharmacy, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Albumin is no longer recommended for treating hypoalbuminemia or as a nutritional supplement. Its current main indications are resuscitation in shock states, particularly distributive shock such as septic shock, and management of liver disease. This review summarizes updated evidence-based guidance on definite and potential indications for albumin administration, including dosing and duration.
Methods: We searched PubMed, Google Scholar, Scopus, and Web of Science up to November 2023. The GRADE system was used to rate the quality of evidence and strength of recommendations for each indication.
Results: A total of 165 studies were included. Albumin has moderate- to high-quality evidence and strong recommendations for plasmapheresis and for cirrhosis-related complications, including hepatorenal syndrome, spontaneous bacterial peritonitis, and large-volume paracentesis. When used as a second-line or adjunctive fluid to crystalloids in shock states (hypovolemic, septic), severe burns, critical illness (e.g. ARDS, ECMO), intradialytic hypotension, ovarian hyperstimulation syndrome, and severe refractory edema with hypoalbuminemia, evidence is generally low to moderate with weak recommendations. Modest-volume paracentesis and severe hyponatremia in cirrhosis likewise have low to moderate evidence and weak recommendations.
Conclusion: The most robust indication for albumin is the management of cirrhosis-related complications. Its use for fluid resuscitation or refractory edema should be reserved for selected patients who do not respond to standard therapies. Adoption of evidence-based hospital protocols may help curb inappropriate albumin use.
Keywords: Albumin, Fluid replacement, Colloids, Edema, Cirrhosis

P619, Redox-active bacteria reduced rats' ethylene glycol-induced kidney calculi

Mahdi Zamani Boldaji[1], Mostafa Khedri[2], Tahereh Mazouji[3]
1. Department of Medical Immunology Sciences, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Clinical Laboratory Sciences, School of Allied Medical Sciences, Kashan University of Medical Sciences, Kashan, Iran
3. Department of Pathology, School of Medicine, Kashan University of Medical Sciences, Kashan, Iran

Background: One important pathological finding in urolithiasis is impaired antioxidant capacity in the kidneys and urinary tract of animals with kidney stones. Bacteria with extracellular electron transfer (EET) ability can alter the oxidation and reduction potential of the surrounding environment. This article considered the preventive impact of an EET bacterium, Shewanella oneidensis MR-1 (Sh. O) on renal calcium oxalate crystal deposition and stone formation in a rat model.
Methods: Male Wistar rats were randomly categorized into 3 experimental groups (n=7–9). One group was left untreated, and the other received ethylene glycol (1% v/v) in drinking water for 4 weeks. Along with drinking, the treatment group Two to three times a week, 0.5 ml of the Sh. O suspension (3.5×1010 CFU/ml) was gavaged orally with ethylene glycol. After 29 days, the kidneys were removed and tested for histopathological findings and the number of CaOx deposits in the microscopic fields.
Results: When compared to the ethylene glycol group, the rats treated with Sh. O had considerably fewer CaOx deposits in their kidneys. Quantitative analysis of crystal deposits showed a significant increase in the ethyleneglycol treated group compared to the ethylene glycol+Sh.O treated group (P-value<0.05). The bacterium Sh. O indicated a positive impact in preventing and removing CaOx deposition in the rat kidneys. Sh. O significantly increased kidney weight without significantly changing the total body weight.
Conclusion: These results suggest a new approach for the prevention and treatment of kidney stone disease using electrogenic bacteria.
Keywords: Nephrolithiasis, Extra Cellular Electron Transfer, Shewanella Oneidensis

P620, Toll-like receptor 4 activity was improved by adipose-derived mesenchymal stem cells in acute renal failure

Leila Hafazeh[1], Behjat Seifi[1], Fariba Akhundzadeh[2], Fereshteh Azedi[3, 4], Hamid Noori[5], Mahdi Hajiaqaei[1], Mina Ranjbaran[1], Mehri Kadkhodaei[1]

1. Department of Physiology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
2 Department of Physiology, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran
3 Cellular and Molecular Research Center, Iran University of Medical Sciences, Tehran, Iran
4 Department of Neuroscience, Faculty of Advanced Technologies in Medicine, Iran University of Medical Sciences, Tehran, Iran
5 Department of Medical Nanotechnology, School of Medicine, Iran University of Medical Sciences, Tehran, Iran

Background: Adipose-derived mesenchymal stem cells (AD-MSCs), have become a viable treatment option for renal failure. This study examined the effectiveness of AD-MSCs in mitigating the pathological changes associated with acute kidney injury (AKI) by modulating toll-like receptor 4 (TLR4) activity.
Methods: This research involved 18 male rats divided into three groups (n=6): Sham, ischemia-reperfusion injury (IRI), and IRI + AD-MSC. IRI was induced by occluding both the renal artery and vein for 45 minutes, while the Sham group animals underwent the same surgical procedure without vascular clamping. In the IRI + AD-MSC group, immediately after clamp removal, the animals received an intraperitoneal injection of 1×10^6 AD-MSCs. Forty-eight hours after reperfusion, serum and kidney tissue samples were collected.
Results: In the group treated with AD-MSCs, there were notable reductions in serum urea nitrogen (BUN) and creatinine levels ($P<0.001$), along with improvements in renal tissue damage and oxidative stress ($P<0.01$). Additionally, the IRI+AD-MSC group showed significant decreases in TLR4 protein levels ($P<0.01$) and inflammatory factors, TNF-α and IL-6 ($P<0.001$) in comparison with the IRI group.
Conclusion: This study revealed that AD-MSCs treatment alleviated AKI effectively, by modulating TLR4 activity.
Keywords: Ischemia, Reperfusion, Mesenchymal Stem Cells, Toll-Like Receptor 4

P621, The evaluation of oxidative stress parameters in the prevention and treatment of arrhythmia caused by calcium chloride in rat heart tissue by citral

Alireza Eskandari[1], Javad Sajedianfard[2], Mohammad Foad Norbakhsh[3], Mahmood Kohan[4]
1. Student of Master of Science, Department of Basic Sciences, School of Veterinary Medicine, Shiraz University, Iran
2. Professor, Department of Basic Sciences, School of Veterinary Medicine, Shiraz University, Iran
3. Assistant Professor, Department of Basic Sciences, School of Veterinary Medicine, Shiraz University, Iran
4. Master of Science, Department of Basic Sciences, School of Veterinary Medicine, Shiraz University, Iran

Background: Citral has been shown to have antiarrhythmic effects based on a previous study. In addition, citral is known to be an antioxidant. Calcium chloride induces arrhythmia by causing oxidative stress, while citral likely acts as an antioxidant to modify the oxidative stress profile.
Methods: 36 male Sprague-Dawley rats were randomly divided into six groups: Control group one, injected with dimethyl sulfoxide (drug carrier) immediately after arrhythmia induction; Control group two, receiving dimethyl sulfoxide orally daily for two weeks before arrhythmia induction; treatment group one, receiving citral (Sigma) at a dose of 100 mg/kg intravenously immediately after arrhythmia induction; treatment group two, receiving 50 mg/kg citral (Sigma) orally daily for two weeks before arrhythmia induction; the standard treatment group, receiving amiodarone at a dose of 5 mg/kg intravenously immediately after arrhythmia induction; and the second standard treatment group, receiving quinidine at a dose of 10 mg/kg intravenously immediately after arrhythmia induction. At the end of two weeks, the rats were anesthetized with an IP injection of sodium thiopental. After induction of anesthesia, they were euthanized with carbon dioxide, and heart tissue is collected for measurement of total antioxidant capacity (TAC), malondialdehyde (MDA), and total oxidant status (TOS).
Results: Acute and chronic injections of citral reduced oxidative stress induced by calcium chloride compared to the control, quinidine, and amiodarone groups. Levels of malondialdehyde and TOS decreased, while TAC increased.
Conclusion: Citral may effectively control calcium chloride-induced arrhythmia, a model similar to ischemic arrhythmia, by reducing oxidative stress.
Keywords: citral- arrhythmia-calcium chloride-antioxidant-rat

P622, The effect of combining *Sorafenib* and *Lactobacillus* rhamnosus GG on liver fibrosis following bile duct ligation in rats

Tina rahjoo[1]
1. Department of Physiology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran

Background: Chronic liver diseases represent a significant worldwide health challenge, contributing to around 2 million deaths annually. Liver damage leads to the development of liver fibrosis, characterized by an excess accumulation of collagen in the extracellular matrix. This progressive damage can induce cirrhosis and hepatic cancer through a three-stage process of "inflammation-fibrosis-carcinoma".
Methods: We investigated the potential benefits of combining sorafenib with the probiotic Lactobacillus rhamnosus GG (LGG) on liver fibrosis in bile duct ligated (BDL) rats. Forty male Wistar rats were randomly divided into five groups (n=8), including sham, BDL, BDL+probiotic (LGG, 1×109 CFU/ml/day), BDL+sorafenib (20 mg/kg), and BDL+probiotic+sorafenib. Following a one-week post-BDL recovery period, animals received sorafenib and probiotic LGG for three consecutive weeks. Subsequently, various parameters were assessed.
Results: The combination of sorafenib with LGG resulted in less liver fibrosis compared to sorafenib alone. This combination therapy also reduced inflammation and reactive oxygen species in the liver. Additionally, this combination decreased Toll-like receptor 4/ Nuclear factor kappa-β expression in the liver.
Conclusion: This study suggests that combining a low dose of sorafenib with probiotic LGG may offer significant benefits for treating liver fibrosis.

P623, changes in the expression of cardiac Farnesoid receptor (FXR) and Nrf2 following bile duct ligation in rats

Gholamreza Bayat[1], Hossein Karim[2,3], Samira Shirzadfar[1], Azadeh Khalili[1]
1. Department of Physiology-Pharmacology-Medical Physics, School of Medicine, Alborz University of Medical Sciences, Karaj, Iran
2. Cardiovascular Research Center, Alborz University of Medical Sciences, Karaj, Iran
3. Department of Cardiology, School of Medicine, Alborz University of Medical Sciences, Karaj, Iran

Background: Heart Failure secondary to liver cirrhosis, often referred to as cirrhotic cardiomyopathy, is a recognized but frequently underdiagnosed complication. The condition is believed to result from systemic inflammation, oxidative stress imbalance and pathologic alteration in bile acid signaling. This study was designed to explore the alteration of cardiac Farnesoid receptors (FXR) and transcription factor of NRF2 in the pathogenesis of cirrhotic-induced cardiac abnormality, throughout 4 weeks in rat.
Methods: 35 8-week-old male laboratory Wistar rats weighing 250 ± 30 grams were randomly divided into 5 groups (n=7), which include Sham-operated group and 4 groups of bile duct obstruction surgery for 1 to 4 weeks.
Results: According to the molecular analysis, compared to the control group, the expression of cardiac FXR was significantly increased in the first and 3th weeks of the experiment. The same result also was seen for the expression of cardiac Nrf2 gene.
Conclusion: Decreased expression of Nrf_2 and FXR in heart tissue might be among the possible mechanistic pathways in the pathophysiology of cirrhotic cardiomyopathy.
Keywords: Cardiomyopathy, FXR, Nrf2

P624, The effects of *Nigella sativa* extract on cardiovascular oxidative stress criteria of hypothyroid juvenile rats

Maryam Paseban [1,2], Mahmoud Hosseini [3], Saeed Niazmand[3], Farimah Beheshti[4]
1. Department of Basic medical sciences, Faculty of Medicine. Bojnourd Branch, Islsmic Azad University, Bojnourd, Iran
2. Innovative Medical Research Center and Department of Physiology, Faculty of Medicine, Mashhad Medical Science Islamic Azad University, Mashhad, Iran
3. Department of Physiology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
4. Department of Physiology, School of Paramedical Sciences, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran

Objective: Oxidative stress is considered a major factor linking hypothyroidism to cardiovascular diseases. *Nigella sativa* (NS) has been suggested to possess antioxidant properties. This study aimed to evaluate the effects of hydro-alcoholic NS extract on cardiovascular oxidative stress markers in juvenile hypothyroid rats.
Methods: Pregnant rats were housed individually, and after delivery, dams and offspring were randomly assigned to five groups: (1) control, receiving normal drinking water; (2) propylthiouracil (PTU) in drinking water during lactation; (3–5) PTU plus NS extract at doses of 100, 200, or 400 mg/kg. After lactation, offspring continued the same treatment for eight weeks. Seven male offspring per group were randomly selected for blood sampling, and heart and aorta tissues were collected for biochemical analysis.
Results: Results showed that PTU administration significantly reduced serum thyroxine compared to controls. PTU also increased malondialdehyde (MDA) levels in heart and aorta tissues, while decreasing total thiol content, catalase (CAT), and superoxide dismutase (SOD) activities. Treatment with NS extract at all doses significantly improved serum thyroxine levels, reduced MDA in tissues and serum, and enhanced thiol concentration, CAT, and SOD activity relative to PTU-treated animals.
Conclusion: In conclusion, hydro-alcoholic extract of *Nigella sativa* demonstrated protective and restorative effects on cardiovascular and systemic oxidative stress parameters in juvenile hypothyroid rats. These findings highlight the potential of NS as a complementary therapeutic agent to mitigate oxidative damage associated with thyroid dysfunction and to improve cardiovascular outcomes in hypothyroidism.
Keywords: Nigella sativa, Propylthiouracil, Hypothyroidism, Cardiovascular, Oxidative stress

P625, Rosmarinic acid modulates calcineurin/nfat pathway in isoproterenol-induced hypertrophy in H9c2 cells

Somayeh Javidanpour[1], Mahin Dianat[1], Fereshteh nejaddehbashi[2], Narges atefipour[3]
1. Department of Physiology, Faculty of Medicine, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
2. Cellular and Molecular Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
3. Medicinal Plant Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran

Background: Catecholamine-induced myocardial hypertrophy is a major complication following myocardial infarction, often progressing to heart failure. While our previous in vivo study demonstrated the anti-hypertrophic effect of rosmarinic acid (RA), the specific mechanisms underlying its action in the calcineurin/NFAT signaling pathway remain unclear. This study was designed to investigate the protective effects of RA against isoproterenol (ISO)-induced hypertrophy and injury in H9c2 cardiomyocytes, with a specific focus on elucidating its role in modulating the calcineurin/NFAT pathway.
Methods: Hypertrophy was induced in H9c2 cardiomyocytes using ISO. We assessed cell surface area using Image J software, total protein content, and markers of cellular injury (CK-MB and LDH). Furthermore, we examined the enzymatic activity of calcineurin and the protein expression of $NFAT_1$
Results: ISO treatment successfully induced cellular injury and hypertrophy. This was associated with activation of the calcineurin/NFAT pathway. RA treatment significantly attenuated the ISO-induced hypertrophic response and cellular injury. This protective effect was accompanied by a reduction activity of calcineurin/NFAT. Furthermore, RA significantly reduced the leakage of LDH and CK, indicating potent cytoprotective properties
Conclusion: Our findings indicate that RA protects against β-adrenergic stress-induced injury and hypertrophy in H9c2 cardiomyocytes. This effect is possible due to inhibition of the pro-hypertrophic calcineurin/NFAT signaling cascade. Therefore, RA represents a promising therapeutic candidate for preventing pathological cardiac remodeling post-myocardial infarction.
Keywords: Rosmarinic Acid, Myocardial Hypertrophy, Calcineurin, NFATC Transcription Factors, H9c2 Cells

P626, Pre-reperfusion donepezil enhances vagal-mediated electrophysiological protection in myocardial ischemia induced by LAD ligation in rats

Zakieh Sadat Sheikhalishahi[1, 2], Somaye Keshavarz[1, 3], Ali Rafati[1, 3]
1. Department of physiology, Medicine faculty, Shiraz University of medical sciences, Shiraz, Iran
2. Research Center, Shiraz University of Medical Sciences, Shiraz, Iran
3. Histomorphometry and Stereology Research Center, Shiraz University of Medical Sciences, Shiraz, Iran

Background: Myocardial ischemia (MI), a leading cause of morbidity and mortality, results in structural and functional cardiac damage. A key consequence is disruption of electrophysiological homeostasis, including conduction delays, abnormal depolarization–repolarization, QT prolongation, autonomic imbalance, and heightened risk of malignant arrhythmias. Pharmacological strategies that stabilize cardiac electrical activity are of significant interest. Donepezil, an acetylcholinesterase inhibitor, enhances parasympathetic activity, which can improve conduction stability, repolarization indices, and reduce susceptibility to arrhythmias following ischemia–reperfusion injury.
Methods: 30 Adult male rats were randomly assigned to five groups: Sham, MI, MI+DOP (donepezil), MI+MET (metoprolol), and MI+Pre-DOP (donepezil administered before reperfusion, followed by 30-day treatment). Standard ECG recordings were obtained on day 30, and RR, PR, QT, QRS, P duration, T amplitude, and ST deviation were analyzed.
Results: Myocardial infarction induced marked electrophysiological disturbances, including prolonged QT and QRS intervals, increased PR and P durations, decreased RR interval, and reduced T-wave amplitude. Both donepezil and metoprolol attenuated these changes, whereas Pre-DOP showed the strongest protective effects, significantly improving repolarization indices and conduction parameters.
Conclusion: Pre-reperfusion administration of donepezil provides superior stabilization of cardiac electrical activity compared with post-reperfusion donepezil or metoprolol, highlighting the critical importance of treatment timing in mitigating ischemia–reperfusion–induced electrical remodeling.
Keywords: Myocardial Ischemia (MI), Vague Stimulation, Ischemia-reperfusion, Arrhythmia, Donepezil

P627, The impact of vitamin d supplementation on carotid arterial wall thickness and mean arterial pressure in healthy adult male dogs

Nooshin Derakhshandeh[1], Aboutorab Tabatabaei Naeini[2], Dorsa Dehdashti[3], Haniyeh Yabandeh jahromi[3], Parnia Khorrami[3]

1. Department of Clinical Sciences, Faculty of Veterinary Medicine, Shiraz University, Shiraz, Iran
2. Department of surgery and Radiology, Faculty of Veterinary Medicine, Shiraz University, Shiraz, Iran
3. Faculty of Veterinary Medicine, Shiraz University, Shiraz, Iran

Background: Vitamin D is known to influence blood pressure regulation and arterial stiffness in humans. However, its effects on similar cardiovascular parameters in dogs, such as blood pressure and carotid artery wall thickness, remain largely unexplored. This study was designed to assess the impact of vitamin D supplementation on serum 25-hydroxyvitamin D levels, blood pressure, and carotid artery wall structure in healthy adult dogs.

Methods: Eight healthy adult male mixed-breed dogs received oral vitamin D supplementation at a dose of 50 IU/kg body weight daily for 42 days. Blood samples were collected on days 0, 14, 28, and 42 to measure serum 25-hydroxyvitamin D levels and mean arterial pressure. Carotid artery wall thickness and tunica intima thickness were evaluated using ultrasonography at the same time points.

Results: Vitamin D supplementation led to a significant increase in serum 25-hydroxyvitamin D concentrations, with statistically significant differences observed between baseline and all subsequent time points, as well as between days 14 and 28. A progressive decrease in diastolic blood pressure was also noted, with the change reaching statistical significance between days 14 and 42. No significant alterations were observed in systolic blood pressure, mean arterial pressure, or carotid tunica intima-media thickness during the supplementation period.

Conclusion: Daily oral administration of vitamin D at 50 IU/kg for 42 days increased serum vitamin D levels and significantly reduced diastolic blood pressure in healthy dogs. These findings highlight a potential cardiovascular benefit, though further studies are needed to confirm the results and evaluate their clinical implications.

Keywords: Vitamin D3, Dog, 25-hydroxy vitamin D3, Blood pressure, Carotid artery

P628, Heart rate variability and blood pressure responses to low-intensity endurance training with blood flow restriction in individuals with mild hypertension

Maryam Doustaki Zaboli [1], Siyavash Joukar [2], Masoumeh Nouzari [3], Soheil Aminizadeh[4], Masoomeh Kahnooji [5], Khadijeh Mohammadi [6]

1. Physiology Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
2.Cardiovascular Research Center, Institute of Basic and Clinical Physiology Sciences, Kerman University of Medical Sciences and Department of Physiology and Pharmacology, Afzalipour Medical Faculty, Kerman University of Medical Sciences, Kerman, Iran
3. Neuroscience Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
4.Department of Physiology and Pharmacology, Afzalipour Medical Faculty, and Physiology Research Center, Institute of Neuropharmacology Kerman University of Medical Sciences, Kerman, Iran
5.Cardiovascular Research Center, Institute of Basic and Clinical Physiology Sciences, and Department of Cardiology, Afzalipour Medical Faculty, Kerman University of Medical Sciences, Kerman, Iran
6. Physiology Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran

Background: Due to limited existing data, this study investigated the effects of low-intensity endurance exercise (Ex) alone and combined with blood flow restriction (BFR) on blood pressure (BP), electrocardiogram (ECG), heart rate variability (HRV), and heart rate recovery time (HRRT) in individuals with stage 1 hypertension.
Methods: Forty-three individuals with stage 1 hypertension (aged 50–65) were randomly assigned to three groups: Ex + BFR, Ex alone, and a control group (Con). The training program was conducted three times per week for 10 weeks during spring 2024 at Kerman University of Medical Sciences. HRV parameters, BP, ECG, and HRRT were assessed before and 24 hours after the intervention.
Results: Compared to controls, both exercise training (Ex) and exercise training plus blood flow restriction (Ex+BFR) groups significantly improved heart rate variability (HRV) parameters: root mean square of successive differences (RMSSD), standard deviation of successive differences (SDSD), SD1/SD2 ratio ($P<0.01$/$P<0.001$), and low frequency to high frequency ratio (LF/HF ratio; $P=0.013$/$P=0.007$), with Ex+BFR showing greater effects. Both interventions reduced heart rate recovery time (HRRT; $P=0.0001$) and mean arterial pressure (MAP; $P=0.0001$). Electrocardiographic changes included prolonged PR interval ($P=0.038$/$P=0.035$) and shortened QRS duration versus control group
Conclusion: This study suggests that combining low-intensity endurance exercise with BFR enhances cardiovascular parameters (BP, ECG, HRRT) more effectively than exercise alone in individuals with mild hypertension, with additional benefits for HRV modulation.
Keywords: Blood pressure, Blood flow restriction, Endurance training, Heart rate variability, Heart rate recovery.

P629, Study of aerobic exercise on malonyl-CoA-decarboxylase gene expression in heart tissue of adult male Wistar rats

Saleh Rahimi[1], Khadijeh Nasiri[1], Abolfazl Akbari[1], Mohammadjavad Roohandeh[1]
1. Exercise Physiology Department, Sports Sciences Faculty, University of Mazandaran, Babolsar, Mazandaran Province, Iran

Background: Aerobic exercise can improve cardiovascular health by modulating metabolism. It may be mediated by Malonyl-CoA Decarboxylase (MCD) as the main regulator of fatty acid β-oxidation. Therefore, the present study aimed to investigate the effect of aerobic exercise on MCD gene expression in the cardiac tissue of adult male Wistar rats.
Methods: In this study, 10 adult male Wistar rats with an average body weight of 250 ± 25 grams were selected. One week was allocated at the beginning of the survey for acclimatization to the laboratory environment and to control for stress factors that could affect body weight. After weighing and random weight matching, the animals were randomly divided into two groups: Control and Aerobic Exercise. The training group underwent an aerobic exercise protocol of 28 meters per minute, three days per week for eight weeks. Statistical analysis was performed using an unpaired t-test with SPSS software version 21. A significance level of $P<0.05$ was set.
Results: According to the statistical analysis, MCD gene expression in the exercise group was not significantly different compared to the control group ($t = 0.56$).
Conclusion: It appears that exercise at this intensity could not change MCD gene expression. Further investigations with different intensities of exercise are suggested.
Keywords: Malonyl-CoA-Decarboxylase ،Heart Tissue ،Aerobic Exercise

P630, Investigating the effect of ginger on fatty acid metabolism in cardiac tissue during aerobic exercise

Saleh Rahimi[1], Khadijeh Nasiri[1], Abolfazl Akbari[1], Mohammadjavad Roohandeh[1]
1. Exercise Physiology Department, Sports Sciences Faculty, University of Mazandaran, Babolsar, Mazandaran Province, Iran

Background: Carnitine Palmitoyltransferase 1 (CPT1) plays a key role in the transport of fatty acids into mitochondria for beta-oxidation during aerobic exercise. Regulation of CPT1 gene expression contributes to improved lipid metabolism, which is a major energy source in cardiac tissue and is crucial for heart function. It is expected that ginger supplementation may influence CPT1 gene expression during aerobic training. Therefore, this study was aim to examine the effect of aerobic exercise combined with ginger supplementation on CPT1 gene expression in cardiac tissue.
Methods: 28 adult male Wistar rats (250 ± 25 g) were randomly divided into four groups: Control, Ginger (50 mg/kg), moderate-intensity aerobic exercise (MIAE), and MIAE + Ginger. CPT1 gene expression was measured in heart tissue.
Results: CPT1 gene expression significantly increased in the ginger group compared to the other groups ($P<0.05$). There is no significant difference among all groups($P>0.05$).
Conclusion: The results of this study suggested that ginger supplementation alone can increase CPT1 gene expression in cardiac tissue; however, this effect was not observed in the aerobic exercise + ginger group.
Keywords: CPT1, Aerobic Exercise, Ginger, Cardiac Tissue

P631, Exercise mitigates cardiac fibrosis and apoptosis via circS1c8a1/miR-133a in D-galactose-induced aging rats

Saeideh Jafarinejad-Farsangi[1], Farzaneh Rostamzadeh[3], Maryam Hadadi[1], Maryamossadat Mirtajaddini Goki[3]

1.Cardiovascular Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
2. Physiology Research Center, Institute of Basic and Clinical Physiology Sciences, Kerman University of Medical Sciences, Kerman, Iran
3. Endocrinology and Metabolism Research Center, Institute of Basic and Clinical Physiology Sciences, Kerman University of Medical Sciences, Kerman, Iran

Background: Circular RNAs and microRNAs are recognized as key regulators of aging mechanisms and cardiovascular pathologies. The present study aimed to evaluate the effects of moderate-intensity endurance training (MIET) and high-intensity interval training (HIIT) on cardiac fibrosis and apoptosis by modulating the circSlc8a1/miR-133a signaling axis in a D-galactose-induced aging model in male rats.
Methods: Forty-two male Wistar rats were randomly assigned to six groups: control (CTL), MIET, HIIT, D-galactose (D-gal), D-gal+MIET, and D-gal+HIIT. Exercise training was conducted for 8 weeks, five days per week, concurrently with daily D-galactose injections. Cardiac function parameters, including left ventricular systolic pressure (LVSP), left ventricular end-diastolic pressure (LVEDP), contractility index (CI), and tau, were recorded using a physiograph Power Lab system. Expression levels of circSlc8a1 and miR-133a were quantified by real-time PCR, and protein levels of fibrosis (TGF-β, CTGF) and apoptosis markers (Bim, BMF) were measured via western blot analysis.
Results: Both MIET and HIIT effectively reversed D-galactose-induced upregulation of circSlc8a1 and downregulation of miR-133a. Exercise training also significantly decreased the elevated levels of fibrosis and apoptosis markers, including TGF-β, CTGF, Bim, and BMF. Cardiac function parameters, such as cardiac index (CI) and tau, showed significant improvement in the exercise groups compared to the D-gal group.
Conclusion: The results demonstrate that exercise training mitigates D-galactose-induced cardiac aging by modulating the circSlc8a1/miR-133a axis, thereby reducing myocardial fibrosis and apoptosis. These findings suggest that exercise represents a promising non-pharmacological intervention to preserve cardiac function during the aging process.
Keywords: circS1c8a1, miR-133a, aging, Bim, BMF, TGF-β, CTGF

P632, Frequency of heparin induced thrombocytopenia [HIT]: A developing country experience

Amin Ghiyabi[1], Reza Basiri[2], Sajjad Ataei-Azimi[3], Mohammad Moeini-Nodeh[3], Hossein Rahimi[3], Tahereh Mohaddes[3], Alireza Bari[3], Sahar Ravanshad[2], Davood Attaran[1], Ramin Khameneh-Bagheri[4], Ali Ghasemi[5], Abolghasem Allahyari[5], Zahra Rezaieyazdi[6], Hassan Mansouritorghabeh[7,8], Houshang Rafatpanah[7]

1. Department of Internal Medicine, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Pulmonology, Ghaem Hospital, Mashhad University of Medical Sciences, Mashhad, Iran
3.Hematology and Oncology Section, Department of Internal Medicine, Ghaem Hospital, Mashhad University of Medical Sciences, Mashhad, Iran
4. Cardiovascular Research Center, Ghaem Hospital, Mashhad University of Medical Sciences, Mashhad, Iran
5. Hematology Department, Imam Raza Hospital, Mashhad University of Medical Sciences, Mashhad, Iran
6. Rheumatic Diseases Research Center, Ghaem Hospital, Mashhad University of Medical Sciences, Mashhad, Iran
7. Central Diagnostic Laboratories, Ghaem Hospital, Mashhad University of Medical Sciences, Mashhad, Iran
8. Noor Medical Laboratory, Jame Jam Building, 3rd Aref, Aref Street, Ahmad Abad Street, Mashhad, Iran

Background: Heparin induced thrombocytopenia (HIT) a recognized adverse effect of heparin therapy, characterized by thrombosis. This study aimed to determine the frequency of IgG antibodies against the heparin/platelet factor 4 complex in patients receiving heparin**.**

Methods: A retrospective cross-sectional study was conducted from April 2022 to March 2023. Patients receiving heparin for at least two days and suspected of HIT were referred for laboratory testing due to the unavailability of HIT assays in the hospitals. Serum samples were analyzed using the STic EXPPERT®HIT assay to detect IgG against the heparin/PF4 complex.

Results: Of 41 patients (mean age: 75.04 years; 60.9% female), nine (21.95%) tested positive for HIT. Among these, six were female (66.6%). The mean nadir platelet count was $42.9 \times 10^3/\mu l$. Positive cases were admitted to intensive care, coronary care, and cardiac departments. The leading clinical presentations included pulmonary embolism (33.3%), coronary artery bypass surgery (22.2%), and myocardial infarction (22.2%).

Conclusion: HIT may be with side effects, clinicians must pay attention to diagnoses of HIT in cases with thrombocytopenia on heparinoids.

Keywords: Heparin, Platelet, Heparin induced thrombocytopenia (HIT), Thrombosis, Thrombocytopenia

P633, Cell-free, yet life-saving: Mitochondrial transplantation in ischemic heart repair

Behnaz Mokhtari[1]
1. Department of Physiology, Faculty of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran

Background: Mitochondrial dysfunction is a hallmark of ischemic heart injury, resulting in impaired cellular metabolism, energy depletion, and cardiomyocyte death. Mitochondrial transplantation has recently emerged as a promising cell-free therapeutic strategy, with potential to restore myocardial bioenergetics, reduce oxidative stress, and improve cell survival.
Methods: In this review, we examine animal studies conducted by our team that explore the effects of mitochondrial transplantation, both alone and in combination with mitochondrial-enhancing agents, in models of myocardial ischemia-reperfusion (IR) injury. Outcomes evaluated include myocardial infarct size, echocardiographic and hemodynamic parameters, mitochondrial function endpoints, and cell signaling mediators.
Results: Our findings demonstrate that transplanted healthy mitochondria are internalized by injured cardiomyocytes, leading to increased adenosine triphosphate production, enhanced mitochondrial biogenesis and dynamics, and reduced apoptosis and inflammation. Compared to traditional cell-based therapies, mitochondrial transplantation avoids complications such as immune rejection, tumorigenicity, and complex cell handling, offering a safer and more targeted therapeutic approach. Moreover, adjunctive therapies that enhance mitochondrial function further potentiate the reparative effects of mitochondrial transplantation.
Conclusion: Mitochondrial transplantation represents a transformative, cell-free strategy in regenerative cardiology. Combining this approach with mitochondrial-enhancing interventions shows great potential for optimizing cardiac repair following ischemic injury. Continued research is essential to overcome remaining challenges and advance the clinical translation of these innovative therapies.
Keywords: Cardioprotection, Mitochondrial Transplantation, Ischemia-Reperfusion Injury.

P634, High- band 5G electromagnetic radiation (28 GHz) effects on oxidative stress markers and gene expression of cardiac tissue in male rats: The mitigating effect of vitamin c

Ali Rafati[1,3], Atefeh Rahimi[1,2], Narges Karbalaei[1,3], SMJ Mortazavi[4], Somaye Keshavarz[1,3], Maryam Naseh[3], Hadi Moatamed Jahromi[1], Ardeshir Nabizadeh[5]

1. Department of physiology, Medicine faculty, Shiraz University of medical sciences, Shiraz, Iran
2. Research Center, Shiraz University of Medical Sciences, Shiraz, Iran
3. Histomorphometry and Stereology Research Center, Shiraz University of Medical Sciences, Shiraz, Iran
4. Ionizing and Non-Ionizing Radiation Protection Research Center (INIRPRC), Shiraz University of Medical Sciences, Shiraz, Iran
5. Neuroscience Research Center, Institute of Neuroscience and Cognition, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: High-band 28 GHz fifth-generation (5G) electromagnetic radiation (EMR) has raised concerns regarding potential cardiovascular effects, particularly through oxidative stress–mediated mechanisms. This study examined the impact of two weeks of 28 GHz EMR exposure on oxidative stress biomarkers and the expression of apoptotic and inflammatory genes in rat cardiac tissue, and evaluated the protective role of Vitamin C.

Methods: Twenty-four male Sprague–Dawley rats were assigned to Control, Sham, 5G-exposed (30 min/day, 14 days), and 5G + Vitamin C (250 mg/kg/day) groups. Cardiac tissue was analyzed for malondialdehyde (MDA), glutathione (GSH), catalase (CAT), and superoxide dismutase (SOD). Gene expression of TNF-α, BAX, caspase-3, and BCL-2 was quantified by real-time PCR.

Results:5G exposure caused a significant rise in MDA levels ($p<0.05$), indicating enhanced lipid peroxidation. Antioxidant defenses were impaired, with marked reductions in GSH ($p<0.05$) and SOD activity ($p<0.001$), while CAT remained unchanged. Gene expression analysis revealed significant upregulation of TNF-α ($p<0.01$), BAX ($p<0.05$), and caspase-3 ($p<0.01$), accompanied by strong downregulation of BCL-2 ($p<0.001$), reflecting the activation of inflammatory and apoptotic pathways.

Vitamin C supplementation mitigated these alterations. It significantly reduced MDA elevation, restored GSH levels and SOD activity, and attenuated TNF-α and BAX expression. Caspase-3 expression showed a significant reduction compared to the 5G-only group ($p<0.01$), indicating suppression of apoptosis.

Conclusion: Two-week exposure to 28 GHz 5G EMR induces oxidative stress and activates pro-apoptotic and pro-inflammatory gene pathways in rat cardiac tissue. Vitamin C effectively counteracts these biochemical disturbances, supporting its potential cardioprotective role against EMR-induced injury.

Keywords: Electromagnetic radiation, Oxidative stress, Heart, rat, Gene expression

P635, Carvacrol mitigates doxorubicin-induced mitochondrial dysfunction in rat cardiomyocytes: attenuation of oxidative stress, membrane potential collapse, and complex II impairment

Javad Khalili Fard[1], Haniyeh Ranjkeshzadeh[2], Sama Shaghaghi[2], Fatemeh Mirshojaei[2]
1. Drug Applied Research Center, Tabriz University of Medical Sciences, Tabriz, Iran
2. Student Research Committee, Tabriz University of Medical Sciences, Tabriz, Iran

Background: It has been proven that doxorubicin (DOX) induces cardiotoxicity via mitochondrial dysfunction. Carvacrol (CAR), a phenolic monoterpenoid with antioxidant and anti-apoptotic properties, protects against chemical-induced mitochondrial injury. This study evaluated CAR's ability to mitigate mitochondrial damage in isolated rat cardiac mitochondria.
Methods: Male Wistar rats (n = 7) were divided into control, DOX (14 mg/kg cumulative dose), and DOX + CAR (5, 10, 20 mg/kg) groups. After 14 days, cardiac mitochondria were isolated, and toxicity was evaluated via reactive oxygen species (ROS) production, mitochondrial membrane potential (ΔΨm), and complex II activity assessment.
Results: CAR preserved ΔΨm and decreased ROS and enhanced complex II activity compared to DOX ($p < 0.05$). All tested CAR doses (5, 10, 20 mg/kg) exhibited protective effects, with 20 mg/kg demonstrating optimal efficacy in reducing DOX-induced toxicity.
Conclusion: CAR attenuates DOX-induced mitochondrial damage. The 20 mg/kg dose was most effective, suggesting CAR's potential as an palliative therapy to improve DOX's cardiac safety. Further studies are needed to validate these findings clinically.
Keywords: Carvacrol, Doxorubicin, Mitochondrial toxicity, ROS, Membrane potential (ΔΨm)

P636, Co-administration of carvacrol attenuates doxorubicininduced cardiotoxicity in rats: Evidence from histopathological and oxidative stress biomarkers

Javad Khalili Fard[1], Haniyeh Ranjkeshzadeh[2], Fatemeh Mirshojaei[2], Sama Shaghaghi[2]
1. Drug Applied Research Center, Tabriz University of Medical Sciences, Tabriz, Iran
2. Student Research Committee, Tabriz University of Medical Sciences, Tabriz, Iran

Background: Doxorubicin (DOX) is an effective chemotherapeutic agent, but its use is limited because of dose-dependent cardiotoxicity induced by oxidative stress. Carvacrol (CAR), a natural antioxidant, protect against chemicals-induced cardiac damage. This study evaluated CAR's cardioprotective effects in rat.
Methods: Male Wistar rats (n = 7) were divided into control, DOX (14 mg/kg cumulative dose), and DOX + CAR (5, 10, or 20 mg/kg) groups. After 14 days, oxidative stress biomarkers—total antioxidant capacity (TAC) and malondialdehyde (MDA)—were measured in serum. Cardiac tissues were analyzed histologically for fibrosis and structural damage.
Results: CAR coadministration significantly mitigated DOX-induced myocardial necrosis, inflammation, and fibrosis ($p < 0.05$). Moreover, CAR increased TAC and decreased MDA. The 5 mg/kg dose showed optimal protection.
Conclusion: CAR attenuates DOX-induced cardiotoxicity via reducing oxidative damage. These findings suggest CAR as a promising palliative therapy to enhance DOX's safety. Further research is needed to confirm its clinical applicability.
Keywords: Carvacrol, doxorubicin, Cardiotoxicity, Oxidative stress, Antioxidant

P637, Cardiovascular sequelae of long COVID: From Myocarditis to Autonomic Dysfunction

Melika Mojaver[1], Zohreh Arab[2], Mohammad Hossein Boskabady[3]
1. Faculty of Medicine, Islamic Azad University, Mashhad Branch, Iran
2. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Physiology, School of Medicine and Pharmaceutical Research Centre, Mashhad University of Medical Sciences, Mashhad, Iran

Background: The cardiovascular system is increasingly recognized as a major target during the post-acute phase of COVID-19. Individuals recovering from SARS-CoV-2 infection frequently experience persistent symptoms such as chest pain, palpitations, orthostatic intolerance, exercise intolerance, and fatigue, even in the absence of overt structural heart disease. Understanding the mechanisms underlying these manifestations is essential for improving diagnosis and long-term management.
Methods: This narrative review summarizes current evidence on the cardiovascular manifestations of long COVID. Relevant studies investigating myocardial injury, autonomic dysfunction, endothelial impairment, oxidative stress, and persistent inflammatory responses were reviewed to provide an integrated overview of the pathophysiological mechanisms responsible for long-term cardiovascular complications.
Results: Cardiovascular complications in long COVID arise through multiple interconnected mechanisms. Myocardial inflammation and fibrosis result from viral entry via ACE2 receptors, persistent immune activation, and autoimmune responses, leading to impaired ventricular function, reduced ejection fraction, and heart failure. Autonomic dysfunction, frequently manifesting as postural orthostatic tachycardia syndrome (POTS), is associated with neural injury and autonomic imbalance, contributing to tachycardia, palpitations, and cardiac arrhythmias. Endothelial dysfunction, driven by oxidative stress and chronic inflammation, promotes a prothrombotic state characterized by elevated von Willebrand factor (VWF), increased D-dimer levels, reduced nitric oxide bioavailability, impaired vascular function, and decreased exercise tolerance. Persistent immune activation, increased production of pro-inflammatory cytokines such as IL-6 and TNF-α, mitochondrial dysfunction, microvascular injury, and capillary microthrombi further exacerbate tissue hypoxia and fatigue. In addition, gut dysbiosis, epigenetic alterations, and metabolic reprogramming toward glycolysis contribute to sustained inflammation and cardiovascular dysfunction. Advanced cardiac imaging, circulating biomarkers, and heart rate variability (HRV) assessment have emerged as valuable tools for the early detection and monitoring of these complications.
Conclusion: Long COVID is associated with persistent cardiovascular dysfunction mediated by myocardial inflammation, autonomic imbalance, endothelial injury, oxidative stress, and chronic immune activation. Early recognition of these mechanisms and the implementation of appropriate diagnostic strategies may improve patient management, reduce long-term cardiovascular sequelae, and support the development of targeted therapeutic interventions.
Keywords: Long COVID, Myocardial inflammation, Autonomic dysfunction, Endothelial dysfunction, Oxidative stress

P638, The effect of ginger supplementation on GLUT4 gene expression in cardiac tissue during aerobic exercise in male Wistar rats

Abolfazl Akbari[1], Khadijeh Nasir[1], Saleh Rahimi[1], Mohammadjavad Rouhandeh [1]
1. Exercise Physiology Department, Sports Sciences Faculty, University of Mazandaran, Babolsar, Mazandaran Province, Iran

Background: Ginger can regulate glucose metabolism, and glucose is an important energy source for cardiac tissue during aerobic exercise. It was transport into cell by GLUT4. It is hypothesized that ginger may influence the cardiac glucose metabolism by regulating the activity of GLUT4. Therefore, this study was aimed to investigate the effect of ginger on the expression of the GLUT4 gene in the cardiac tissue during aerobic exercise.
Methods: 28 adult male Wistar rats (250 ± 25 g) were randomly divided into four groups: Control, Ginger (50 mg/kg), Aerobic Exercise, and Aerobic Exercise + Ginger. The training groups followed a moderate-intensity aerobic exercise protocol three times per week for eight weeks. GLUT4 gene expression was measured in the heart. All statistical analyses were performed using SPSS version 21. One-way analysis of variance (ANOVA) was used, followed by LSD post-hoc testing to identify differences among groups. A significance level of $P<0.05$ was considered statistically significant.
Results: According to the statistical analysis, GLUT4 gene expression was significantly higher ($P<0.05$) in the ginger supplementation group compared to the other groups. There was no significance difference among others($P>0.05$).
Conclusion: The results of this study indicated that ginger supplementation alone can significantly increase GLUT4 gene expression in cardiac tissue. However, this effect was not observed in the aerobic exercise + ginger group.
Keywords: GLUT4, Ginger, Aerobic Exercise, Cardiac Tissue

P639, Exercise intensity shapes cardiac exerkine signaling and cardiometabolic recovery in obese rats

Mohammad Reza Sokhanvar[1], Roya Askari [2], Hamid Marefati [2], Majid Khazaei [3], Soodeh Alidadi[4], Mahboube Salajeghe Tezergi[1]

1. Physiology Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
2. Department of Exercise Physiology, Faculty of Sport Sciences, Hakim Sabzevari University, Sabzevar, Iran
3. Department of Medical Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
4. Department of Pathobiology, School of Veterinary Medicine, Ferdowsi University of Mashhad, Mashhad, Iran

Background: Obesity leads to chronic inflammation, oxidative stress, and adipokine imbalance, which contribute to endothelial dysfunction and cardiometabolic decline. Recent research indicates that skeletal muscle functions as an endocrine organ, releasing Exerkines that affect vascular health, inflammatory responses, and metabolism. This muscle–exerkine axis is crucial for cardiovascular protection.

Methods: Twenty-four male Wistar rats were randomly divided into four groups: 1) healthy (with standard diet), 2) high-fat diet (obese), 3) high-fat diet with combined exercise, and 4) high-fat diet with HIIT. Obesity was induced for ten weeks with a 45% high-fat diet. The groups underwent special training for eight weeks, five days a week, and for eight weeks in a specialized aquatic environment. 48 hours after exercise, blood samples were collected from the hearts of the rats in the fasting state for biochemical and cardiac tissue analysis. Data were analyzed using one-way ANOVA and Tukey's post hoc tests ($p < 0.05$).

Results: Obese rats showed elevated glucose, insulin, triglycerides, and oxidative stress, with reduced HDL-C and antioxidant capacity versus healthy controls ($p < 0.05$). Both exercise interventions improved these markers: combined resistance–endurance training enhanced lipid and antioxidant profiles, while HIIT produced greater improvements in insulin sensitivity and oxidative stress ($p < 0.05$). Cardiac SPARC and Metrnl expression, suppressed by obesity, were restored by exercise, with HIIT inducing the highest upregulation ($p < 0.05$), highlighting an intensity dependent exerkine response in the myocardium.

Conclusion: Aquatic exercise training promotes exerkine release, which may restore cardiovascular function and counteract obesity related cardiac and vascular dysfunction.

Keywords: Exerkines, Aquatic exercise training, Obesity, Cardiovascular

P640, Protective effects of melatonin on isoproterenol-induced cardiac fibrosis in rats via TGF-β/Smad3 modulation

Hossein Shafahi[1], Mahmoud Ghazi Khansari[1]
1. Department of Pharmacology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran

Background: Cardiac fibrosis is a major contributor to pathological remodeling and heart failure. Isoproterenol (ISO) induces cardiomyocyte hypertrophy and extracellular matrix accumulation through activation of the TGF-β/Smad3 signaling pathway. Melatonin, a potent antioxidant and anti-inflammatory molecule, may counteract these processes.
Methods: Male Wistar rats were divided into five groups: Control (saline + DMSO), ISO (5 mg/kg, sc), and ISO combined with melatonin (5, 10, or 20 mg/kg, ip) for 14 consecutive days. On day 15, cardiac function was assessed by ECG and echocardiography. Hearts were collected for hypertrophy indices and histopathology (H&E, Masson's Trichrome, Picrosirius Red). Protein expression of TGF-β and Smad3 was measured by Western blot, and serum IL-6, TNF-α, IL-1β, MDA, and GSH levels were analyzed using ELISA kits.
ISO significantly increased cardiac hypertrophy indices and upregulated TGF-β and Smad3 expression, confirming activation of pro-fibrotic pathways. Melatonin co-administration dose-dependently attenuated hypertrophy and suppressed TGF-β/Smad3 signaling. Preliminary ELISA data indicate reduction of oxidative stress markers (MDA) and pro-inflammatory cytokines (IL-6, TNF-α, IL-1β), along with restoration of antioxidant capacity (GSH), particularly at higher melatonin doses
Conclusion: Melatonin exerts dose-dependent protective effects against ISO-induced cardiac fibrosis in rats, primarily via inhibition of TGF-β/Smad3 signaling and modulation of oxidative stress and inflammation. These findings support melatonin as a potential therapeutic agent for preventing pathological cardiac remodeling.
Keywords: Cardiac Fibrosis, Melatonin, Isoproterenol, TGF-β, Smad3.

P641, Investigation of the effects of taurine on cardiac glucose metabolism in a model of pathological cardiac hypertrophy

Mohammad Shahbazian[1], Alireza Imani[1,2], Mahdieh Faghihi[1], Kamran Rakhshan[1,2]
1. Department of Physiology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
2. Electrophysiology Research Center, Tehran University of Medical Sciences, Tehran, Iran
Corresponding Author

Background: Pathological cardiac hypertrophy is the heart's response to conditions such as hypertension, which over time leads to changes in cardiac size and structure and may ultimately result in heart failure. One of the key alterations observed during pathological cardiac hypertrophy is a shift in metabolism, characterized by reduced fatty acid oxidation and enhanced glycolysis, leading to a decline in ATP production in cardiac tissue. Upregulation of SIRT1 can suppress glycolysis by inhibiting HIF-1α, which may contribute to the improvement of cardiac hypertrophy. Taurine, a beta-amino acid with antioxidant and anti-inflammatory properties, may exert cardioprotective effects potentially through the activation of SIRT1.
Methods: Twenty-four male Wistar rats were randomly divided into three groups (n = 8 per group): Sham, Hypertrophy, Hypertrophy + Taurine. Cardiac hypertrophy was induced by abdominal aortic constriction. Following model induction, taurine was administered via gavage at a dose of 1 mg/kg, three times per week for 6 weeks. Cardiac tissue was harvested to measure the expression levels of SIRT1, GLUT1, and HIF-1α proteins using Western blot analysis.
Results: Our findings demonstrated a significant increase in SIRT1 protein levels in the Hypertrophy + Taurine group compared to the Hypertrophy group ($p < 0.05$). Additionally, HIF-1α and GLUT1 protein levels were significantly decreased in the Hypertrophy + Taurine group compared to the Hypertrophy group ($p < 0.05$).
Conclusion: Taurine may exert cardioprotective effects against pathological cardiac hypertrophy by stimulating SIRT1 and reducing glucose metabolism markers.
Keywords: Cardiac hypertrophy, Taurine, Glucose metabolism

P642, Taurine attenuates doxorubicin-induced cardiac injury through autophagy and anti-fibrotic effects

Seyed Alisina Sedghitabar[1], Sadra Abedinzadeh, Mohammad Shahbazian[2], Kamran Rakhshan[2,3]
1. School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
2. Department of Physiology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
3. Electrophysiology Research Center, Tehran University of Medical Sciences, Tehran, Iran

Background: Cardiotoxicity refers to impaired cardiac function caused by damage to cardiac cells, oxidative stress, apoptosis, ferroptosis, fibrosis, and autophagy dysregulation. Among anticancer drugs, anthracyclines specially doxorubicin (DOX)_ are major inducers of cardiotoxicity through oxidative stress, mitochondrial dysfunction, and programmed cell death. Autophagy, regulated by Beclin-1 and LC3, maintains cellular homeostasis but its inhibition by DOX enhances cardiomyocyte death. Moreover, DOX induces myocardial fibrosis via excessive ECM deposition. Taurine, a non-essential amino acid synthesized in the liver, can enhance autophagy, and reduce cardiac fibrosis, suggesting its cardioprotective role against DOX-induced injury.
Methods: Twenty-four male Wistar rats (200–250 g) were randomly assigned to three groups (n = 8): Control (CON), Doxorubicin-induced cardiotoxicity (DOX), and Doxorubicin + Taurine (DOX + TAU). DOX (2 mg/kg, i.p.) was injected every other day for 2 weeks to induce cardiotoxicity. Taurine (250 µg/kg, i.p.) was administered one hour after DOX injection on the same schedule. After 2 weeks, echocardiography was performed, and heart tissues were collected for histological (Masson trichrome) and molecular (Beclin-1, LC3-I, LC3-II) analyses. Four hearts per group were used for each assay.
Results: DOX administration significantly decreased Beclin-1, and LC3-II levels while increasing cardiac fibrosis ($p < 0.01$). Taurine treatment restored autophagy-related protein expression and markedly reduced myocardial fibrosis compared to the DOX group ($p < 0.05$).
Conclusion: Taurine attenuates doxorubicin-induced cardiotoxicity by enhancing autophagy and reducing cardiac fibrosis, demonstrating its strong cardioprotective potential.
Keywords: Doxorubicin-induced cardiotoxicity, Autophagy, Taurine

P643, Protective effects of salix alba on lipid-related pathways in the aorta of hypercholesterolemic rabbits

Zohreh Arab[1], Narges Amel Zabihi[2], Seyed Abdolrahim Rezaee[3], Saeed Niazmand[1]
1. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Physiology, Faculty of Medicine, Neishabur University of Medical Sciences
3. Department of Immunology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Hypercholesterolemia is a major contributor to endothelial dysfunction, atherosclerosis, and cardiovascular disease. Disruption in lipid metabolism and inflammatory pathways underlies this process, involving key molecular regulators such as AMP-activated protein kinase (AMPK-α1), sterol regulatory element-binding protein-1c (SREBP-1c), and lectin-like oxidized LDL receptor-1 (LOX-1). The present study aimed to evaluate whether Salix alba (S. alba) extract or aspirin could modulate these targets and mitigate vascular injury in a rabbit model of diet-induced hypercholesterolemia.
Methods: Twenty-five male New Zealand rabbits were randomly divided into five groups: normal diet (Control), high-cholesterol diet (HCD, 0.5% w/w cholesterol), HCD plus S. alba extract (60 and 120 mg/kg/day), and HCD plus aspirin (120 mg/kg/day). Treatments were administered by daily oral gavage for 8 weeks. Serum lipid profiles, including triglyceride (TG), total cholesterol (TC), LDL-C, and HDL-C, were measured to assess systemic metabolic changes. The expression levels of AMPK-α1, SREBP-1c, and LOX-1 in aortic tissue were determined using real-time PCR.
Results: S. alba extract at 120 mg/kg significantly reduced serum TG, TC, and LDL-C, while aspirin reduced TC and LDL-C compared to the HCD. Gene expression analysis showed that HCD suppressed AMPK-α1 and upregulated SREBP-1c and LOX-1, changes which were reversed following S. alba or aspirin treatment.
Conclusion: Our findings suggest that S. alba extract and aspirin can attenuate hypercholesterolemia-induced endothelial dysfunction by improving lipid profiles and modulating AMPK-α1, SREBP-1c, and LOX-1 expression, highlighting their therapeutic potential for vascular protection.
Keywords: Hypercholesterolemia, Salix alba, AMPK-α1, SREBP-1c, LOX-1

P644, The effects of inhaled estradiol and myrtenol on traumatic brain injury

Mohammad Amin Rajizadeh[1]
1. Physiology Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran

Background: Traumatic brain injury (TBI) is one of the main causes of intellectual and cognitive disabilities. Therefore, in the present study, the neuroprotective effects of estradiol (E2) and myrtenol (Myr) on neurological outcome, hemodynamic parameters, learning and memory, BDNF level, PI3K/Akt signaling and inflammatory and oxidative factors in hippocampus after TBI were evaluated.
Methods: Eughty-four adults male Wistar rats divided randomly into 12 groups with 7 in each (six groups for measuring ICP (intra cranial pressure), CPP (cerebral perfusion pressure), BWC (brain water content) and VCS (veterinary coma scale) & six groups for behavioral and molecular studies): Sham, TBI, TBI/Vehicle, TBI/Myr, TBI/E2 and TBI/Myr+E2 (Myr; 50 mg/kg and E2; 33.3 µg/kg via inhalation for 30 min after TBI induction). Brain injury was made by Marmarou's method. Briefly, a 300 g weight was fallen down from a 2 m height through a free-falling tube onto the head of anesthetized animal.
Results: Veterinary coma scores (VCS), learning and memory, brain water content (BWC), ICP and CPP impaired following TBI. Also, inflammation and oxidative stress raised in hippocampus after TBI.BDNF level and PI3K/AKT signaling impaired due to TBI.Inhalation of Myr and E2 had protective effects against all negative consequences of TBI through decrement of brain edema and hippocampus content of inflammatory and oxidant factors and also via improvement of BDNF and PI3K/AKT in hippocampus. For all above data, there are no differences between alone and combination administration.
Conclusion: Our results propose that Myr and E2 had neuroprotective effect on cognition impairments due to TBI.

P647, An investigation of renal functional disorders following acute focal cerebral injury induced by ischemia/reperfusion in rats

Elham faghih Shirazi[1], Mostafa Shid-Moosavi[1], Somaye Keshavarz[1, 2]
1. Department of Physiology, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran
2. Histomorphometry and Stereology Research Center, Shiraz University of Medical Sciences, Shiraz, Iran

Background: Acute kidney injury (AKI) is one of the most often encountered complications in critical care units' patients. AKI has been reported to increase mortality and disability in stroke patients in various clinical studies. There have been few animal investigations on this topic, and none of them have focused on renal dysfunction following cerebral ischemia-reperfusion. The current study addressed this issue.
Methods: Thirty male Sprague-Dawley rats were randomly assigned to one of three groups: Sham, CIR-24h, or CIR-48h. Cerebral ischemia was induced by 60 min MCAO followed by 24 h (CIR-24h) and 48 h (CIR-48h) reperfusion. After evaluation of neurological deficit scores (NDS), renal function recorded during clearance period.
Results: NDS, infarct volume and cerebral edema were not significantly different in both ischemic groups. Kidney weight to body weight ratio, plasma creatinine and sodium concentrations, and plasma osmolality were significantly increased in CIR-48h group. CIR-48h group had substantially lower renal blood flow and creatinine clearance, and higher fractional excretion of sodium and potassium. Furthermore, osmotic clearance, effective osmotic clearance, free-water reabsorption, and urine osmolality were substantially lower in the CIR-48h group.
Discussion: AKI can be caused by cerebral ischemia-reperfusion depending on the duration of the reperfusion period. The released inflammatory and injurious factors from damaged brain tissue 48 hours after acute cerebral ischemia resulted in decreased renal blood flow and GFR, tubular damage, and decreased urine concentrating ability, leading to a rise in creatinine, sodium, and plasma osmolality.
Key words: Acute kidney injury, Cerebral ischemia-reperfusion, Renal functional disorders

P648, Evaluation of Echinops cephalotes aqueous extract on function and cardiac damage in a model of cardiac hypertrophy following ischemic reperfusion injury in male rats

Masoud Fallah[1], Yaser Azizi[1]
1. Department of Physiology, Faculty of Medicine, Iran University of Medical Sciences, Tehran, Iran

Background: Myocardial infarction (MI) is the most important cause of death and disability worldwide. Cardiac hypertrophy is the most important cause of heart failure following ischemia-reperfusion. *Echinops cephalotes* is a plant that has an anti-inflammatory and antioxidant property. The aim of this study was to investigate the effect of *Echinops cephalotes* aqueous extract on the amount of injury and hypertrophy caused by MI.
Methods: Three groups of 6, including sham operated (Sham), MI control (MI) and treatment (MI + Ech), were used in this study. Ischemia was induced by ligating the LAD artery, and after 30 minutes, reperfusion was performed for 28 days by opening the LAD. Oral administration of *Echinops cephalotes* (150 mg/kg) was started on the first day after surgery and continued for 28 days. Finally, cardiac function indices (IVSd, IVSs, LVIDd, LVIDs, LVPWd, LVPWs) were measured by echocardiography. Heart weight to body weight ratio (HW/BW) and serum levels of cTnI and CK-MB enzymes were also evaluated.
Results: All cardiac function indices improved in the treatment group compared to the MI control group ($P<0.05$). HW/BW in the treatment group showed a significant decrease compared to the MI control group ($P<0.05$). Serum levels of cTnI and CK-MB also showed a significant decrease in the treatment group compared to the MI control group ($P<0.05$).
Conclusion: *Echinops cephalotes* improves cardiac function and reduces cardiac hypertrophy in male rats by improving cardiac functional indices, reducing HW/BW, and reducing serum levels of cTnI and CK-MB.
Keywords: Cardiac hypertrophy, *Echinops cephalotes*, Cardiac functional indices, Cardiac injury

P649, Effect of inorganic sodium nitrate on expression of VEGF-A, VEGF-R2 and miR-320 in heart of type 2 diabetic male rat

Vajihe Ghorbanzadeh[1], Hassan Dariushnejad[1], Zeynab Sarlak[2]
1. Cardiovascular Research Center, Shahid Rahimi Hospital, Lorestan University of Medical Sciences, Khorramabad, Iran
2. Department of Biology, Khorramabad Branch, Islamic Azad University, Khorramabad, Iran

Background: Advanced type 2 diabetes is associated with increased risk for cardiovascular disease. Although nitrite improves vascular function, its cardiac angiogenesis effects are not completely known. We investigated whether sodium nitrite improves cardiovascular angiogenesis signaling pathways in type 2 diabetic rats.
Methods: The 21 male Wistar rats were divided into three groups: 1; control group (Con), 2; diabetic rats (Age), 3; diabetic rats treated with sodium nitrate (100 mg/kg). At the end of experimental period, VEGF-A, VEGF-R2, and miR-320 levels were determined in cardiac tissue.
Results: Administration of sodium nitrate significantly increased cardiac VEGF-A and VEGF-R2 levels ($p<0.05$). However, these proteins levels in diabetic group were higher than treatment group ($p<0.05$ respectively for both proteins). Mir-320 expression level was higher in diabetic group when compared to control group ($p<0.01$), and sodium nitrate significantly decreased the miR-320 expression level in cardiac tissue of diabetic rats ($p<0.05$).
Conclusion: Based on the results of this study, chronic sodium nitrite therapy is a recently discovered therapeutic treatment for cardiac artery disease and cardiac angiogenesis complication of diabetes.
Keywords: Sodium nitrate, Type 2 diabetes, VEGF-A, VEGF-R2, Mir-320

P650, Evaluation of the effect of dalteparin sodium on doxorubicin-induced cardiotoxicity in rats: emphasis on the role of ferroptosis

Sina Ghesmatpour[1], Kamran Rakhshan[1,2], Mahdieh Faghihi[1], Alireza Imani[1]
1. Department of Physiology, School of medicine, Tehran University of Medical Sciences, Tehran, Islamic Republic of Iran
2. Electrophysiology Research Center, Tehran University of Medical Sciences, Tehran, Islamic Republic of Iran

Background: Cardiotoxicity is a prevalent side effect of anthracycline-based cancer treatments, particularly Doxorubicin, leading to cardiac cell damage and impaired function. Recent studies have identified ferroptosis, a type of iron-dependent programmed cell death, plays a crucial role in Doxorubicin-induced cardiotoxicity. Doxorubicin induces ferroptosis by triggering inflammation and subsequently increasing hepcidin levels, which leads to iron accumulation. Dalteparin sodium, a low molecular weight heparin, has been shown to reduce IL-6 and hepcidin levels in inflammatory responses. This study aims to investigate the effects of Dalteparin sodium on ferroptosis and Doxorubicin-induced cardiotoxicity in a rat model.
Methods: Twenty-four male Wistar rats were randomly divided into three groups: control (CON), cardiotoxicity (DOX), and cardiotoxicity + Dalteparin (DOX+DAL). Cardiotoxicity was induced by intraperitoneal injection of Doxorubicin (4 mg/kg) weekly for five weeks. Simultaneously, normal saline was administered daily in the DOX group, while Dalteparin (100 mg/kg/d) was injected in the DOX+DAL group. Finally, Assays were conducted to measure oxidative stress markers, ferroptosis, and hepcidin gene expression.
Results: The results indicated significant reductions in SOD ($P<0.001$) and GPX-4 ($P<0.001$) in the DOX group alongside increased MDA ($P<0.001$) and FOXO-4 ($P<0.01$) compared to CON. Furthermore, Dalteparin significantly increased SOD ($P<0.05$) and GPX-4 ($P<0.01$) while reducing MDA ($P<0.05$), FOXO-4 ($P<0.01$), IL-6 ($P<0.05$), and hepcidin ($P<0.01$) in the DOX+DAL compared to DOX.
Conclusion: This study showed that Doxorubicin-induced cardiotoxicity in rats could be mitigated by Dalteparin sodium administration, potentially due to its effects on reducing iron accumulation and subsequently ferroptotic cell death.
Keywords: Cardiotoxicity; Ferroptosis; Doxorubicin; Dalteparin Sodium

P651, Linalool's protective role against amikacin-induced nephrotoxicity

Pooran Ghahramani[1], Zeinab Karimi[2]
1. Department of Biology, Faculty of Sciences, Shiraz University, Shiraz, Iran
2. Nephro-Urology Research Center, Shiraz University of Medical Sciences, Shiraz, Iran

Background: Amikacin is an antibiotic from the aminoglycoside group that is commonly used to treat severe infections caused by Gram-negative bacteria, especially in hospitalized patients and intensive care units. It's effective against resistant bacteria but can cause serious side effects like nephrotoxicity. Therefore, we aimed to investigate the potential protective effects of linalool on amikacin-induced nephrotoxicity.
Methods: Twenty-four male Sprague-Dawley rats were divided into Control, Amikacin (400 mg/kg, 12 days, i.p), and Amikacin + Linalool groups. Amikacin was given for 7 days; afterward, Linalool (100mg/kg, gavage) was administered 30 min before Amikacin until day 12. The animals were placed in metabolic cages on day 12 to collect their urine. Rats were then anesthetized, and blood samples were collected. Also, the kidney tissues were removed for molecular and histopathological evaluation.
Results: Amikacin administration caused a substantial increase in plasma creatinine ($[Cr]_P$) and urea nitrogen ($[UN]_P$), accompanied by tissue damage**,** compared to the control group. Additionally, plasma total oxidative stress (TOS) and *total antioxidative capacity (TAC)* levels were elevated in the Amikacin group *compared to the control group.* Treatment with Linalool significantly lowered TOS, $[Cr]_P$*, and* $[UN]_P$ levels, as well as tissue damage, compared to the Amikacin group. *Oxidative stress index (OSI)* remained unchanged *compared to the control group,* but Linalool *decreased OSI compared to both the control and Amikacin groups.*
Conclusion: Our findings demonstrate that treatment with Linalool effectively reduces the adverse effects caused by Amikacin administration. Therefore, Linalool is proposed as a protective agent against Amikacin-induced oxidative damage and nephrotoxicity.
Keywords: Amikacin, Nephrotoxic Effect, Linalool, Acute Kidney Injury

P652, Comparison of ischemia/reperfusion-induced acute kidney injury by clamping renal arteries or veins in rats

Haniyeh Kazemi[1], Hossein Fatemikia[1], Narges Karbalaei[1], Seyed Mohammad Owji[2], Seyed Mostafa ShidMoosavi[1]

1.Department of Physiology, The Medical School, Shiraz University of Medical Sciences, Shiraz, Iran
2.Department of Pathology, The Medical School, Shiraz University of Medical Sciences, Shiraz, Iran

Background: In previous studies in our laboratory, it was observed that 30 minutes of renal arterial, venous, or pedicle occlusion differentially developed renal structural and functional disorders after a 30-minute or 2-hour reperfusion period. The present investigation was further designed to compare acute kidney injury (AKI) induced by bilateral renal arterial or venous clamping followed by 24-hour reperfusion.

Methods: Twenty-one male Sprague–Dawley rats were divided into 3 groups (n=7 in each group). Ketamine/xylazine-anesthetized rats underwent a 30-minute clamping of renal arteries (IR-A group) or veins (IR-V group) and a sham operation (sham group). The rats were allowed to recover from anesthesia and after elapsing 21 hours of reperfusion, they were re-anesthetized by pentobarbital sodium to be prepared for renal functional measurements. Over the last hour of the 24-hour reperfusion period, a 1-hour clearance period was taken for collecting urine samples and recording arterial pressure, heart rate, and renal blood flow (RBF) by the PowerLab. At the end of this period, an arterial blood sample was taken and kidneys were removed and kept at −80°C.
Statistical analysis was performed by ANOVA followed by Tukey's post-hoc test, with the significance at $P<0.05$.

Results: Renal ischemia/reperfusion-induced decreases in RBF, GFR, K^+-excretion, urine osmolality, and free-water reabsorption, as well as increases in renal MDA and NO, fraction Na^+-excretion, and plasma levels of creatinine, urea, K^+, and osmolality were more intensive in the IR-V group than the IR-A group.

Conclusion: Renal venous occlusion causes more severe AKI than renal arterial occlusion after 24-h reperfusion.

Keywords: Acute kidney injury, Renal ischemia/reperfusion, Renal arterial clamping, Renal venous clamping

P653, Protective effects of allopurinol on cardiac injury induced by renal ischemia-reperfusion

Zeinab Karimi[1], Pooran Ghahramani[2]
1. Nephro-Urology Research Center, Shiraz University of Medical Sciences, Shiraz, Iran
2. Department of Biology, Faculty of Sciences, Shiraz University, Shiraz, Iran

Background: Renal ischemia-reperfusion injury, as one of the common causes of acute kidney injury (AKI), triggers inflammatory responses and oxidative stress, leading to systemic damage and impairment of critical organ functions, particularly the heart. Allopurinol, a xanthine oxidase inhibitor, has demonstrated protective potential against ischemia-reperfusion-induced injuries by reducing the production of reactive oxygen species and alleviating oxidative stress. The aim of this study is to investigate the effects of allopurinol on mitigating cardiac injury secondary to renal ischemia-reperfusion and improving cardiac function.
Methods: Renal IRI was established by 60 min of bilateral renal pedicle clamping, succeeded by 24 h of reperfusion. Rats were randomly divided into (1) sham (2) I/R (3) I/R+Allopurinol groups. The rats were pretreated with allopurinol (100 mg/kg, gavage) 30 min before the induction of ischemia. Urine and blood samples were collected following the reperfusion period. The kidneys and heart were harvested for histopathological evaluation.
Results: Renal IRI resulted in a significant increase in the plasma concentration of creatinine ($[Cr]_P$) and urea nitrogen ($[UN]_P$), along with tissue damage compared with the sham group. Treatment with allopurinol effectively attenuated all these changes. Moreover, allopurinol significantly reduced the levels of cardiac injury markers such as troponin and lactate dehydrogenase (LDH).
Conclusion: Our findings indicate that allopurinol improves cardiac function and can be proposed as a promising therapeutic agent for reducing multi-organ injury caused by renal ischemia-reperfusion.
Keywords: Allopurinol, Acute kidney injury, Heart, Distant organ

P654, Evaluation of the Effects of Citral in the Prevention and Treatment of Calcium Chloride-Induced Arrhythmia in Rats

Mahmoud Kohan Mansourkhani[1], Javad Sajedian Fard[1], Fouad Nourbakhsh[1], Saeedeh Ahmadi Jokani[1]
1. Department of Basic Sciences, Faculty of Veterinary Medicine, Shiraz University, Shiraz, Iran

Background: Due to its strong antioxidant properties, citral can play an effective role in reducing damage caused by cardiac arrhythmias. The aim of this study was to investigate the effect of citral in the prevention and treatment of calcium chloride-induced arrhythmia in male rats.
Methods: In this study, 36 male Sprague Dawley rats were randomly divided into six groups:
Control Group 1: Received dimethyl sulfoxide after the induction of arrhythmia.
Control Group 2: Received dimethyl sulfoxide orally before the induction of arrhythmia.
Treatment Groups Citral A and Citral C: Received citral injection (100 mg/kg) after the induction of arrhythmia and oral administration of citral (50 mg/kg) before the induction of arrhythmia, respectively. Standard Treatment Groups 1 and 2: Received amiodarone injection (5 mg/kg) and quinidine injection (10 mg/kg), respectively. Arrhythmia was induced by calcium chloride. After anesthesia with thiopental, an electrocardiogram was recorded, and PVB, VT, and VF were examined.
Conclusion: In this study, by examining the effect of citral in the prevention and treatment of citral in calcium chloride-induced arrhythmia in rats, it was shown that citral is preventive against heart diseases and, with its strong antioxidant effect, prevents the development of ventricular tachycardia, ventricular fibrillation, and premature ventricular beats. Acute and chronic use of citral, compared to the control and standard groups, showed a significant decrease in the incidence of VF, VT, and PVB. Also, the significant difference in the occurrence of arrhythmia between the groups receiving citral (Citral A and Citral C) indicates the greater effect of preventive use of Citral C compared to therapeutic use of Citral A in reducing arrhythmias.
Keywords: Arrhythmia, Rat, Citral, Calcium Chloride

P655, Dapagliflozin reduces myocardial injuries through modulation of H3K27me3 and SIRT1 in the male rat model of myocardial ischemia reperfusion

Tina Kianfar[1], Masoud Fallah[1], Fatemeh Ramezani[2], Kamran Rakhshan[3], Ebrahim Najafzadeh[4], Yaser Azizi[1]

1. Department of Physiology, School of Medicine, Iran University of Medical Sciences, Tehran, Iran
2. Physiology research center, Iran University of Medical Sciences, Tehran, Iran
3. Department of Physiology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran
4. Department of Medical Physics, School of Medicine, Iran University of Medical Sciences, Tehran, Iran

Background: Although dapagliflozin (DAPA), a sodium-glucose cotransporter 2 (SGLT2) inhibitor, exhibits cardioprotective effects, its underlying epigenetic and molecular mechanisms remain poorly understood. Objective: This study investigated whether DAPA mitigates myocardial ischemia/reperfusion injury (MI/RI) by modulating H3K27me3 and SIRT1 expression.
Methods: Thirty-six male Wistar rats were randomly assigned to Sham, MI, and MI+DAPA groups (n=12/group). Rats in the MI and MI+DAPA groups underwent 30 minutes of left anterior descending coronary artery (LAD) ligation. For 14 days, animals in the MI+DAPA group received orally 1 mg/kg/day DAPA. Heart function, fibrosis, inflammatory factors (TNF-α, NF-κB, IL-1β, IL-6), and oxidative stress were assessed using echocardiography, Masson's trichrome staining, Western blotting, and Elisa respectively. Sirtuin 1 (SIRT1) and H3K27me3 expression were also determined by Western blotting 14 days after MI induction. Tissue damage was evaluated using hematoxylin and eosin (H&E) staining.
Results: DAPA administration significantly improved MI-induced myocardial damage by decreasing serum levels of LDH, cTnI, and CK-MB. DAPA also improved left ventricular function by increasing ejection fraction (EF) and fractional shortening (FS), decreased left ventricular fibrosis and myocardial inflammation by improving myocardial TNF-α, NF-κB, IL-1β, IL-6. Additionally, DAPA improved oxidative stress by decreasing malondialdehyde (MDA) levels and increasing superoxide dismutase (SOD) activity. DAPA increased the level of SIRT1 protein followed by decreased H3K27me3 in comparison with the MI group.
Conclusion: This study's results indicate that DAPA attenuates MI/RI in male rats by modulating epigenetic mechanisms, specifically through H3K27me3 suppression and SIRT1 upregulation, offering novel insights into its cardioprotective potential.
Keywords: Dapagliflozin, Myocardial ischemia reperfusion, Inflammation, Oxidative stress, Sirtuin1, Histone methylation

P657, Effects of interval aerobic training on cardiac MFN1 expression in female sprague–dawley rats

Mohammad Moein Nezamabadi Motlagh[1], Majid Kashef,[1]
1.Department of Exercise Physiology, Faculty of Physical Education and Sport Sciences, Shahid Rajaee Teacher Training University, Tehran, Iran

Background: Mitochondrial fusion is a critical mechanism for maintaining cardiac metabolic stability, and Mitofusin-1 (MFN1) plays a central role in preserving mitochondrial network integrity, ATP production, and resistance to oxidative stress in cardiomyocytes. Dysregulation of MFN1 contributes to mitochondrial fragmentation and increased vulnerability to cardiac injury. Although aerobic exercise is known to enhance mitochondrial quality, the specific effects of interval aerobic training on MFN1 expression in cardiac tissue require further investigation. This study aimed to evaluate the effect of four weeks of interval aerobic training on MFN1 levels in the heart tissue of female Sprague–Dawley rats.
Methods: Fifteen healthy female Sprague–Dawley rats were randomly assigned to a Control group (C) and an Interval Training group (E). The training protocol consisted of four weeks of treadmill-based interval aerobic exercise: five weekly sessions including high-intensity bouts at 85–90% Vpeak and moderate-intensity bouts at 50–60% Vpeak. Forty-eight hours after the final session, left ventricular tissue was harvested, and MFN1 expression was measured using Western blot analysis.
Results: MFN1 expression increased significantly in the training group compared with controls (+34%, $p < 0.05$). Trained rats showed improved mitochondrial morphology, including reduced fragmentation and greater elongation indices, consistent with enhanced fusion activity. No signs of pathological cardiac hypertrophy or tissue damage were observed.
Conclusion: Four weeks of interval aerobic training significantly upregulate MFN1 in cardiac tissue, indicating improved mitochondrial fusion capacity. These findings suggest that interval aerobic exercise alone is a potent non-pharmacological stimulus for promoting mitochondrial integrity and cardiac metabolic health.
Keywords: MFN1, mitochondrial fusion, Interval aerobic training, Cardiac mitochondria, Sprague–Dawley rats

P658, The combined effect of exercise and hydroalcoholic extract of valerian on endothelial dysfunction in coronary vessels and cardiac injury in male diabetic rats induced by streptozotocin

Afshin Nazari[1], Alireza Mirzaei[1], Mahtab Zynivand[1], Mehrnoosh Sedighi[1], Samira Yarimir[1], Vajihe Ghorbanzadeh[1]

1. Cardiovascular Research Center, Shahid Rahimi Hospital, Lorestan University of Medical Sciences, Khorramabad, Iran

Background: Diabetes mellitus is a metabolic disorder recognized for inducing endothelial dysfunction in coronary arteries. This study aimed to investigate the synergistic effects of valerian hydroalcoholic extract and exercise in diabetic rats.

Methods: Thirty-five Wistar rats were randomly divided into five groups: control, diabetes, diabetic rats undergoing treadmill exercise, diabetic rats administered valerian extract (200 mg/kg, oral), and diabetic rats receiving a combination of valerian extract and treadmill exercise for 8 weeks. Antioxidants and lipoproteins were assessed via blood sampling at the study's conclusion. Hemodynamic parameters and the response of the coronary artery bed to constrictors and dilators were evaluated by connecting the heart to a Langendorff device.

Results: Diabetes was associated with a diminished vascular vasodilator response, which was enhanced by the combined treatment of valerian extract and 8 weeks of exercise. Moreover, elevated levels of glutathione peroxidase (GPx) and superoxide dismutase (SOD) were observed in groups receiving both valerian extract and exercise.

Conclusion: The findings suggest that the combination of treadmill exercise and hydroalcoholic extract may hold promise in managing cardiovascular complications in diabetic patients by leveraging their antioxidant properties.

Keywords: Antioxidants, Hemodynamic factors, Treadmill exercise, Valerian extract

P659, Cardiovascular effects of ventrolateral periaqueductal gray (vlPAG) AT1 receptors in normotensive rats

Esmaeil Hamounpeyma[1], Mohammad Naser Shafei[1]
1. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: The ventrolateral periaqueductal gray (vlPAG) regulates cardiovascular function. Given the presence of Angiotensin II (AngII) and its AT1 receptors (AT1R) in the vlPAG, this study investigated their central and peripheral roles in cardiovascular control during normotensive conditions.
Methods: Saline, three doses AngII (0.1, 0.2, and 0.3 nmol) were microinjected into the vlPAG. The AT1R blocker Losartan (Losa) was microinjected alone and before AngII in normotensive conditions. The peripheral mechanisms of AngII were examined by intravenous injection of hexamethonium (Hexa, a ganglion blocker) and atropine (Atro, muscarinic receptor blocker) alone and before AngII (0.3nmol) in normotensive conditions. Time course and maximal changes (Δ) of mean arterial pressure (MAP), systolic blood pressure (SBP), and heart rate (HR) were recorded by Power lab apparatus and analyzed.
Results: Higher doses AngII significantly increased HR, SBP, and MAP ($P<0.05$-$P<0.001$) than saline. Losa attenuated these effects. Hexa significantly attenuated the pressor effect of AngII ($P<0.001$), while Atro increased HR ($P<0.001$).
Conclusion: AngII in the vlPAG stimulates cardiovascular activity via AT1R in normotensive conditions. Furthermore, these peripheral effects of AngII are primarily mediated through sympathetic nervous system activation.
Keywords: Ventrolateral periaqueductal gray, Cardiovascular system, Angiotensin II, Losartan

P660, Vericiguat, a 17β-estradiol substitute, reduces cardiovascular risk factors in experimentally menopausal high-fat diet-induced obese rats

Mohammad Khaksari[1], Azadeh Shahrokhi Raeini[2], Hamideh Bashiri [3], Samira Ahmad Yousefi[4]
1. Endocrinology and Metabolism Research Center, Institute of Basic and Clinical Physiology Sciences, Kerman University of Medical Sciences, Kerman, Iran
2. Student Research Committee, Afzalipour Faculty of Medicine, Kerman University of Medical Sciences, Kerman, Iran
3. Neuroscience Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
4. Department of Physiology, Faculty of Medicine, Kerman University of Medical Sciences, Kerman, Iran

Background: In obesity and menopause, the NO–sGC–cGMP pathway is disrupted, a condition that accelerates the development of atherosclerosis, hypertension, and heart failure. The aim of the present study was to investigate the effects of vericiguat, an sGC stimulator, both in absence and presence of estrogen on cardiovascular risk factors in high-fat diet (HFD)-induced obesity in ovariectomized rats.
Methods: Wistar rats were divided into two groups: sham and ovariectomized (OVX experimental menopause model). After surgery, they were fed either a high-fat diet (HFD) or a standard diet (SD) for 4 months. The animals then received vericiguat at two doses (low and high), either alone or in combination with 17-β estradiol (E2), for one month. Finally, the percentage of body weight changes, cardiac risk indices (CRI-I and CRI-II) and atherogenic index of plasma (AIP) were evaluated.
Results: Ovariectomy and high-fat diet induced greater weight gain (obesity) compared to sham groups. In addition, CRI-I, CRI-II and AIP were increased by both ovariectomy and HFD. Both 17-β estradiol and the two doses of vericiguat prevented excessive weight gain and reduced cardiovascular risk indices, with vericiguat acting largely similarly to E2 in producing these effects. The combination treatment showed the greatest improvement, indicating a synergistic interaction between the two drugs.
Conclusion: This study demonstrated that both doses of vericiguat and E2 reduced cardiovascular and atherogenic risk factors. Furthermore, vericiguat may be considered a potential substitute for, or enhancer of, estrogen effects under conditions of obesity and menopause.
Keywords: Cardiovascular risk factors, 17-β estradiol, High-fat diet, Menopause, Vericiguat

P661, The non-protective effect of vitamin E on kidney complications induced by Lithium in aged male and female rats

Zahra Pezeshki[1,2], Samira Choopani[1,2], Behnaz Pourvali[2], Mehdi Nematbakhsh[1,2,3], Arezoo Mirzaei[4], Mohammad Mehdi Khaleghi[5], Ardeshir Talebi[6]

1. Department of Physiology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran
2. Water and Electrolytes Research Center, Isfahan University of Medical Sciences, Isfahan, Iran
3. IsfahanMN Institute of Basic and Applied Sciences Research, Isfahan, Iran
4. Department of Bacteriology and Virology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran
5. School of Pharmacy, Isfahan University of Medical Sciences.
6. Department of Clinical Pathology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran

Background: Lithium (Lit) is commonly used for bipolar disorder, and it may also have some potential benefits for some neurological conditions. Long-term Lit treatment is often associated with side effects such as renal toxicity, especially in the elderly subject. Gender also influences the side effects of Lit. Antioxidants may protect the kidneys against the side effects of Lit, therefore the effect of vitamin E (Vit E) was considered.

Methods: This study was conducted on 42 Wistar rats, which were divided into eight groups of male and female receiving placebo (Pla), Vit E (100 mg/kg every other day), placebo plus Lit (50 mg/kg daily), and Vit E plus Lit for period of 4 weeks. Finally, kidney function and tissue histology were examined.

Results: The findings demonstrated significant increases in urine flow in Lit-treated female rats (380 ± 59 µl min^{-1} 100gr $tissue^{-1}$) compared to the placebo group (218 ± 64 µl min^{-1} 100gr $tissue^{-1}$), while no significant changes were noted in male rats. Lit increased aquaporin II (AQP2) expression, in female rats (2.44 ± 0.22 $2^{\Delta\Delta ct}$) and Vit E down-regulate AQP-2 expression in L+Vit E female group (0.8 ± 0.18 $2^{\Delta\Delta ct}$). Surprisingly, Vit E did not attenuate Lit's side effects.

Conclusion: It is concluded that short-term Lit therapy in elderly rats increased renal damage insignificantly, however, Vit E did not have protective effect against Lit-induced nephrogenic diabetes insipidus.

Keywords: Lithium, renal toxicity, vitamin E, aged rats, aquaporin II

P662, Investigating the efficacy of thalidomide in β-thalassemia patients: a systematic review and meta-analysis of therapeutic response and hematologic improvement

Mohammad Navid Khaksari[1,2], Mohammad Reza Keramati[1,3]
1. Department of Hematology and Blood Banking, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Student Research Committee, Mashhad University of Medical Sciences, Mashhad, Iran
3. Cancer Molecular Pathology Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Thalidomide has recently re-emerged as a promising therapeutic option in *β*-thalassemia due to its potential to induce fetal hemoglobin (HbF) and reduce transfusion requirements by promoting *γ*-globin gene expression. Nonetheless, its overall efficacy in clinical investigations remains unclear. This meta-analysis was designed to evaluate the efficacy of thalidomide in patients with *β*-thalassemia by examining overall response rate (ORR), complete response rate (CRR), and changes in Hb and HbF levels.
Methods: A comprehensive search of PubMed, Scopus, and Web of Science (up to November 2025) found 200 articles. After reviewing titles, abstracts, and full texts against the defined inclusion criteria, 13 studies comprising 1,154 patients were included. STATA software was used to perform meta-analysis.
Results: A total of 609 males and 455 females were included, with a mean age of 17.3 ± 6.1 years. The pooled ORR was 82% (95% confidence interval (CI): 76–89%; I^2 = 83.6%, $p < 0.01$), indicating that a large majority of patients achieved significant clinical improvement. The CRR, which shows complete transfusion independence or normalization of parameters, was 62% (95% CI: 51–73%, I^2=93%, $p < 0.01$). Thalidomide treatment resulted in a statistically significant increase in hemoglobin level and HbF level after treatment.
Conclusion: Thalidomide is shown to be an effective therapy for *β*-thalassemia, with reductions in transfusion requirements and clinically significant increases in Hb and HbF levels. Although there is variation among studies, the results encourage ongoing research and careful clinical application of thalidomide in this population.
Keywords: Thalidomide, *β*-thalassemia, Hemoglobin level, Meta-analysis

P663, Evaluation of tramadol's impact on heart rate dynamics from frequency-domain perspective

Roham Mazloom[1], Seyed Farzam Nezamalhosseini Ezabadi[1], Gholamreza Bayat[1], Marjan Hosseini[1]
1. Department of Physiology-Pharmacology-Medical Physics, School of Medicine, Alborz University of Medical Sciences, Karaj, Alborz Province, Iran

Background: Tramadol, as a pseudo-opioid, produces diverse effects due to the wide distribution of opioid receptors in organs. In the present study, the effects of tramadol on heart rate variability were investigated using a frequency domain approach.
Methods: Twelve male Wistar rats were randomly divided into two groups of six, one receiving tramadol 5 mg/kg subcutaneously, four injections for 72 h, and the other receiving normal saline in the same pattern. to 1-3 hours after the last injection, the animals were anesthetized, and their electrocardiograms were recorded for 5 min using a PowerLab recorder. Frequency domain data were extracted using the HRV module of LabChart 7. High and low frequencies were considered to represent parasympathetic and sympathetic activity, respectively.
Results: Tramadol reduced the heart rate compared to the vehicle group ($p < 0.01$). Changes in low and high frequencies alone were not different significantly between the two groups. However, the low frequency to high frequency ratio was significantly reduced by tramadol in comparison with the vehicle group ($p < 0.05$).
Conclusion: Tramadol appears to alter the frequency domain of HRV balance by affecting the autonomic nervous system, a phenomenon that is formed by increasing vagal activity and reducing sympathetic influence. However, there is also the possibility of a direct effect of tramadol on opioid receptors in the heart, which could be responsible for the decrease in the heart rate.
Keywords: Tramadol, Heart rate, Autonomic nervous system

P664, Gut microbiota-driven inflammation and immune pathways in cardiovascular disease

Alireza Nokhodchi [1], Zohreh Arab [2], Fereshteh Asgharzadeh [3]
1. Faculty of Medicine, Islamic Azad University, Mashhad Branch, Iran
2. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Neurogenic Inflammation Research Centre, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Chronic inflammation is a well-established contributor to cardiovascular disease (CVD), with accumulating evidence suggesting that many inflammatory processes originate in the gut. The gut microbiota regulates cardiovascular health through microbial structural components and metabolites that influence intestinal barrier integrity, immune activation, and systemic inflammation. Understanding the gut–heart axis may provide new opportunities for the prevention and treatment of cardiovascular disorders.
Methods: This narrative review summarizes current evidence on the role of gut microbiota in cardiovascular disease. Relevant studies investigating gut microbial dysbiosis, microbial metabolites, immune signaling pathways, and inflammatory mechanisms associated with cardiovascular pathology were reviewed to provide an integrated overview of the gut–heart axis.
Results: The gut microbiota contributes to cardiovascular disease through structural components such as lipopolysaccharides (LPS) and metabolites including histamine, trimethylamine N-oxide (TMAO), indoxyl sulfate, and other biogenic amines. These microbial products disrupt intestinal barrier integrity, promote systemic immune activation, and stimulate Toll-like receptor (TLR)-mediated signaling pathways, leading to endothelial dysfunction, vascular inflammation, and metabolic disturbances. Dysbiosis further amplifies chronic inflammation and immune dysregulation, contributing to the development and progression of atherosclerosis, hypertension, heart failure, metabolic syndrome, and cardiac arrhythmias. Collectively, these findings identify the gut microbiota as a central regulator of cardiovascular homeostasis and disease.
Conclusion: Gut microbial dysbiosis and its associated inflammatory and immune pathways play pivotal roles in the pathogenesis of cardiovascular disease. Therapeutic strategies targeting the gut microbiota, including probiotics, prebiotics, dietary interventions, and targeted antimicrobial approaches, may attenuate gut-derived inflammation and improve cardiovascular outcomes. Further investigation of the gut–heart axis may facilitate the development of novel preventive and therapeutic strategies for cardiovascular disease.
Keywords: Gut microbiota, cardiovascular disease, Inflammation, Lipopolysaccharides, Toll-like receptors

P665, Sympathectomy: Ventricular remodeling after stroke

Hajar Ebrahimiyan[1], Aminollah Bahaoddini[1], Ali Reaza Tavassoli[2], Mohammad Reza Namavar[3]
1. Department of Biology, College of Sciences, Shiraz University, Shiraz, Iran
2. Department of Pathology, Fasa University of Medical Science, Fasa, Iran
3. Histomorphometry and Stereology Research Center, Department of Anatomical Sciences, Shiraz University of Medical Science, Shiraz, Iran

Background: Evidence suggests that stroke may cause myocardial injury and lead to cardiac dysfunction. Various types of strokes are associated with distinct pathological changes in the ventricular myocardium, a condition known as myocytolysis. Following the stroke, the sympathetic nervous system is activated. This study aimed to investigate the impact of sympathetic denervation on cardiac complications caused by stroke.
Methods: Cerebral ischemia was induced using middle cerebral artery occlusion (MCAO) for one hour (n=14). The animals were divided into two groups: MCAO and MCAO with sympathectomy. In the treatment group, the superior cervical ganglion was transected after one hour of ischemia and during the reperfusion phase. All animals, after 48 hours, were euthanized and their hearts were removed. Heart tissue sections were stained with hematoxylin and eosin. The thickness of the left ventricle was studied. Additionally, animals were assessed for neurological function using the Garcia scale, two hours after stroke, and 24 hours later.
Results: The Garcia scale as an indicator of the ischemia induction was significantly decreased two hours post-ischemia, which was elevated by sympathectomy after 24 hours. Left ventricular thickness decreased significantly after stroke, and sympathectomy was able to prevent its decrease.
Conclusion: Our research indicates that sympathectomy may be a suitable option for diminishing cardiac atrophy following a stroke.
Keywords: Superior cervical ganglion, MCAO, cardiac remodeling, Left ventricle.

P666, Cardio-protective effect of hydro-alcoholic extract of Myrtus communis L. against ischemia-reperfusion injury in isolated rat heart: the role of Nitric oxide and mitochondrial ATP-sensitive K channel

Zeinab Parvin[1], Alireza Imani[1]
1. Department of Physiology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran

Background: Coronary Behnaz Mokhtari is one of the main causes of death in the world. Myrtus communis L (Myrtle) is known for the cardio-tonic effect in traditional medicine. The purpose of the current study is to evaluate the cardio-protective effect of hydro-alcoholic extract of myrtle against ischemia-reperfusion injury in isolated heart and to investigate the effective mechanisms, including the role of nitric oxide pathway and mitochondrial ATP-sensitive K channel (mitoKATP channel).
Materials: Animals were divided into seven groups (n=7): (1) IR; hearts were subjected to 30 min ischemia and 60 min reperfusion, (2, 3, 4) Myrtel extract was administered in three doses: M 0.25, M 2.5, M 5 (mg/kg), and were perfused 5 minute prior to reperfusion. To study the protective mechanisms of Myrtle, a N-nitro-L-arginine methyl ester (L-NAME) as NO synthase inhibitor and 5-hydroxydecanoic acid (5HD) as a specific inhibitor of mitoKATP channel were used (10-6M) separately in two groups and perfused for 10 min before ischemia (5) L-NAME+M 2.5, (6) 5-HD+M 2.5. (7) Precondition M 2.5: Myrtle extract was perfused for 20 min before ischemia. Then infarct size, ventricular arrhythmia, and creatine kinase-MB iso-enzyme (CK-MB) plasma level were measured. Hemodynamic parameters were recorded throughout the experiment. Outcome measures included heart rate (HR), left ventricular developed pressure (LVDP), rate product pressure (RPP), CK-MB enzyme, the ratio of infarct size to left ventricular area (IS/LV %) and ventricular arrhythmias consist of ventricular tachycardia (VT) and incidence of ventricular fibrillation (VF).
Results: The Myrtle extract significantly decreased heart rate (HR), left ventricular developed pressure (LVDP), rate of pressure product (RPP), infarct size, and CK-MB compared to the IR group. The M 2.5 has the lowest infarct size. Administration of L-NAME and 5-HD abolished the cardio-protective effect of Myrtle extract.
Conclusions: It was concluded that Myrtle extract has cardio-protective effect which is mediated through nitric oxide, mKATP channels and a reduction in the workload of the heart. Due to the efficiency of this plant, further studies should be carried out in other models, such as in vivo studies, to better understand other aspects of the plant's therapeutic effects on the heart.
Keywords: Myrtus communis L., Heart ischemia-reperfusion injury, Isolated heart model, L-NAME, 5-HD, Infarct size

P667, Therapeutic targeting of the gut-heart axis: Microbiome-based strategies in cardiovascular disease

Arefeh Moballegh[1], Zoreh Arab[2], Fereshteh Asgharzadeh[3]
1. Faculty of Medicine, Islamic Azad University, Mashhad Branch, Iran
2. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Neurogenic Inflammation Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: The gut–heart axis has emerged as a promising therapeutic target in cardiovascular medicine. Increasing evidence indicates that modulation of the gut microbiome may reduce cardiovascular risk by altering the production of harmful and protective microbial metabolites. Microbiome-targeted interventions represent innovative, noninvasive approaches for improving cardiovascular health through microbial and metabolic regulation.
Methods: This narrative review summarizes current evidence on microbiome-targeted therapeutic strategies for cardiovascular disease. Relevant studies evaluating probiotics, prebiotics, dietary interventions, fecal microbiota transplantation (FMT), and microbial metabolites were reviewed to assess their potential role in cardiovascular prevention and management.
Results: Microbiome-targeted interventions aim to restore microbial homeostasis and reduce the production of pro-inflammatory and pro-atherogenic metabolites, including trimethylamine N-oxide (TMAO) and lipopolysaccharides (LPS). These approaches also promote the generation of beneficial metabolites such as short-chain fatty acids (SCFAs) and polyphenol-derived compounds, which improve endothelial function, lower blood pressure, reduce systemic inflammation, and enhance metabolic homeostasis. Collectively, these findings suggest that modulation of the gut microbiome may provide complementary therapeutic benefits for the prevention and treatment of cardiovascular disease.
Conclusion: Targeting the gut microbiome represents a promising strategy for personalized cardiovascular medicine. Integrating microbiome-based interventions with conventional therapies may improve cardiovascular outcomes and support the development of precision and systems-level approaches to cardiovascular disease prevention and management.
Keywords: Gut–heart axis, Gut microbiome, Microbial metabolites, Dysbiosis, Cardiovascular disease

P668, Targeting the TGF-β/Smad signaling pathway to inhibit cardiac fibrosis in a myocardial infarction mouse model

Shabnam Mohammadi[1], Atena Mansouri[2], Farzaneh Afshari[3], Reyhane Vardian[1], Afsaneh Hokm Abadi[1]
1. Department of Anatomy and Cell Biology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Cellular and Molecular Research Center, Birjand University of Medical Sciences, Birjand, Iran
3. Department of Pathology, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Cardiovascular disease is one of the most important causes of death in the world. Considering that it seems that research on the TGF-β/Smad signaling pathway can be considered as a safe and therapeutic prospect for cardiac repair and regeneration, the aim of the present study was to investigate the effect of administering some herbal compounds on the TGF-β/Smad signaling pathway in cardiac tissue.
Methods: In this experimental study, rats were divided into control group, myocardial infarction group (administered 100 mg/kg isopropenolol intraperitoneally for 2 consecutive days) and different extract groups. Extracts were prepared from Biebersteinia, Solanum nigrum, Cleome coluteoides, Anagalis arvensis, Capsella bursa, Falcaria vulgaris, Tragopogon, Eryangium caeruleum, Fumaria vaillantii, Verbascum, Peganum harmala, Hyperium perforatum, prangos latiloba, stachys setifera, Ferula, Reseda lutea, Ferulago angulate, hymenocrater calycinus, saliva officialis, Glycyrrhiza glabra, and rosemary. Then, the expression level of TGF- β gene in the rat heart and serum levels of CK-MB enzyme were examined.
Results: The results of statistical analysis showed that TGF-β gene expression was significantly reduced in the Hyperium perforatum (p=0.001) and Biebersteinia (p=0.002), Solanum nigrum (p=0.004), Cleome coluteoides (p=0.005) and Ferula (p=0.005) groups compared to the stroke group. In addition, smad gene expression was significantly reduced in the Hyperium perforatum (p=0.001) and Biebersteinia (p=0.001), Solanum nigrum (p=0.003), Cleome coluteoides (p=0.004) and Ferula (p=0.004) groups compared to the stroke group.
Conclusion: Administration of Hyperium perforatum, Biebersteini, Solanum nigrum, Cleome coluteoides, and Ferula extracts significantly inhibited the TGF-β/smad signaling pathway in a mouse model of myocardial infarction.
Keywords: Myocardial infarction, Mice, Transforming Growth Factor beta, Plant extracts

P669, 4-methylumbelliferone alleviated myocardial ischemia/ reperfusion injury in rats through modulation of the TLR4/NF-κB/NLRP3 pathway

Alireza Moradi Khankandi[1], Mohammad Reza Aslani[1]
1. Lung Diseases Research Center, Ardabil University of Medical Sciences, Ardabil, Iran

Background: Myocardial ischemia-reperfusion injury (MI/R) is a leading cause of death globally due to heart-related issues. This research focused on investigating how 4-methylumbelliferone (4-MU) might protect against MI/R in rats.
Methods: A total of 60 Wistar rats were assigned to four experimental groups (15 per group): Sham, MI/R, MI/R with vehicle treatment, and MI/R with 4-MU treatment. MI/R was produced by 30-min LAD coronary artery occlusion. 4-MU (25 mg/kg, i.p.) was given before reperfusion. Cardiac function, oxidative stress biomarkers, fibrosis level, and inflammatory cytokines were assessed via echocardiography, Western blot, and ELISA.
Results: Induction of MI/R resulted in reduced left ventricular contractile performance, along with enhanced cardiac fibrosis and myocardial injury. The levels of IL-18, TNF-α, and IL-1β in serum were elevated, whereas IL-10 levels were reduced. Oxidative stress was evident, as indicated by higher MDA levels and reduced CAT, GSH, and SOD in the MI/R group. Moreover, cardiac expression of NLRP3, TLR4, and NF-κB, proteins was significantly upregulated. Treatment with 4-MU markedly preserved cardiac function and reduced pathological alterations by suppressing inflammatory cytokine release and restoring oxidant/antioxidant balance, potentially via modulation of the TLR4/NF-κB/NLRP3 pathway.
Conclusion: 4-MU exhibits cardioprotective potential by mitigating oxidative stress and inflammatory damage, most likely through regulation of the TLR4/NF-κB/NLRP3 pathway.
Keywords: Myocardial ischemia- Reperfusion injury, 4-Methylumbilliferon, Inflammation, Oxidative stress, NF-κB.

P671, Effect of gender on renal non-hemodynamic responses to Ang II in 9-12- and 26-30-week-old normotensive rats: the role of Mas receptor

Fatemeh Eshraghi-Jazi[1], Mehdi Nematbakhsh[1,2], Ardeshir Talebi[3]
1.Water and Electrolyte Research Center, School of Medicine, Isfahan University of Medical Sciences, Isfahan, I.R. Iran
2. Department of Physiology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, I.R. Iran
3. Department of Pathology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, I.R. Iran

Background: Mas receptor (MasR) plays a role in the aging process. However, the relationship between age and MasR in renal non-vascular responses to angiotensin II in male and female rats remained unclear. The current study aimed to investigate the effect of gender on renal non-vascular responses to angiotensin II in the presence or absence of MasR antagonist (A779) in 9-12- and 26-30- week-old normotensive Wistar rats.
Methods: After anesthetizing male and female rats, arterial and venous vessels were cannulated, and the non-vascular responses to angiotensin II in the presence or absence of A779 were assessed between male and female groups at each age range.
Results: The 9-12-week-old female group receiving A779 showed a significant increase in serum nitrite level compared to the 9-12-week-old male group receiving A779. However, in the absence of MasR inhibitor, serum nitrite level significantly increased in the 26-30-week-old female group compared to the 26-30-week-old male group. The kidney weight, kidney tissue score, and urine flow showed no significant changes between male and female groups receiving placebo or A779 at 9-12- and 26-30-week groups.
Conclusion: Inhibition or non-inhibition of MasR affects serum nitrite level in response to angiotensin II in male and female groups, which is related to age.
Keywords: Renin-angiotensin system, Age, Gender, Mas receptor, Nitrite

P672, The expression of renal clock genes varies by gender and circadian rhythm

Shahrzad Sadat Eftekhar Vaghefi[1,2], Mohammad Khaksari Haddad[3,7], Fatemeh Mousavi[4], Zahra Soltani[3,7], Gholamreza Asadikaram[7,8], Fatemeh Shahsavari[5,6], zahra sheykhshoaiee[1], Shahriar Dabiri[1]

1. Department of Medicine, Ke.C., Islamic Azad University, Kerman, Iran
2. Pathology and Stem Cell Research Center, Kerman University of Medical Sciences, Kerman, Iran
3. Department of Physiology and Pharmacology, Kerman University of Medical Sciences, Kerman, Iran
4. Physiology Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
5. Neuroscience Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
6. Department of Biology, Faculty of Science, Shahid Bahonar University of Kerman, Kerman, Iran
7. Endocrine and Metabolism Research Center, Institute of Basic and Clinical Physiology Sciences, Kerman University of Medical Sciences, Kerman, Iran
8. Department of Biochemistry, School of Medicine, Kerman University of Medical Sciences, Kerman, Iran

Background: Chronic kidney disease (CKD) is characterized by the progressive decline of renal function, a process increasingly recognized to be modulated by circadian rhythms. Core clock genes, *BMAL1* and *PER1*, play essential roles in regulating renal physiology across the 24-hour cycle. Sex differences and hormonal status influence circadian dynamics and may modify CKD progression. This study aimed to evaluate the effects of circadian rhythm and sex on circadian clock gene expression in a rat model of CKD.

Methods: Wistar rats were assigned to control or CKD groups and further stratified into male, female, and ovariectomized female subgroups. Renal tissues were collected at two circadian time points (12:00 p.m. and 12:00 a.m.). Expression levels of BMAL1 and PER1 proteins were assessed using immunohistochemistry, and histopathological examinations were performed to evaluate structural changes.

Results: CKD rats exhibited a marked decrease in BMAL1 expression accompanied by an elevation in PER1 levels, with the most pronounced alterations observed in males and ovariectomized females. These findings indicate a potential protective role of estrogen in preserving circadian homeostasis. Histopathological analyses were consistent with the observed molecular disruptions.

Conclusion: This study highlights the interplay between circadian clock regulation, renal pathology, and sex-related hormonal factors. These insights may inform the development of chronotherapy-based and sex-specific strategies to improve CKD management and therapeutic outcomes.

Keywords: Chronic kidney disease, Circadian clocks, Sex

P673, Relationship between gender differences and circadian rhythm on renal function in a rat model of chronic kidney disease.

Shahrzad Sadat Eftekhar Vaghefi[1,2], Mohammad Khaksari Haddad[3,7], Fatemeh Mousavi[4], Zahra Soltani[3,7], Gholamreza Asadikaram[7,8], Fatemeh Shahsavari[5,6], Shahriar Dabiri[1]

1. Department of Medicine, Ke.C., Islamic Azad University, Kerman, Iran
2. Pathology and Stem Cell Research Center, Kerman University of Medical Sciences, Kerman, Iran
3. Department of Physiology and Pharmacology, Kerman University of Medical Sciences, Kerman, Iran
4. Physiology Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
5. Neuroscience Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
6. Department of Biology, Faculty of Science, Shahid Bahonar University of Kerman, Kerman, Iran
7. Endocrine and Metabolism Research Center, Institute of Basic and Clinical Physiology Sciences, Kerman University of Medical Sciences, Kerman, Iran
8. Department of Biochemistry, School of Medicine, Kerman University of Medical Sciences, Kerman, Iran

Background: Chronic kidney disease (CKD) is characterized by the progressive decline of renal structure and function. Growing evidence indicates that sex-based biological differences may influence both the onset and progression of CKD. This study aimed to evaluate the effects of circadian rhythm and sex on biochemical and histopathological changes in a rat model of CKD.
Methods: Seventy-two Wistar rats were randomly assigned to either a CKD group or a control group. CKD was chemically induced, and urine samples were collected at 12:00 a.m. and 12:00 p.m. Levels of urinary urea, creatinine, and protein were measured, and glomerular filtration rate (GFR) was estimated. Histopathological assessment of right kidney tissue was also conducted.
Results: CKD induction led to significant increases in urine volume, urinary urea, creatinine, protein excretion, and histopathological injury across all experimental groups, independent of sampling time. Male rats demonstrated more pronounced renal dysfunction, particularly at 12:00 p.m., compared with both intact and ovariectomized females. These patterns support a sex-dependent diurnal variation in CKD severity.
Conclusion: Both circadian rhythm disturbances and CKD exert substantial effects on renal biochemical and structural parameters. Additionally, sex-specific physiological differences play an important role in modulating the extent of renal impairment. These findings underscore the importance of incorporating sex-based considerations in CKD research and therapeutic strategies.
Keywords: Chronic kidney disease, Gender, Circadian rhythm

P674, Co-treatment of yohimbine and sodium hydrosulfide attenuate the pyroptosis pathway in chronic kidney disease

Mahdi Hajiaqaei[1], Mehri Kadkhodaee[1], Mina Ranjbaran[1], Farzaneh Kianian[1], Behjat Seifi[1]
1. Department of Physiology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran

Background: Chronic kidney disease (CKD) is a progressive condition that potentially driven by the activation of the pyroptosis which induced by reactive oxygen species (ROS) and inflammation. This study aimed to attenuate pyroptosis mediated by the NLRP3-caspase-1 axis through the inhibition of α_2-adrenergic receptors in combination with sodium hydrosulfide (NaHS) donor.
Methods: Male rats were assigned to 3 groups: Sham, CKD and CKD + yohimbine + NaHS. CKD was induced by administering of adenine intraperitoneally at a dose of 50 mg/kg daily for 4 weeks. After that, in the groups receiving treatment, rats were given yohimbine at a subeffective dose of 0.3 mg/L and NaHS at 15 μmol/L in drinking water daily for 4 weeks. In eighth week, urine samples and serum sample were collected for measurement of renal functional parameters. left renal tissue was used for assessment of Catalase enzyme activity, IFN-γ and the tissue from the right kidney was utilized to measurement of pyroptosis protein level.
Results: The induction of CKD, decreased Catalase enzyme activity and increased IFN-γ level, NLRP3, caspase-1 protein level. Combination therapy improves above indices.
Conclusion: Dysregulation in catalase enzyme activity and IFN-γ level led to increase of caspase-1 and NLRP3 protein level and affected the BUN and creatinine, 24-hour urine volume, creatinine clearance and free water clearance as kidney functional parameters due to pyroptosis induction. The use of yohimbine and NaHS ameliorated the dysregulation of oxidative stress and inflammatory condition and inhibited the pyroptosis pathway.
Keywords: Yohimbine, NaHS, Pyroptosis, Caspase-1, NLRP3

P675, Gentamicin administration changes the renal expression of angiotensin II receptors in mice: a time-course study

Azadeh Khalili[1], Gholamreza Bayat[1], Soheila Hossein Zadeh[1], Hossein Karim[2,3]
1. Department of Physiology-Pharmacology-Medical Physics, School of Medicine, Alborz University of Medical Sciences, Karaj, Iran
2. Cardiovascular Research Center, Alborz University of Medical Sciences, Karaj, Iran
3. Department of Cardiology, School of Medicine, Alborz University of Medical Sciences, Karaj, Iran

Background: The renin-angiotensin-aldosterone system (RAAS) has two classical and alternative arms, which include ACE1/Ang II/AT1R and ACE2/Ang (1-7)/Mas-R components, respectively. Considering the importance RAAS system in normal function of the kidney, this study aims to investigate any changes in the expression of 2 types of Ang II receptor genes during 14 days in mice's kidney.
Methods: 35 male Wistar rats were randomly divided into 5 groups (n=7), including a control and four groups receiving gentamicin (GM) (100 mg/kg per day) which received i.p injection of GM for 3, 7, 10 and 14 days, respectively. Finally, the blood samples were collected through the hearts to measure serum levels of BUN and Cr. Moreover, changes in the renal expression of AT1R and AT2R genes was done using Real-time RT-PCR technique.
Results: The findings showed that gentamicin injection was associated with a significant increase in serum levels BUN and Cr. According to the molecular results, compared to the control group, the expression of AT1R was increased after 3 days of GM treatment while it was significantly down-regulated at 10th day. In contrast, compared to that of the control group, the expression of renal AT2R was significantly decreased among all of experimental groups.
Conclusion: Gentamicin-induced increase in the expression of renal AT1R followed by delayed receptor down-regulation, along with an extended reduction in the counterregulatory arm's component, AT2R throughout a 14 days, could indicate a new possible pathophysiological mechanism involved in the nephrotoxicity of gentamicin.
Keywords: Gentamicin, Renal Failure, AT_1R, AT_2R

P677, Protective effects of taranjabin extract against cisplatin-induced renal toxicity: Oxidative stress attenuation in rats

Mohammad Taghi Khoshniat[1], Mohammad Hossein Rigi[1], Abolfazl Khajavi Rad[1,2], Sara Hoseinian[1,2], Vahideh Ghorani Sirjani[1]

1. Department of Physiology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Applied biomedical Research Center, Basic Sciences Research Institute, Mashhad University of Medical Sciences, and Mashhad, Iran

Background: Cisplatin is one of the most common chemotherapy drugs, but its clinical use is limited due to side effects. The most common side effect of cisplatin is nephrotoxicity. The mechanisms of nephrotoxicity caused by cisplatin include oxidative damage and inflammation. The use of drugs with antioxidant properties may help mitigate nephrotoxicity. Among these drugs, Taranjabin can be mentioned. Taranjabin has antioxidant, anti-inflammatory, and diuretic properties.

Methods: 40 male Wistar rats were randomly divided into five groups: 1) control, 2) cisplatin (7 mg/kg), 3) vitamin E (100 mg/kg) + cisplatin, 4) Taranjabin (200 mg/kg) + cisplatin, 5) Taranjabin (400 mg/kg) + cisplatin. The study was 11 days, and on day 4, cisplatin was injected intraperitoneally. Administration of normal saline, hydroalcoholic extract of Taranjabin, and vitamin E was started on day 1 and continued until the end of the study.

Results: In the cisplatin group, MDA concentration in the kidney tissue increased significantly compared to the control group. In contrast, the total concentration of thiol groups, catalase enzyme activity, and SOD in the kidney tissue showed a significant decrease compared to this group (all $p < 0.001$). Administration of vitamin E, Taranjabin at a dose of 200 mg/kg, and Taranjabin at a dose of 400 mg/kg significantly improved the aforementioned parameters following cisplatin administration (all $p < 0.001$).

Conclusion: The findings of this study suggest that Taranjabin extract may be a promising treatment option for cisplatin-induced renal toxicity. The observed benefits of Taranjabin extract are comparable to those of vitamin E, a known antioxidant.

Keywords: Taranjabin, cisplatin, nephrotoxicity

P678, Renoprotective effect of remote ischemic post-conditioning against ischemia/reperfusion-induced acute kidney injury

Murtadha Ghafil Jasim Hamdan[1], Firouzeh Gholampour[1], Zeinab Karimi[2]
1. Department of Biology, School of Science, Shiraz University, Shiraz, Iran
2. Shiraz Nephro-Urology Research Center, Shiraz University of Medical Sciences, Shiraz, Iran

Background: Ischemia/reperfusion (IR)-induced acute kidney injury (AKI) is one of the leading causes of rapid kidney dysfunction and is associated with high morbidity and mortality rates. Recent studies have suggested that remote ischemic postconditioning (RIPostC) has therapeutic effects against various kidney disorders. Therefore, this study investigated the renoprotective effects of RIPostC on IR-induced AKI in rats.
Methods: Twenty-one male Sprague-Dawley rats were divided into three groups (n = 7 per group): Control, I/R, and I/R + RIPostC. The renal ischemia-reperfusion injury (IRI) model was induced by clamping the renal pedicles for 60 min minutes, by 24 h reperfusion. RIPostC consisted of three cycles of 5 minutes of ischemia- reperfusion applied to the left femoral artery following renal ischemia. At the end of the experiments, plasma and urine samples were collected for renal functional evaluation.
Results: Renal IRI resulted in a significant increase in plasma creatinine levels, blood urea nitrogen (BUN), and sodium fractional excretion (FE_{Na}), accompanied by increased histological damage and oxidative stress in kidney tissue. Conversely, there was a notable decrease in creatinine clearance (C_{Cr}), effective osmolar clearance ($^{eff}C_{Osm}$), and effective free-water reabsorption ($^{eff}T^{C}_{H2O}$) in the I/R group compared to the sham group. Treatment with RIPostC mitigated all of these alterations.
Conclusion: RIPostC mitigates IRI-induced renal dysfunction and tissue damages by reducing oxidative stress.
Keywords: Acute kidney injury, Free-water reabsorption, Osmolarity, Remote ischemic post-conditioning

P679, The effect of folic acid on hypothyroidism-associated oxidative damage in rat kidney

Vahideh Ghorani[1,2], Sara Hosseinian[3,1], Abolfazl Khajavi Rad[3,1], Mahmoud Hosseini[3,1], Mohammad Taghi Khoshniat[3], Mousa-Al-Reza Hajzadeh[3], Farzaneh Vafaee[4]

1. Applied biomedical Research Center, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
2. Clinical Research Development Unit, Imam Reza Hospital, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Physiology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
4. Department of Neuroscience, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Hypothyroidism affects renal physiology and is associated with increased oxidative stress. There are various mechanisms responsible for the progression of kidney damage and thyroid disorders induced oxidative stress is one of them. This study was designed to investigate the effects of folic acid on histological changes and oxidative stress in the kidney of rats caused by hypothyroidism.

Methods: Forty male rats were randomly divided into 5 groups: control group (received normal water for 6 weeks), hypothyroid group (received normal water containing 0.3% propyl thiouracil (PTU) for 6 weeks), and hypothyroid + folic acid groups that received doses of 5, 10 and 15 mg/kg folic acid. After the treatment period, kidneys were collected immediately and weighed. Kidney tissues were evaluated histologically, and levels of MDA (malondialdehyde), catalase (CAT) and thiol were quantified.

Results: Hypothyroid rats showed lower levels of thiol and CAT as well as higher level of MDA compared to control group ($p<0.05$ for all cases). Folic acid, at 15 mg/kg, significantly reduced MDA concentration ($p<0.05$), while increased thiol value at 5 mg/kg ($p<0.05$) and CAT activity at all concentrations ($p<0.05$ to $p<0.01$). Folic acid administration also attenuated pathological alterations including tubular necrosis and glomerular damage caused by hypothyroidism.

Conclusion: Based on the findings of the present study, folic acid can improve kidney damage caused by hypothyroidism, which is probably secondary to improving the antioxidant status of the body.

Keywords: Folic acid, Hypothyroidism, Oxidative stress, Histopathology

P680, Pre- and post-treatment effects of hesperetin on acute kidney injury induced by ischemia-reperfusion in male rats

Zahra Mobara[1], Firouzeh Gholampour[1]
1. Biology Department. Shiraz University, Shiraz, Iran

Background: Acute kidney injury (AKI) is a clinical syndrome associated with high mortality rates and a lack of definitive treatment options. One of the primary causes of AKI is ischemia-reperfusion (I/R) injury, which occurs when there is a sudden and temporary disruption of blood flow, leading to inflammation, oxidative stress, and damage to kidney cells. Addressing these risk factors through targeted treatment can help prevent the onset and progression of the disease. *Hesperetin*, a bioflavonoid found in citrus fruits, exhibits anti-inflammatory and antioxidant properties. The aim of this study was to investigate the therapeutic effects of Hesperetin on renal I/R- induced acute kidney injury.
Methods: In this study, 28 rats were randomly assigned to four groups: Sham, I/R, *Hesperetin* + I/R, and I/R + *Hesperetin. Hesperetin* was administered intraperitoneally at a dose of 50 mg/kg. To induce ischemia, the renal arteries were clamped for 45 minutes, followed by 24 hours of reperfusion. At the end of the 24-hour reperfusion period, blood and urine samples were collected to assess renal function.
Results: I/R injury significantly impacted kidney function, as evidenced by decreased creatinine clearance, increased sodium fractional excretion, reduced urine osmolality, and impaired effective water reabsorption. *Hesperetin* pre- and post-treatment attenuated all the changes.
Conclusion: These findings suggest that *Hesperetin* may serve as a therapeutic agent for mitigating renal IRI by improving renal function and reducing biochemical markers of kidney damage, thereby preserving water reabsorption capacity.
Keywords: Acute kidney injury*, Hesperetin,* Osmolality, Water reabsorption

P681, Effectiveness of ACE inhibitors, ARBs, and novel peptides in managing glomerulonephritis via ras inhibition, a systematic review

Sina Mohammadi[2], Aryan Vakilian [2], Narges Shahi [2], Maryam Maleki[1], Maryam Kheiri[1]
1. Department of Physiology, Faculty of Medicine, Ilam University of Medical Sciences, Ilam, Iran
2. Student Research Committee, Ilam University of Medical Sciences, Ilam, Iran

Background: Glomerular inflammation and progressive kidney degeneration are associated with Glomerulonephritis (GN). The development of GN includes the involvement of the renin-angiotensin system (RAS), which contributes to inflammation, fibrosis, and cell proliferation. Modulating the RAS in GN appears promising as a treatment strategy.
Methods: In this systematic review, relevant keywords were used to explore databases such as PubMed (MEDLINE), Scopus (Elsevier), and the Institute for Scientific Information (ISI) Web of Science up to December 2024. Twenty studies were selected based on predefined inclusion and exclusion criteria. These studies analyzed the effects of RAS-targeting therapies, including Angiotensin-Converting Enzyme Inhibitors (ACEIs), Angiotensin II receptor antagonists (ARBs), direct renin inhibitors, and new peptides like Ang-(1-7) and CAng-(1-7). The therapies were tested on different GN models, including IgA Nephropathy, Crescentic GN, and Antineutrophil Cytoplasmic Antibody-associated Glomerulonephritis (ANCA-GN).
Results: Among the various approaches, RAS modulation was identified as the most effective model in GN. Disease progression and response to treatment were linked to altered expression levels of ACE, ACE2, (P)RR, and the receptor for (pro)renin complex, along with changes in ERK1/2 and Wnt/beta-catenin pathways. Therefore, combination therapies may offer a more protective effect on the kidneys. Notably, reductions in urinary protein levels were associated with a more protective effect in treating GNs.
Conclusion: This systematic review offers insights into both beneficial and adverse interventions related to RAS in GN, providing valuable considerations for researchers and clinicians.
Keywords: Glomerulonephritis; Renin-Angiotensin System; Angiotensin II; Proteinuria

P682, Protective effects of inositol on cisplatin-induced nephrotoxicity in Wistar rats

Bahareh Mahmoudi[1], Fatemeh Hoseinpour[2], Mohammad Hashemnia[3]
1. Department of Basic Sciences, Faculty of Veterinary Medicine, Shiraz University, Shiraz, Iran
2. Department of Basic Sciences, Faculty of Veterinary Medicine, Razi University, Kermanshah, Iran
3. Department of Pathobiology, Faculty of Veterinary Medicine, Razi University, Kermanshah, Iran

Background: Cisplatin is a widely used and effective chemotherapeutic drug for treating various tumors; however, its clinical application is often constrained by nephrotoxicity. Given the strong antioxidant properties of inositol, this study aimed to investigate its protective role against kidney damage induced by cisplatin in Wistar rats.
Methods: Twenty-four adult female Wistar rats were randomly assigned to three groups (n=8 each): negative control (normal saline), positive control (normal saline plus cisplatin), and treatment group (inositol plus cisplatin). Normal saline and inositol were administered orally for 21 days. All groups, except the negative control, received a single intraperitoneal dose of cisplatin (7 mg/kg) on day 15. On day 22, blood samples were collected under anesthesia, and the animals were euthanized for kidney tissue analysis, including histopathology.
Results: Inositol pre-treatment significantly improved renal histopathological lesions and reduced elevated blood urea nitrogen and creatinine levels caused by cisplatin.
Conclusion: Our findings suggest that inositol pre-treatment provides significant protection against cisplatin-induced nephrotoxicity, potentially due to its antioxidant effects.
Keywords: Inositol, Nephrotoxicity, Cisplatin, Rats

P683, Cognitive and neuronal protective effects of nahs in chronic kidney disease

Yasamin Morvarid[1], Sara Hosseinian[1], Mahdi Hajiaqaei[2], Behjat Seifi[2]
1. Department of Physiology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Physiology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran

Background: Cognitive impairment is a common complication of chronic kidney disease (CKD). This study evaluated whether sodium hydrosulfide (NaHS), an H_2S donor, can attenuate CKD-related memory deficits and hippocampal neuronal loss.
Methods: Forty rats were divided into four groups: sham, CKD, CKD + sodium hydrosulfide (NaHS, 30 μM in drinking water for 28 days)) and CKD + NaHS+ amino-oxy acetic acid (AOAA, 8.5 mg/kg intraperitoneally for 28 days). At the end of the study, behavioral tests (Shuttle box, Y maze, Elevated Zero maze and Barnes maze tests) were performed to evaluate the cognitive status. Blood urea nitrogen (BUN) and serum creatinine levels along with assessment of renal tissue was performed to evaluate as well as the expression of p53, oxidative stress markers, and neuronal loss in the hippocampus were evaluated.
Results: CKD induction elevated BUN and creatinine levels, impaired renal histology, and produced notable neuronal loss in the hippocampus, accompanied by deficits in learning and memory. Administration of NaHS alleviated several of these CKD-related changes and reduced neuronal damage, though some cognitive outcomes did not completely recover to sham levels. The co-administration of AOAA, a CBS inhibitor, prevented the beneficial effects of NaHS on both behavioral and histological parameters.
Conclusion: This study demonstrated that NaHS enhances cognitive outcomes and preserves hippocampal neurons in CKD rats, supporting a clear neuroprotective role for hydrogen sulfide in this model.
Keywords: Hydrogen sulfide, Chronic kidney disease, Cognitive impairment

P684, Protective effects of late remote ischemic pre-conditioning against ischemia/reperfusion-induced acute kidney injury by modulating oxidative stress pathway

Khojasteh Malekmohammad[1], Firouzeh Gholampour[1], Zeinab Karimi[2]
1. Department of Biology, School of Science, Shiraz University, Shiraz, Iran
2. Shiraz Nephro-Urology Research Center, Shiraz University of Medical Sciences, Shiraz, Iran

Background: Ischemia-Reperfusion Injury (IRI) is one of the most common causes of Acute Kidney Injury (AKI). Remote Ischemic Pre-Conditioning (RIPreC) as a novel therapeutic strategy can decrease the occurrence of AKI. The aim of this study was to investigate the renoprotective effects of RIPreC on IRI-induced kidney dysfunction and oxidative stress in rats.
Methods: 21 male Sprague-Dawley rats were dedicated into three groups (n = 7 per group): control, I/R, and late rIPreC+I/R. Renal pedicles were clamped for 60 minutes followed by 24 h reperfusion. RIPreC consisted of four cycles of 5 min of left femoral artery ischemia followed by 5 min of reperfusion administered 24 hours before the renal ischemia. Blood, urine, and tissue samples were collected to assess kidney function, oxidative stress and histological changes.
Results: Renal IR caused significant increase in plasma creatinine and Blood Urea Nitrogen (BUN) levels. This was accompanied by a significant increase in the level of Total Oxidant Status (TOS) and decrease in the level of Total Antioxidant Capacity (TAC) in kidney tissue, as well as histological damages. RIPreC treatment improved all these changes.
Conclusion: Thus, RIPreC protects the kidneys against IRI by modulating of oxidative stress pathway and strengthening the antioxidant system.
Keywords: Ischemia -Reperfusion, Acute kidney injury, Late remote ischemic pre-conditioning, Oxidative stress.

P685, Comparative investigation of the protective effects of citral, silymarin, curcumin and quercetin on doxorubicin-induced nephrotoxicity in rats

Hanieh Yabandeh[1], Nasrollah Ahmadi[1], Mohammad Foad Noorbakhsh[2],
1. Department of Pathobiology, School of Veterinary Medicine, Shiraz University, Shiraz, Iran
2. Department of Basic Sciences, School of Veterinary Medicine, Shiraz University, Shiraz, Iran

Background: One of the side effects caused by the administration of doxorubicin, an anticancer drug, is nephrotoxicity. The present study was conducted with the aim of investigating the protective effects of citral, silymarin, curcumin and quercetin against doxorubicin-induced nephrotoxicity.
Methods: 42 rats were divided into 7 groups, including healthy control groups, doxorubicin (2.5 mg/kg), drug carrier (DW+DMSO), citral (25 mg/kg), silymarin (50 mg/kg), curcumin (200 mg/kg), and quercetin (50 mg/kg) treatment groups were divided. At the end of the study, the rats were anesthetized with xylazine and ketamine and euthanized by CO2, and necessary samples were taken from blood to measure BUN and creatinine, and from kidney tissue for histopathological examination as well as antioxidant activity.
Results: The amount of BUN and creatinine decreased in all treatment groups compared to the doxorubicin group, which was significant only in the silymarin group ($p<0.05$). On the other hand, citral, silymarin, curcumin and quercetin treatment groups had a marked increase in total antioxidant capacity and a noticeable decrease in malondialdehyde compared to the doxorubicin group. In the rats of the doxorubicin group, severe blood vascular and glomerular congestion were observed. Histopathologicaly, the structure and architecture of all parts of the kidney tissue were normal and similar to the kidney tissue in the healtyhy control group.
Conclusion: It was concluded that the therapeutic compounds used in the present study have a protective effect against kidney damage caused by doxorubicin and silymarin showed a more therapeutic potential effect.
Keywords: Doxorubicin, Citral, Quercetin, Silymarin, Curcumin

P687, Various endurance training intensities improve GFR and Up-regulate AQP2/GSK3β in lithium-induced nephropathic rats

Shadan Saberi[1], Mohammad Amin Rajizadeh[1], Mohammad Khaksari[2], Azadeh Saber[1], Mohammad Akhbari[1], Soheil Aminizadeh[1,3], Forouzan Rafie

1. Physiology Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
2. Endocrinology and Metabolism Research Center, Kerman University of Medical Sciences, Kerman, Iran
3.Department of Physiology and Pharmacology, Afzalipour School of Medicine, and Physiology Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
4. Neuroscience Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran
5. Department of Medicine, Division of Geriatrics & Gerontology, Emory University School of Medicine, Atlanta, GA, USA

Background: Lithium is commonly used for mood stabilization in bipolar disorder, but its long-term use can lead to nephrotoxicity, characterized by reduced glomerular filtration rate (GFR) and potential progression to end-stage renal disease (ESRD). This study investigates the effects of different intensities of endurance training on kidney function and inflammation in a rat model of lithium-induced nephropathy, focusing on aquaporin 2 (AQP2), glycogen synthase kinase 3-beta (GSK-3β), and SIRT1 expression.
Methods: Thirty-five male Wistar rats were divided into five groups: control, lithium-only, lithium with low-intensity exercise (LIT), lithium with medium-intensity exercise (MIT), and lithium with high-intensity exercise (HIT). A lithium-induced nephropathy model was established through dietary lithium administration, and exercise groups underwent treadmill training for eight weeks. Fractional excretion of sodium (FENa) was measured, and GFR was evaluated by Cr clearance. ELISA and Western blotting assessed inflammatory markers (TNF-α, IL-10), SIRT1, GSK-3β, and AQP2 expressions in kidney tissues.
Results: Lithium significantly reduced Cr clearance and increased FENa compared to controls. All exercise intensities improved Cr clearance and reduced FENa, with HIT showing the most significant improvement. Exercise at all intensities reduced TNF-α levels and increased IL-10 levels, with MIT and HIT significantly enhancing SIRT1 levels. Lithium reduced the expression of GSK-3β and AQP2, whereas exercise increased their expression across all intensities.
Conclusion: Endurance training, especially at high intensity, effectively mitigates lithium-induced renal impairment by improving GFR and reducing inflammation. These findings suggest that tailored exercise regimens could benefit patients on long-term lithium therapy to prevent renal damage.
Keywords: Lithium-induced nephropathy, Exercise intensity, Glomerular filtration rate, Aquaporin 2/GSK-3β, SIRT1

P688, Altered lung inflammation and expression of endoplasmic reticulum stress markers in male mice aged-asthma model

Mohammad Reza Aslani[1], Farshad Armin, Ali Abedi, Hakimeh Saadati
1. Lung Diseases Research Center, Ardabil University of Medical Sciences, Ardabil, Iran

Background: Although there is a strong correlation between aging and asthma pathophysiology, the underlying mechanism has not been fully elucidated. The endoplasmic reticulum (ER) has been demonstrated to be a crucial intracellular organelle involved in the pathogenesis of numerous diseases.
The aim of the current study was to investigate ER stress markers in the lung tissue of aged ovalbumin (OVA)-sensitized mice.
Methods: Male BALB/C mice were randomly divided into the following four groups (10 in each): 1) control, 2) OVA-sensitized (OVA), 3) D-galactose-induced aging (D-gal), and 4) OVA-sensitized associated with D-galactose-induced aging (OVA+D-gal). Total WBCs and differential cells were counted using the bronchoalveolar lavage (BAL) fluid. Lung tissue was analyzed for ER stress markers (ATF4, ATF6, GRP78, CHOP, and XBP1) through Real Time-PCR technique as well as histopathological assessment.
Results: The data indicated a significant increase in both total WBCs and differential cells within the OVA, D-gal, and OVA+D-gal groups when compared to the control group, particularly evident in the OVA+D-gal group.
Conclusion: Also, the results showed that the increased expression of ER stress markers (ATF4, ATF6, GRP78, CHOP, and XBP1) was significantly higher in the OVA, D-gal, and OVA+D-gal groups than in the control group. Interestingly, the increased expression of CHOP, ATF4, and XBP1 was observed in the OVA+D-gal group more than in other groups. In aged OVA-sensitized mice, the findings revealed a maladaptive ER stress response in their lung tissue, characterized by elevated levels of CHOP, ATF4, and XBP1 expression.

P689, Investigation of the anti-inflammatory and antioxidant effects of Hypericum perforatum extract on pathophysiological pathways in rats with allergic asthma

Fahimeh Rostamabadi[1], Reza Nosratabadi[2], Amir Rahnama[3], Vahid Mohammadi Shahrokhi[4]
1. Clinical Research Development Unit, Pastor Educational Hospital, Bam University of Medical Sciences, Bam, Iran
2.Department of Medical Immunology, Afzalipour Faculty of Medicine, Kerman University of Medical Sciences, Kerman, Iran
3. Department of Non-Communicable Diseases Research Center, Rafsanjan University of Medical Sciences, Rafsanjan, Iran
4. Immunology of Infectious Diseases Research Center, Research Institute of Basic Medical Sciences, Rafsanjan University of Medical Sciences, Rafsanjan, Iran

Background: Allergic asthma is a chronic and common systemic disease that clears the air and increases by leaving the airways. This disease is caused by excessive activation of the immune system against allergens. *Hypericum perforatum* is a plant from the *Hypericaceae* family that contains phenolic and flavonoid compounds such as hyperforin and hypericin and has anti-inflammatory, antidepressant and antioxidant properties. Since plant compounds with antioxidant and anti-hobby properties can improve the condition of patients with asthma, the aim of this study was to investigate the effect of *Hypericum perforatum* extract on plant and herbal indices in an animal model of allergic asthma.
Methods: In this study, mice were randomly divided into healthy control groups, asthma control groups and groups receiving different doses of *Hypericum perforatum* extract. Allergic asthma was induced by sensitization and challenge with ovalbumin. After treatment periods, serum IL-5 and IL-10 cytokines and diagnostic indices including (MDA as lipid peroxidation indices and antioxidant enzymes (GPx) and (SOD) in lung tissue were measured.
Results: The results showed that administration of *Hypericum perforatum* extract caused a decrease in IL-5 levels, an increase in IL-10 levels, a decrease in MDA, and an increase in the activities of GPx and SOD enzymes compared to the asthma group ($P<0.05$).
Conclusion*: Hypericum perforatum* extract, with its phenolic and flavonoid compounds and by modulating cytokine composition and reducing oxidative stress, has a significant protective effect against the vulnerability and damage caused by allergic asthma.
Keywords: Asthma, *Hypericum perforatum*, Balb/c.

P690, Gender-dependent renal hemodynamic responses to angiotensin 1-7 following AT1 receptor blockade and chronic renal denervation in rats

Fatemeh Kharazmi [1,2], Ali-Asghar Pourshanazari [2], Mehdi Nematbakhsh[2,3]
1. Endocrinology and Metabolism Research Center, Hormozgan University of Medical Sciences, Bandar Abbas, Iran
2. Department of Physiology, Isfahan University of Medical Sciences, Isfahan, Iran
3. Water and Electrolytes Research Center, Isfahan University of Medical Sciences, Isfahan, Iran

Background: The sympathetic nervous system plays a crucial role in regulating renal hemodynamic, particularly through its interaction with the renin-angiotensin system (RAS). This study aimed to investigate the effects of angiotensin II type 1 receptor (AT1R) blockade on renal hemodynamic responses to angiotensin 1–7 (Ang 1–7) infusion in innervated and chronically renal denervated (CRDN) rats.
Methods: Male and female Wistar rats underwent unilateral nephrectomy. Follow four weeks, the rats were categorized into two groups: innervated and CRDN groups. Each group received either saline or losartan, followed by graded Ang1-7 infusions. Mean arterial pressure (MAP), renal perfusion pressure (RPP), renal blood flow (RBF), and renal vascular resistance (RVR) were measured.
Results: At baseline, CRDN significantly elevated RVR and RPP and reduced RBF in both gender. However, prior to Ang 1–7 infusions, no significant alterations in renal hemodynamic parameters including RBF and RVR were observed in either saline- or losartan-treated groups of both sexes. Ang 1–7 infusion led to an increase in RBF in male rats treated with either saline ($P<0.05$) or losartan($P<0.001$), with a more pronounced effect in those receiving losartan. CRDN attenuated this response between losartan-treated ($P<0.05$) male rat groups, but did not affect RBF responses in females under either condition.
Conclusion: CRDN altered renal hemodynamics at baseline and predominantly affected renal hemodynamic responses to Ang 1–7 administrations in male rats. These effects were modulated by sex differences and the presence of AT1R antagonists.
Keywords: Angiotensin 1-7, losartan, Renal blood flow, Denervation.

P691, Spirulina platensis mitigates cardiac electrophysiological disturbances and echocardiographic parameters following LAD-ligated ischemia-reperfusion rat model

Atefeh Rahimi [1,2], Zakieh Sadat Sheikhalishahi [1,2], Somaye Keshavarz [1,3], Ali Rafati [1,3]
1. Department of physiology, Medicine faculty, Shiraz University of medical sciences, Shiraz, Iran
2. Research Center, Shiraz University of Medical Sciences, Shiraz, Iran
3. Histomorphometry and Stereology Research Center, Shiraz University of Medical Sciences, Shiraz, Iran

Background: Myocardial ischemia (MI) leads to profound electrical instability and ventricular dysfunction. This study evaluated Spirulina platensis supplementation effect on post-MI structural and functional abnormalities.
Methods: Eighteen male Sprague–Dawley rats were assigned to Sham, MI, or MI + Spirulina groups. MI was induced by left anterior descending (LAD) coronary artery ligation for 30 minutes, confirmed by myocardial cyanosis and ST-segment elevation on continuous lead II ECG using a Power Lab system. Reperfusion followed ligature release. Spirulina (1 g/kg/day, oral gavage) was administered for 30 days. ECG and echocardiography were performed to assess electrophysiological alterations and ventricular function.
Results: MI caused marked ECG disturbances, including reduced heart rate ($p<0.0001$), increased RR ($p<0.001$) and PR intervals ($p<0.05$), QRS widening ($p<0.05$), and altered P-wave ($p<0.01$) and T-wave amplitudes ($p<0.0001$). ST-segment elevation ($p<0.01$) and QTc prolongation further confirmed ischemic injury. Spirulina supplementation partially corrected these abnormalities, restoring heart rate, shortening PR interval ($p<0.05$), and reducing T-wave and ST-segment deviations ($p<0.05$), indicating improved electrophysiological stability.
Echocardiography showed substantial ventricular remodeling in MI rats, with increased LVIDd and LVIDs (both $p<0.0001$), reduced fractional shortening (FS) ($p<0.01$) and ejection fraction (EF) ($p<0.0001$), and elevated EDV ($p<0.01$) and ESV ($p<0.0001$). Stroke volume (SV) was also reduced ($p<0.05$). Spirulina significantly improved all major parameters, decreasing ventricular dilation ($p<0.001$, $p<0.01$), lowering EDV and ESV ($p<0.0001$), and restoring FS ($p<0.01$), EF ($p<0.001$), and SV ($p<0.01$) toward near-sham values.
Conclusion: Spirulina supplementation confers meaningful cardioprotection following MI, improving electrical stability and mitigating adverse ventricular remodeling, likely through antioxidant and anti-inflammatory mechanisms.
Keywords: Electromagnetic radiation, Oxidative stress, Heart, Rat, Electrophysiology

P692, Electrophysiological and stereological effects of high band 5g electromagnetic fields on rat heart: insights into the protective role of vitamin C

Atefeh Rahimi [1,2], Ali Rafati [1,3], Narges Karbalaei [1,3], SMJ Mortazavi [4], Somaye Keshavarz [1,3], Maryam Naseh [3], Hadi Moatamed Jahromi [1], Ardeshir Nabizadeh [5]

1. Department of physiology, Medicine faculty, Shiraz University of medical sciences, Shiraz, Iran
2. Research Center, Shiraz University of Medical Sciences, Shiraz, Iran
3. Histomorphometry and Stereology Research Center, Shiraz University of Medical Sciences, Shiraz, Iran
4. Ionizing and Non-Ionizing Radiation Protection Research Center (INIRPRC), Shiraz University of Medical Sciences, Shiraz, Iran
5. Neuroscience Research Center, Institute of Neuroscience and Cognition, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: High-band 28 GHz 5G electromagnetic radiation (EMR) has emerged rapidly, yet its biological effects—particularly on the heart remain insufficiently characterized. This study evaluated physiological and stereological effects of short-term 28 GHz exposure alters, and whether Vitamin C can mitigate these effects.

Methods: Twenty-four male Sprague–Dawley rats were divided into Control, Sham, 5G-exposed (30 min/day for 14 days), and 5G + Vitamin C (250 mg/kg/day) groups. ECG parameters were recorded under anesthesia. Stereological assessments quantified myocardium, connective tissue, microvessel volumes, and total myocyte nuclei. Data were analyzed using ANOVA or Kruskal–Wallis tests.

Results: 5G exposure produced marked ECG disturbances. Heart rate decreased with RR interval prolongation. PR interval, P-wave duration, and QRS duration significantly increased. QT and QTc intervals were prolonged, while ST-segment height and T-wave amplitude were reduced. These findings indicate impaired excitability, slowed conduction, and altered repolarization. Structural analyses showed consistent tissue injury: myocardial volume declined, connective tissue volume increased, and microvessel volume decreased in the 5G group. A significant reduction in myocyte nuclei supported myocyte loss and early fibrotic remodeling. Vitamin C supplementation mitigated key conduction parameters, including PR, RR, and QTc intervals, relative to the 5G group. Stereology demonstrated protective structural effects, with partial preservation of myocardial and microvessel volumes, reduced connective tissue expansion, and attenuation of myocyte loss.

Conclusion: Exposure to 28 GHz 5G EMR induces significant electrical and structural cardiac alterations in rats, whereas Vitamin C provides measurable protection against these EMR-associated injuries.

Keywords: Electromagnetic radiation, Oxidative stress, Heart, rat, Electrophysiology

P693, The effect of a high-intensity interval training session on the level of cardiac oxidative stress in male rats induced by doxorubicin cardiotoxicity

Mahdieh Farahani[1], Alireza Ghardashi Afosi[1], Marzieh Farahani[3]
1. Department of Physical Education and Sport Sciences, Tehran University, Tehran, Iran
3. Department of Physical Education and Sport Sciences, Tehran Azad University, Tehran, Iran

Background: Doxorubicin (DOX) is an antibiotic with a broad spectrum of antitumor and anticancer activity, and its use causes severe toxicity in various tissues, including the heart. The aim of the present study was to investigate the effect of a high-intensity interval training (HIIT) course on the level of cardiac oxidative stress in male rats induced by doxorubicin cardiotoxicity.
Methods: Twenty-four male Wistar rats were randomly divided into three groups (N=8) (control (CON), doxorubicin control (CON+DOX), and exercise+doxorubicin (EXE+DOX)) after cardiotoxicity induction. The CON group received 6 doses of normal saline, the CON+DOX group received 6 doses of DOX (12 mg/kg body weight) over 12 days, and in the EXE+DOX group, each rat ran intermittently for 30 minutes for 8 weeks and 3 sessions per week. Each interval consisted of 4 minutes of very intense running at an intensity of 85 to 90% VO2max and 2 minutes of active recovery at an intensity of 50 to 60% VO2max. Finally, Superoxide dismutase (SOD), Malondialdehyde (MDA), and Tumor necrosis factor alpha (TNF-α) proteins were measured from heart tissue using homogenization and ELISA techniques. Statistical analysis was performed at a significance level of 0.05 using SPSS 27 and GraphPad Prism 10.4.0.
Results: A significant increase in cardiac SOD was observed in EXE+DOX compared to CON+DOX (P=0.017) and a significant decrease in cardiac MDA and TNFα was observed in EXE+DOX compared to CON+DOX (P=0.001). There was also a significant increase in cardiac MDA and TNFα and a significant decrease in cardiac SOD in CON+DOX compared to CON (P=0.001).
Conclusion: Despite being a high-intensity exercise method, HIIT has relatively good adaptations to oxidative stress and inflammation in DOX-induced cardiac tissue toxicity, and it can be said that this type of exercise can probably prevent severe DOX toxicity on the heart.
Keywords: Doxorubicin, TNF-α, HIIT, MDA, SOD

P694, Therapeutic effects of alpha-lipoic acid and ubiquinol combination on mitochondrial function in doxorubicin-induced cardiac injury

Aysa Rezabakhsh[1,2], Reza Badalzadeh[3], Reyhaneh Zamani[4]
1. Patient Safety Research Center, Clinical Research Institute, Urmia University of Medical Sciences, Urmia, Iran
2. Cardiovascular Research Center, Tabriz University of Medical Sciences, Tabriz, Iran
3. Physiology Department, School of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran
4. Student Research Committee, Tabriz University of Medical Sciences, Tabriz, Iran

Background: To reduce the cardiac side effects of doxorubicin (DOX), we investigated the impact of a combination of alpha-lipoic acid (ALA) and ubiquinol, the reduced form of CoQ10, on cardiac mitochondrial function and histopathological changes in DOX-induced cardiac injury *in vivo*.
Methods: In this study, Wistar rats, weighing 250-300 g, were randomly assigned to five groups (n=6 in each group): control; DOX (2 mg/kg); DOX+ ALA (100 mg/kg), DOX + ubiquinol (30 mg/kg), and DOX+ ALA+ ubiquinol group. Histopathological changes in the left ventricular tissue were performed using H&E staining. Examination of the mitochondrial membrane potential was also performed using an ELISA kit. In addition, the levels of mitochondrial reactive oxygen species (ROS) were measured using the DCFDA staining, and the cellular ATP levels were assessed using a specific ELISA kit.
Results: The findings of this study showed that ALA and ubiquinol can markedly reduce DOX-induced cardiotoxicity by affecting histopathological changes at the mitochondrial level. Also, the results showed the appreciable effect of the ALA and ubiquinol combination on changes in the mitochondrial membrane potential of cardiomyocytes in DOX-induced cardiomyopathy ($p<0.05$). Moreover, the combined use of ubiquinol and ALA simultaneously reduces the production of ROS in mitochondria, providing protective effects against cardiac damage caused by DOX.
Conclusion: According to these results, a combination of ubiquinol and ALA synergistically improved the cardiac mitochondrial function against DOX.
Keywords: Alpha-lipoic acid, Doxorubicin-induced cardiomyopathy, Mitochondrial Function, Ubiquinol

P695, Nephroprotective impact of royal jelly against rhabdomyolysis-induced kidney damage in rats

Ahmad Reza Aminian, Mohammad Taghi Khoshniat, Abolfazl Khajavi Rad, Maryam Mahmoudabady, Mohammad Hossein Rigi, Sara Hosseinian
Dept. of Physiology. Faculty of Medicine, Mashhad University if Medical Sciences, Mashhad, Iran

Background: The current work aimed at studying the impact of royal jelly on kidney damage caused by rhabdomyolysis in male rats.
Methods: 40 male rats were randomly assigned to five groups of eight: control, rhabdomyolysis, and rhabdomyolysis, administered with three doses of royal jelly (RJ) (100, 200, and 400 mg/kg) for seven days. On the fifth day, we injected glycerol intramuscularly to induce rhabdomyolysis. Researchers examined serum biochemical parameters, inflammation, oxidative stress, apoptosis, and kidney tissue injury.
Results: As a result of injecting glycerol, serum levels of creatinine, urea, and creatine phosphokinase were considerably elevated. The concentration of inflammatory mediators, as well as the expression of apoptotic parameters, was significantly elevated after glycerol injection. The percentage of kidney tissue damage and neutrophil gelatinase-associated lipocalin expression also increased significantly. Oral usage of RJ (100, 200, and 400 mg/kg) caused a decline in serum CPK, tissue level of total thiols, catalase activity, and renal expression of BAX compared to the rhabdomyolysis group. Serum creatinine and NGAL expression were also significantly reduced by the RJ (200 and 400 mg/kg). RJ significantly reduced the concentration of inflammatory mediators at 100 and 200 mg/kg doses and the expression of bcl2 by RJ at 100 and 400 mg/kg doses.
Conclusion: Royal jelly safeguards the kidney from rhabdomyolysis-related damage, primarily through its anti-oxidant, anti-apoptotic, and anti-inflammatory effects.

P701, Persa americana seed improve fibrosis and tissue remodeling of soleus muscle in type II diabetic mice by inhibition of TNF-α

Gholamreza Hamidian[1], Mohamad Mustafa Swara[2], Seyed Hadi Taheri[2]
1. Department of Basic Sciences, Faculty of Veterinary Medicine, University of Tabriz, Tabriz, Iran
2. DVM Student, Faculty of Veterinary Medicine, University of Tabriz, Tabriz, Iran

Background: Diabetic myopathy, a significant clinical complication of chronic type II diabetes, leads to progressive motor impairment. This condition is understood to originate from insulin resistance, which disrupts metabolic homeostasis, elevates oxidative stress, and promotes intramuscular inflammation, ultimately resulting in muscle tissue degradation. The avocado tree (*Persea americana*), native to Central and South America, has a history of traditional use attributed to its antioxidant and anti-hyperlipidemic properties.
Methods: In this study, forty adult male mice were divided into five groups: a control group, a diabetic group, and three treatment groups. Type II diabetes was induced through a high-fat diet followed by a low-dose streptozotocin (STZ) injection. Seven days post-STZ injection, diabetic mice in the treatment groups received methanolic extract of avocado seed (MEAS) at doses of 50, 100, and 150 mg/kg via oral gavage for 40 consecutive days. Finally, the animals were euthanized and the soleus muscle was fixed in 10% neutral buffered formalin for histopathological analysis and another portion of it immediately frozen in liquid nitrogen and stored at -70°C for subsequent quantification of TNF-α.
Results: The results indicated a significant increase in fibrocollagenous connective tissue deposition and TNF-α levels in the diabetic animals compared to controls. MEAS administration ameliorated these effects, improving tissue remodeling and reducing TNF-α levels in the soleus muscle in a dose-dependent manner.
Conclusion: In conclusion, these findings suggest that MEAS may mitigate inappropriate muscle tissue remodeling in type 2 diabetes by suppressing diabetes-induced inflammation.
Keywords: *Persa americana*, Soleus muscle, Type II diabetes, TNF-α

P702, The effects of curcumin supplementation on liver function, inflammation, and oxidative stress in patients with NAFLD: A systematic review

Zahra Baghani[1], Pooya Bagheri[1]
1. Students Research Committee, Bushehr University of Medical Sciences, Bushehr, Iran

Background: Non-alcoholic fatty liver disease (NAFLD) is a chronic condition associated with systemic inflammation, oxidative stress, and metabolic abnormalities. Curcuma longa (curcumin), the main bioactive compound in turmeric, has gained attention for its anti-inflammatory and antioxidant effects. This meta-analysis aimed to review evidence (2015–2025) on the effects of oral curcumin supplementation on liver function, inflammation, and oxidative stress markers in NAFLD patients.
Methods: A systematic search was performed in PubMed, Scopus, and Web of Science. Randomized and non-randomized clinical trials, systematic reviews, and meta-analyses evaluating curcumin effects on liver enzymes (ALT, AST), inflammatory markers (CRP, TNF-α, IL-6), and oxidative stress markers (MDA, TAC) were included.
Results: Evidence suggests that supplementation of curcumin leads to significant decrease in ALT and AST, especially when administered in nano-formulations and co-administered with piperine for bioavailability. Curcumin substantially lowers inflammatory markers, like CRP, TNF-α, as well as IL-6. Increases in TAC and decreases in lipid peroxidation markers (MDA) have also been observed, but findings depend on dose and type of preparation. Other studies also demonstrate benefits in glycemic control and lipid profile, which may imply a role of curcumin in control of cardiovascular risk factors in patients with NAFLD.
Conclusion: Curcumin seems to be a safe and efficacious natural supplement to improve liver function, to decrease inflammation, and to scavenge oxygen radicals in NAFLD patients. However, larger sample size and high quality RCT are warranted to determine the optimal dose and duration of application, as well as the long-term effects.
Keywords: Curcumin, NAFLD, Liver Enzymes, Inflammation, Oxidative Stress

P703, The effect of hydroalcoholic extract of *Equisetum ramosissimum* (horsetail) on certain parameters of the circulatory system in male rats

Maryam Ehsannejad[1], Aminollah Bahaoddini[1], Hajar Ebrahimiyan[1], Faezeh Zarei[1], Mohammad J. Saharkhiz[2]

1. Department of Biology, College of Sciences, Shiraz University, Shiraz, Iran
2. Department of Horticultural Sciences, College of Agriculture, Shiraz University, Shiraz, Iran

Background: Cardiovascular diseases are considered as main cause of worldwide mortality. The medicinal plants and their composition have been traditionally used among people due to their relatively fewer side effects compared to synthetic drugs. *Equisetum ramosissimum*, commonly known as horsetail, has been used as diuretic.
Methods: present study was performed to investigate the effect *Equisetum ramosissimum* extract on cardiovascular system of healthy male rats. Hydroalcoholic extract (40 mg/kg) was intravenously injected to anaesthetized rats then heart rate, systolic, diastolic, mean arterial and pulse pressure were recorded.
Results: the results showed significant decrease of systolic, diastolic and mean arterial pressures with no changes of heart rate and pulse pressure after horsetail extract administration.
Conclusion: it can be concluded that horsetail extract may be suggested as hypotensive agent.
Keywords: Hydroalcoholic extract, Horsetail plant, Blood pressure

P704, Optimized ginger-derived exosome-like nanoparticles for drug delivery: A seasonal and methodological evaluation

Sara Ahmadi Shokooh [1], Masoud Fereidoni [1]
1. Department of Biology, Faculty of Science, Ferdowsi University of Mashhad, Mashhad, Iran

Background: Plant-derived nanoparticles, particularly ginger-derived lipid nanoparticles (GELNPs), are promising drug delivery systems due to their biocompatibility. Critical physicochemical parameters—size, polydispersity index (PDI), and zeta potential—govern their stability and efficacy. This study optimized GELNP isolation by combining polyethylene glycol (PEG6000) precipitation with pH adjustment and 0.45 μm filtration, refining existing methods.
Methods: GELNPs were extracted from fresh ginger harvested in November, December, April, and July to evaluate seasonal effects. Characterization included TEM, AFM, dynamic light scattering (PSA), zeta potential, FT-IR, and protein analysis. Spearman's correlation assessed temperature-dependent variations in size and PDI.
Results: AFM and TEM confirmed GELNP structural integrity (cup-shaped morphology) and size, correlating with PSA data. pH adjusted GELNPs were smaller (58–108 nm, *p*<0.05), while filtered GELNPs showed enhanced colloidal stability (PDI=0.12, *p*<0.0007) and larger size (208 nm). Zeta potential differences were nonsignificant. FT-IR spectra (400–4000 cm^{-1}) revealed proteins, lipids, nucleic acids, and carbohydrates. July-derived GELNPs exhibited superior stability and reduced size ($\rho=-1.0$), attributed to elevated temperatures.
Conclusion: Filtration coupled with PEG precipitation yields stable, small GELNPs. Seasonal variability significantly influences nanoparticle properties, necessitating harvest-time consideration in protocols. GELNPs demonstrate strong therapeutic potential, though standardization and clinical validation require further study. These findings enhance plant-based nanomedicine development.
Keywords: Ginger exosome-like nanoparticles, Syringe filter, Size, Polydispersity index, Nanocarrier.

P705, Investigating the effects of silver nanoparticles synthesized with Echinophora platyloba on breast cancer cells by MTT assay

Amirhosein Ekhlasi[1], Mohammad Foad Noorbakhsh[1], Mahdi Fazeli[1]
1. Department of Basic Sciences, School of Veterinary Medicine, Shiraz University, Shiraz, Iran

Background: Breast cancer treatment is fraught with significant challenges. *Echinophora platyloba* contains phytochemicals with potential anticancer activities and silver nanoparticles (AgNPs) for anticancer action. The green synthesis of AgNPs using *Echinophora platyloba* can enhance therapeutic performance and reduce cytotoxicity to normal cells.
Methods: AgNPs were synthesized by mixing 2 mL extract of *Echinophora platyloba* with 98 mL 1 mM silver nitrate, stirred for 24h at room temperature. MCF7 and NIH3T3 cells, cultured in DMEM with 10% FBS, 1% penicillin/streptomycin, 0.1% amphotericin B at 37°C with 5% CO2, were seeded at 5 × 10^3 cells/well in 96-well plates. Cells were treated with AgNPs (100-200-400-600-800 µg/mL) or taxol (5-10-15-20 µL/mL) for 24 and 48h. Cytotoxicity was assessed via MTT assay, measuring absorbance at 570 nm to determine IC50 values, with experiments in triplicate.
Results: One-way ANOVA with Tukey's post hoc test ($p < 0.05$) showed AgNPs had IC50 values of 438.93 µg/mL (24 h) and 321.08 µg/mL (48 h) in MCF7 cells, and 644.23 µg/mL (24 h) and 168 µg/mL (48 h) in NIH3T3 cells. Taxol IC50 values were 9.58 µg/mL (24 h) and 10.13 µg/mL (48 h) in MCF7 cells, and 3.14 µg/mL (24 h) and 2.77 µg/mL (48 h) in NIH3T3 cells.
Conclusion: AgNPs from *Echinophora platyloba* exhibited selective cytotoxic activities against MCF7 cells with less cytotoxicity against NIH3T3 cells compared to taxol. More research is required to clarify the mechanism of action as well as in vivo efficacy.
Keywords: Breast cancer - MTT assay - Silver nanoparticle – Taxol- *Echinophora platyloba*

P707, Efficacy of panax ginseng in stress: A systematic review of its effects on psychological stress and blood markers

Ghazaleh Elahabadi[1], Amirhooshang Mohammadpoor[1]
1. Department of Clinical Pharmacy, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran

Background: This first systematic review assessed whether *Panax ginseng* supplementation reduces perceived psychological stress in humans, based on its suggested neuromodulatory and neuroprotective properties.
Methods: Following Cochrane methodology, databases (PubMed, Scopus, Medline, Web of Science) were searched up to June 2025, supplemented by manual searches, and included studies measured human psychological stress. Risk of bias was assessed. Significant heterogeneity in design, outcomes, and reporting precluded meta-analysis, necessitating narrative synthesis.
Results: Eight randomized, double-blind, placebo-controlled trials (total n ≈ 473) were included. Studies used daily ginseng doses of 200-500 mg for 14 days to 6 weeks. Findings on ginseng's effects on subjective stress levels, stress-related blood markers, and gene expression patterns were inconsistent. However, the *majority* of results indicated that ginseng had a measurable impact on stress. Supplementation was associated with reduced epinephrine levels, potential stabilization of the autonomic nervous system, prevention of serotonin depletion, and support for HPA axis regulation by mitigating cortisol elevation. Ginseng also demonstrated effects on metabolic markers (triglycerides, glucose). Data on gene expression changes were deemed insufficient for a conclusive judgment.
Conclusion: While the majority of included studies suggest *Panax ginseng* supplementation may reduce psychological stress and positively influence key stress pathways (epinephrine, autonomic nervous system, serotonin, HPA axis/cortisol) and metabolism, significant inconsistencies in core stress outcomes and biomarkers, coupled with insufficient gene expression data, highlight limitations in the current evidence. More rigorous, standardized research is needed to confirm these effects and elucidate underlying mechanisms.
Keywords: Epinephrine, Serotonin, Psychological Stress Scale, Panax ginseng

P708, The use of plant-derived exosomes in the treatment of some neurodegenerative diseases

Mohammad Sorush Ansari[1], Masoud Fereidoni[1]
1. Department of Biology, Faculty of Science, Ferdowsi University of Mashhad, Mashhad, Iran

Background: Neurodegenerative diseases such as Alzheimer's and Parkinson's are characterized by progressive neuronal loss and cognitive impairment, with limited treatment options targeting disease mechanisms. Plant-derived exosomes (PDEs) have emerged as a biocompatible and non-toxic therapeutic modality capable of crossing the blood-brain barrier and delivering bioactive molecules to neural tissue.
Methods: A systematic Review of articles taken from three major databases: PubMed, Scopus, and Web of Science. Exosomes were isolated from ginger, grape, and broccoli via differential ultracentrifugation and characterized using nanoparticle tracking analysis, TEM, and Western blotting. Their neuroprotective effects were evaluated in vitro using SH-SY5Y and BV2 cells under oxidative and inflammatory stress, and in vivo in a transgenic Alzheimer's mouse model through behavioral testing and histological analysis.
Results: PDEs exhibited uniform morphology (80–120 nm) and carried neuroactive phytochemicals and regulatory RNAs. Treatment significantly reduced apoptosis, preserved mitochondrial function, and decreased pro-inflammatory cytokine expression in vitro. In vivo, PDE administration improved cognitive performance, reduced amyloid-β accumulation, and suppressed glial activation.
Conclusion: PDEs represent a promising, nature-derived therapeutic strategy for neurodegenerative disorders, offering both neuroprotective and anti-inflammatory benefits. Their ability to cross the blood-brain barrier and modulate disease-relevant pathways supports their potential in developing safe and effective interventions for neurodegeneration.
Keywords: Plant-derived exosomes, Extracellular vesicles, Neurodegenerative diseases, Nanomedicine

P709, Antibacterial effects of green-synthesized silver and gold nanoparticles using *Echinophora platyloba* extract against *Escherichia coli* and *Bacillus subtilis*

Maryam Azadmanesh[1], Mohammad Foad Noorbakhsh[1]
1. Department of Basic Sciences, School of Veterinary Medicine, Shiraz University, Shiraz, Iran

Background: The antibacterial effects of *Echinophora platyloba* (*E. platyloba*) extract have been shown in various studies. Moreover, the benefits of green synthesis of silver and gold nanoparticles, especially their therapeutic and antibacterial properties, are well documented.
Methods: The hydroalcoholic extract of *E. platyloba* was prepared, and silver and gold nanoparticles were synthesized using $AgNO_3$ and $HAuCl_4$, respectively. Their antibacterial effects, along with those of the *E. platyloba* extract, were tested against *Bacillus subtilis* and *Escherichia coli* using the disk diffusion method to assess bacterial sensitivity, and the serial dilution method to determine Minimum Inhibitory Concentration (MIC) and Minimum Bactericidal Concentration (MBC).
Results: For *B. subtilis*, the MIC of synthesized silver nanoparticles (3.33±1.33 µg/mL) was lower than that of *E. platyloba* extract (4000±0 µg/mL), $AgNO_3$ (2000±0 µg/mL), and synthesized gold nanoparticles (2667±7.67 µg/mL). For *E. coli*, silver nanoparticles (583±220.5 µg/mL) also showed lower MIC values than the extract (4000±0 µg/mL), $AgNO_3$ (666.7±166.7 µg/mL), and gold nanoparticles (2333±881.9 µg/mL). MBC results similarly confirmed the strongest effect for silver nanoparticles, followed by gold nanoparticles. Disk diffusion tests showed that green silver nanoparticles had the largest inhibition zones, while gold nanoparticles also displayed good antibacterial activity.
Conclusion: Silver nanoparticles synthesized using *E. platyloba* exhibited the strongest antibacterial effects, outperforming gold nanoparticles and the extract against *E. coli* and *B. subtilis*. These results suggest potential applications for both green-synthesized silver and gold nanoparticles as antibacterial agents, with silver being particularly more effective.
Keywords: *Echinophora platyloba*, Silver nanoparticle, Gold nanoparticles, Antibacterial effects

P710, Lactoferrin: A review on a multifunctional natural molecule – from antibiotic alternative to comprehensive protection in poultry production

Mahmood Ahmadi Hamedani[1], Fatemeh Sadat Seif Hashemi[2], Arman Babaee Monir[2]
1.Associate Professor of Clinical Pathology, Department of Clinical Sciences, Faculty of Veterinary Medicine, Semnan University, Semnan, Iran
2.Doctor of Veterinary Medicine (DVM) Student, Faculty of Veterinary Medicine, Semnan University, Semnan, Iran

Background: *Lactoferrin* (LF) is an iron-binding glycoprotein of the transferrin family, abundantly present in milk and colostrum. Its bilobal structure and reversible iron-binding ability enable iron homeostasis, microbial growth inhibition, immune modulation, and protection against oxidative stress. Recent studies confirm its broad antibacterial, antiviral, antifungal, antiparasitic, antioxidant, and detoxifying properties. In poultry production, LF and its derived peptides are recognized as effective natural alternatives to antibiotics.
Methods: This comprehensive review is based on ten recent high-quality studies selected from Google Scholar, PubMed, and ScienceDirect.
Results: *Lactoferrin* inhibits bacterial growth through iron sequestration and direct membrane disruption while preventing adhesion, invasion, biofilm formation, and virulence factor expression. Antiviral effects occur by binding to viral particles or host-cell receptors, blocking entry and replication, and reducing oxidative stress. Antifungal and antiparasitic actions mainly involve iron deprivation and membrane damage. Antioxidant activity results from free-radical scavenging and regulation of stress pathways, whereas detoxification neutralizes microbial toxins. In poultry, oral bovine LF outperforms ciprofloxacin against pathogenic E. coli, increases IgG and secretory IgA, reduces inflammatory cytokines, and restores gut microbiota balance. Bovine LF activates the Nrf2 pathway, alleviates aflatoxin B1-induced liver and kidney damage, and suppresses NetB toxin in Clostridium perfringens. Recombinant camel LF exhibits strong anti-H9N2 activity. Overall, supplementation enhances growth performance, feed efficiency, bone strength, pathogen resistance, and extends meat shelf life without affecting sensory properties.
Conclusion: *Lactoferrin* is a multifunctional natural molecule exerting antimicrobial, antioxidant, and detoxifying effects, offering a sustainable antibiotic alternative with significant potential in poultry production, veterinary, and human medicine.
Keywords: *Lactoferrin* effects, Antibiotic alternative, Poultry health, Immune system, Antioxidant

P711, Antioxidant activity of *Allium cepa* and its main constituents: Experimental and clinical evidences

Mohammad Salar Boustani[1,2], Mohammad Hossein Eshaghi Ghalibaf[2,3], Sima Beigoli[2,3], Mohammad Hossein Boskabady[2,3]

1. Student Research Committee, Faculty of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran
2. Applied biomedical Research Center, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Physiology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Various pharmacological properties and therapeutic effects were shown for Allium cepa L. (Liliaceae), (A. cepa) or onion and its derivatives including their effects on oxidative stress in different conditions. In this article an update and comprehensive review of antioxidant effects of A. cepa and its main constituents, as well as the underlying molecular mechanisms are provided.
Methods: Key-words; A. cepa, its derivatives, antioxidant were used to searched for articles on antioxidant and its derivatives published between 1990 and the end of July 2025 through the Web of Science, Medline/PubMed, Scopus, and Google Scholar.
Results: A. cepa and its constituents showed antioxidant in various conditions such as cardiovascular, endocrine and metabolic, gastrointestinal and liver, immunological, hematological and autoimmune, urogenital, neurologic and respiratory disorders as well as cancer and neoplasia. The antioxidant effects of A. cepa, its derivatives were achieved by decreasing lipid peroxidation, NAD(P)H, MDA, NO, LPO and eNOS but enhancing antioxidants such as SOD, CAT, GSH, GPx, GSPO, TrxR, SDH, GST and GR activities and thiol level.
Conclusion: Therefore A. cepa, and its constituents showed potent antioxidant effects indicating their possible therapeutic value in treatment of disorders associated with oxidative stress.
Keywords: Allium cepa, Onion, Antioxidant, Disorders, Oxidative stress

P712, Understanding the molecular basis for the immunomodulatory impact of natural products: a critical review

Sima Beigoli[1], Mohammad Hossein Boskabady[1, 2]
1. Applied Biomedical Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Natural products (NPs) have historically been valued for their capacity to influence and regulate immune responses, offering a complementary and holistic strategy to support immune function. In recent years, increasing scientific interest has focused on the immunomodulatory properties of various natural compounds. This review aims to summarize the role of natural products in immune modulation, highlighting their mechanisms of action, major categories of immunomodulatory NPs, potential clinical applications, and key considerations regarding their safety and effectiveness.
Methods: A comprehensive literature search was conducted using major scientific databases, including PubMed, ScienceDirect, and Scopus, covering studies published up to January 2024. Relevant findings on the immunomodulatory effects of natural products were systematically collected and analyzed.
Results: Evidence indicates that natural products can regulate immune responses by reducing Th2-associated cytokines and pro-inflammatory mediators, thereby contributing to inflammation control in conditions such as asthma and cancer. Additionally, increases in $CD4^+$ T cells and IFN-γ/IL-4 levels along with a higher IFN-γ/IL-4 ratio suggest that NPs may enhance Th1-mediated immune responses in inflammatory disorders. Furthermore, certain natural products demonstrate inhibitory effects on T-cell activity and suppress the proliferation of immature B-cell lymphoma cells.
Conclusion: Overall, current findings suggest that natural products hold promise as immunomodulatory agents for managing diseases characterized by immune imbalance. Nevertheless, further experimental and clinical investigations are required to establish their safety, efficacy, and suitability for routine clinical use.
Keywords: Defense mechanisms, Natural products, Immunomodulatory activities, Inflammation, Autoimmune diseases

P713, Combined effects of hesperidin and quercetin on inflammation in HepG2 cell line

Mohadese Pouryani[1,2], Nasrin Ziamajidi[1], Mahdi Bahmani[1], Zeinab Seyedkhan[1,2], Shayan Marhamati[1,2], Roghayeh Abbasalipourkabir[1]

1. Department of Clinical Biochemistry, School of Medicine, Hamadan University of Medical Sciences, Hamadan, Iran
2. Student Research and Technology Committee, Hamadan University of Medical Sciences, Hamadan, Iran

Background: This study aimed to investigate the combined effect of hesperidin and quercetin on inflammation in HepG2 cells.
Methods: Cell viability was tested using the MTT assay after 24 and 48 hours of incubation with different concentrations of hesperidin and quercetin (0-1000 μM). After treatment, equal amounts of proteins were separated by SDS-PAGE and transferred to PVDF, and western blots were developed.
Results: The IC50 values for both compounds were determined to be 250 μM at 48 hours. In addition, TNF-α protein levels significantly decreased ($p < 0.05$ quercetin and $p < 0.01$ hesperidin). NF-κB levels also decreased, but it was not significant in any of the groups of flavonoids. In addition, IL-1β levels in treated cells significantly decreased compared to untreated cells ($p < 0.05$ quercetin and $p < 0.01$ hesperidin). IL-6 levels also decreased in treated groups compared to untreated group, and this decrease was significant for quercetin ($p < 0.05$) and hesperidin ($p < 0.01$). It should be noted that the combined treatment had more effects in all experiments ($p < 0.001$ TNF-α and IL-6, $p < 0.01$ NF-κB and IL-1β). Regarding changes in TGF-β1 levels, unlike the decrease in each of the hesperidin ($p < 0.05$) and quercetin ($p > 0.05$) groups, an increase was observed in the combination group ($p < 0.001$).
Conclusion: Hesperidin and quercetin reduce inflammation, while the combination of both of them is more effective than each one alone. Therefore, it may be a therapy candidate for the treatment of liver cancer.
Keywords: Hesperidin, Quercetin, Inflammation, HepG2 cell line

P714, Development of an effective and safe topical anti-inflammatory hydrophilic ointments containing Nepeta crispa essential oil in rats

Zahra Jafariazar [1], Fozhan Saatian[2], Zahra Mousavi[3], Saeed Mohammadi Motamed[4], Ramezan Kalvandi[5]
1. Department of Pharmaceutics, TeMS.C., Islamic Azad University, Tehran, Iran
2. Pharm. D. Department of Pharmaceutics, TeMS.C., Islamic Azad University, Tehran, Iran
3. Department of Pharmacology and Toxicology, TeMS.C., Islamic Azad University, Tehran, Iran
4. Department of Pharmacognosy, TeMS.C., Islamic Azad University, Tehran, Iran
5.Natural Resources Research Division, Hamadan Agricultural, and Natural Resources Research and Education Center, Agricultural Research, Education and Extension Organization (AREEO), Hamadan, Iran

Background: *Nepeta crispa* (Lamiaceae) is a medicinal plant widely used in indigenous medicine across Iran as an anti-inflammatory remedy. The topical use of the aerial parts of this plant as anti-inflammatory, analgesic, nervous, gastrointestinal, respiratory diseases is a common practice in many countries.
Methods: First, the hydrophilic ointment containing *N. crispa* essential oil was developed, physicochemically characterized and evaluated in the same model of inflammation to assess whether the essential oil incorporation in ointment would affect its anti-inflammatory potential.
Results: The best formulation contains white petrolatum (25% w/w), stearyl alcohol (5% w/w), water (57% w/w), propylene glycol (12% w/w), methyl- and propyl paraben (1% w/w). For the pharmacological testing, the formulations from 3%, 5%, 7% w/w essential oil were evaluated by Carrageenan method at a time interval of 30 min and 1, 2, 3, 4 hours in thirty male Wistar rats; meanwhile, the hydrophilic ointment without essential oil was conserved as a negative control. The anti-inflammatory activity of the prepared hydrophilic ointments of was compared with diclofenac gel (1% w/w). Finally, dermal irritation/corrosion test in mice was performed to access the safeness of the developed ointment.
Conclusion: GC and GC–MS analysis confirmed the presence of 1, 8-cineol as the major compounds of *N. crispa* hydrophilic ointment, which might be responsible for these observed activities. Placebo formulation as well as ointment containing essential oil showed pH compatible to that of human skin and exhibited absence of signs of toxicity in rabbit, indicating the safeness of the developed product for topical use.
Keywords: Anti-inflammation; *Nepeta crispa*; Essential oil; Hydrophilic ointment; Carrageenan

P715, The effect of alpha-pinene in an experimental model of ulcerative colitis in rats

Kaveh Rahimi[1], Mahsa Khademi[1], Negar Eftekhar[1], Hoora Shushtari[1], Arian Javadi[1]
1.Department of Basic Sciences, Faculty of Veterinary Medicine, Shahid Chamran University of Ahvaz, Ahvaz, Iran

Background: Inflammatory bowel diseases, including ulcerative colitis (UC) and Crohn's disease (CD), are multifactorial disorders characterized by chronic intestinal inflammation of unclear etiology. This study aimed to investigate the effect of alpha-pinene on inflammatory markers in an experimental model of ulcerative colitis in rats.
Methods: Colitis was induced by intracolonic administration of 4% acetic acid. Twenty-four hours after induction, alpha-pinene at doses of 50 and 100 mg/kg or the vehicle (liquid paraffin) was administered orally once daily. After seven days, serum and colonic tissue samples were collected to assess inflammatory cytokine levels, including interleukin-6 (IL-6) and tumor necrosis factor-alpha (TNF-α), using ELISA.
Results: Acetic acid–induced colitis markedly increased the levels of IL-6 and TNF-α compared with the control group, indicating strong inflammatory activation. Treatment with alpha-pinene at both doses significantly reduced IL-6 and TNF-α levels in comparison with the colitis group, demonstrating an anti-inflammatory effect. The reduction was more pronounced in the 100 mg/kg group.
Conclusion: Alpha-pinene exhibited notable anti-inflammatory activity in the acetic acid–induced colitis model by downregulating proinflammatory cytokines IL-6 and TNF-α. These findings suggest that alpha-pinene may exert protective effects against ulcerative colitis through modulation of inflammatory mediators.
Keywords: Alpha-pinene, Ulcerative colitis, Rat.

P716, β-sitosterol attenuates stress-induced colonic hypermotility and diarrhea in a rodent IBS model: Comparative efficacy with sertraline

Sepideh Hajivand[1], Maedeh Ghasemi[1], Mohammad Reza Sharifi[2]
1. Department of Physiology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran
2. Department of Genetics and Molecular Biology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran

Background: This study investigated the therapeutic effects of sertraline and β-sitosterol on stress-induced IBS-like symptoms in rats using the water avoidance stress (WAS) model, which mimics the altered intestinal motility and visceral hypersensitivity characteristic of IBS.
Methods: Thirty-five male rats underwent 10 days of WAS to induce IBS-like symptoms. Daily fecal pellet output (FPO) was quantified and rats were treated daily with sertraline (30 mg/kg), β-sitosterol (25 mg/kg), or vehicle during the stress period. Intestinal transit was assessed by measuring steel bead expulsion at 4- 9- and 12-hours' post-barium gavage, and fecal water content (FWC) was determined Animal weight changes were also evaluated.
Results: WAS significantly increased daily and cumulative FPO compared to controls. Both sertraline and β-sitosterol significantly reduced FPO and FWC compared to the WAS-induced IBS group, although not to control levels. WAS increased FWC to ~70% compared to 45.5% in controls, while sertraline and β-sitosterol reduced FWC to 55.8% and 57.9%, respectively. WAS also accelerated intestinal transit. Notably, β-sitosterol, but not sertraline, significantly slowed transit at 9 and 12 hours. The WAS-induced IBS group showed no significant weight change compared to the control group. β-sitosterol and sertraline resulted in weight gain changes similar to the control group.
Conclusion: WAS successfully induced IBS-like hypermotility and diarrhea in rats. Both sertraline and β-sitosterol attenuated these symptoms; however, β-sitosterol uniquely normalized intestinal transit, suggesting its potential as a targeted IBS therapy. Further research should investigate β-sitosterol's mechanisms of action on visceral hypersensitivity.
Keywords: IBS, β-sitosterol, sertraline, Hypermotility, Diarrhea

P718, Comparison of the effect of hydroalcoholic extract of Foeniculum vulgare on volumetric changes in the sexuallydimorphic nucleus of the rat and the striatum of the chick

Elham Derakhshan Marian[1], Gholamhassan Vaezi[1], Maryam Tehranipour[2], Vida Hojjati[1]
1. Department of Biology, Da.C., Islamic Azad University, Damghan, Iran
2. Department of Biology, Ma.C., Islamic Azad University, Mashhad, Iran

Background: Volumetric changes such as malformation of the striatum, which is an area that affects the mating of some birds during their breeding season, as well as changes in the preoptic area of the sexually dimorphic nucleus, which plays a key role in the sexual differentiation of the brain in humans and mammals, prove to us that disorders of different parts of the brain system are irreversible and can affect the population and reproduction of different animal species.
Methods: In this experimental study, the extract was injected into the experimental groups using the window technique using a Hamilton syringe into the amniotic fluid on days 5 and 12. The injection was performed under sterile conditions and through the broad base of the egg. The injection site was immediately sealed with molten paraffin and the eggs were incubated at a temperature of about 38°C and a humidity of 65%. After the chicks hatched, the males were examined and compared with the control and treated females. Around the 18th day, the brain was removed from the skull and fixed in 10% saline formalin fixative, and they entered the passage and molding stages. Also, 24 female Wistar rats were used, which were divided into 4 groups (1 control group, 3 experimental groups) with extract doses of 70, 280, and 140 mg/kg, respectively. Intraperitoneal injection was performed for 9 days from day zero (observation of vaginal plaque). After the male rats were born, comparison was made with the female rats. Then, the brain removed from the fetal rat skull entered the stages of fixation, passage, and sample molding.
Results: The nuclear volume was calculated using the disector method to examine the number of neurons and the Cavalier method to examine the volume changes. The results showed that the volume of the dimorphic nucleus in male rat neonates treated with fennel hydroalcoholic extract at a dose of 70 mg/kg was significantly reduced compared to the control group ($p < 0.05$). Also, the volume of the striatal nucleus and the neuronal density of the nucleus in the brain of chickens in the experimental female groups increased significantly compared to the control female ($P<0.001$).
Conclusion: Consumption of natural estrogen in unauthorized doses causes changes in the volume and, as a result, a decrease in neurons, which leads to impotent sexual behavior in various animals because the size of the brain's sex nucleus approaches that of the opposite sex, especially if it is consumed during the early stages of fetal development.
Keywords: Median perioptic, Sexually dimorphic nucleus, Fennel, Striated nucleus, Chick

P720, Investigating the impact of curcumin-loaded solid lipid nanoparticles on melanoma

Tayebeh Rabani Nia[1,2], Seyed Hamid Aghaee-Bakhtiari[1], Fatemeh Gheybi[1], Zahra Sabouri[1], Mohammadreza Khakzad[2], Majid Darroudi[3]

1. Department of Medical Biotechnology & Nanotechnology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Innovative Medical Research Center, MMS.C, Islamic Azad University, Mashhad, Iran
3. Nuclear Medicine Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Melanoma is an aggressive skin cancer characterized by genetic mutations that promote uncontrolled cell proliferation and metastasis. Solid lipid nanoparticles (SLNs) are carriers composed of a solid lipid core matrix typically 10-1000 nm that can encapsulate hydrophilic and hydrophobic drugs. They are used for various applications, including drug delivery, clinical trials, and cosmetics. The SLNs offer benefits such as extended drug release, better cellular entry and protection against degradation. Curcumin, a natural polyphenol derived from turmeric, exhibits anti-inflammatory, antioxidant, and anticancer properties. However, its clinical application is limited by poor solubility, stability, and bioavailability. Encapsulating curcumin into nanocarriers like SLNs enhances its stability and therapeutic efficacy.
Methods: The most recent articles were reviewed in PubMed, Wiley, MEDLINE and Scopus databases.
Results: Studies have demonstrated that curcumin-loaded SLNs can influence the expression of various genes like anti-apoptotic, cell cycle regulators, metastasis genes and inflammatory pathways related to melanoma progression. Using SLNs as a delivery system for curcumin can improve its cellular uptake and accumulation in melanoma cells. This targeted delivery can modulate gene expression pathways involved in tumor growth, apoptosis and metastasis. It also can induce oxidative stress and interfere with signaling pathways, culminating in altered gene expression profiles that favor tumor suppression.
Conclusion: SLN-encapsulated curcumin shows promising potential in modulating gene expression to inhibit melanoma progression. Molecular studies and clinical trials are needed to validate these findings and develop effective nanocarrier-based therapies. Further research is also required to fully elucidate the specific miRNAs affected and potential clinical applications of curcumin-loaded SLNs in melanoma therapy.
Keywords: Solid lipid nanoparticle, Delivery system, Melanoma, Curcumin

P721, Evaluation of pathways involved in the protective effect of baicalein on contrast-induced nephropathy in in vitro model

Fatemeh Rajabian, Hossein Hosseinzadeh, Sara Sarrafan Sadeghi, Soghra Mehri
Neuroscience Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Contrast media (CM) are used for diagnostic or therapeutic intervention purposes in medicine. The main adverse reaction after administration of CM is nephropathy. This complication is the third cause of renal failure after hospital treatment. This study was designed to investigate the possible protective effect of baicalein, derived from the root of Scutellaria baicalensis, against sodium amidotrizoate/meglumine amidotrizoate (SAMA) induced cytotoxicity in HEK-293 cells.
Methods: HEK-293 cells were incubated with different concentrations of baicalein (0.125, 0.25, 0.5, 1, 2.5, 5, 10, 25, 50 µM and 100, for 24 hours) and then exposed to SAMA (8 mgI/ml). After 24 hours, the cell viability and intracellular ROS production were detected by MTT assay and DCFH-DA method, respectively. The western blot method was used to evaluate apoptosis (caspase 3-cleaved) and autophagy (sirtuin-1, LC3-II/I ratio and Beclin-1) markers in cells.
Results: The exposure of HEK-293 cells to SAMA (8 mgI/ml) decreased the cell viability, and increased the production of ROS. Also, SAMA significantly increased the protein level of the apoptosis (caspase 3-cleaved) and autophagy (LC3-II/I ratio, Beclin-1 and sirtuin-1) pathways compared to the control group. Exposure to baicalein (0.5 and 1 µM) enhanced cell viability and treatment of cells with baicalein (0.25, 0.5, 1, 2.5, 5 and 10 µM) decreased ROS production in comparison to the SAMA group. Also, exposure of HEK-293 cells to baicalein (1 µM) was able to decrease the level of caspase-cleaved 3, sirtuin-1, Beclin-1 proteins and LC3-II/I ratio in comparison to the SAMA group.
Conclusion: The pretreatment of HEK-293 cells with baicalein can decrease contrast-induced cytotoxicity through antioxidant, anti-apoptotic and anti-autophagy effects.
Keywords: Contrast media, Baicalein, Reactive oxygen species, Apoptosis, Autophagy

P722, Neuroprotective effects of garlic against lead neurotoxicity: Behavioral and biochemical evidence in adolescent rats

Pourya Roknabadi[1], Farimah Beheshti[2,3], Farzaneh Vafaee[4], Mahmoud Hosseini[5,6]
1. Department of Physiology, School of Medicine, Mashhad University of Medial Sciences, Mashhad, Iran
2. Neuroscience Research Center, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
3. Department of Physiology, School of Medicine, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
4. Neuroscience Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
5. Applied Biomedical Research Center, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
6. Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Lead exposure is a serious health risk, causing learning and memory deficits primarily through oxidative stress in the brain. *Garlic*, a natural compound known for its antioxidant properties is a beneficial agent for neuroprotection. In this study the effects of *Garlic* on memory deficits and brain tissue oxidative damages induced by lead exposure was investigated.
Methods: After randomization, adolescent rats received one of the following: no intervention (control), lead acetate in drinking water for 8 weeks (1500 ppm; lead), or lead acetate plus *Garlic* extract daily by gavage (100 mg/kg; lead-Gar).
Results: Lead exposure significantly impaired cognitive function in adolescent rats. In the Morris water maze, the lead group exhibited longer escape latency and path length, and spent less time in the target quadrant (Q1) compared to controls. Co-treatment with *Garlic* significantly increased the time spent in Q1. Similarly, in the passive avoidance test, lead shortened the latency to enter the dark chamber, an effect reversed by *Garlic*. At the biochemical level, lead reduced total thiol and increased MDA levels in brain tissue. *Garlic* co-treatment effectively restored thiol concentrations and reduced MDA. No differences in swimming speed were observed, indicating the deficits were cognitive, not motor.
Conclusion: Our findings demonstrate that *Garlic* co-treatment ameliorates lead-induced cognitive deficits in adolescent rats. This protective effect is linked to improvements in two neurochemical parameters: the mitigation of oxidative stress in brain tissue and a reduction in cerebral lead content
Keywords: *Garlic*, Lead exposure, Oxidative stress, Neuroprotective

P723, From curcumin to aloe vera: A comprehensive natural approach to target key immunopathogenic pathways in psoriasis

Negin Zare Mehrjerdi [1], Homa Fazeli Kakhki[1], Hossein Hosseinzadeh[2]
1. Department of Pharmacodynamics and Toxicology, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran
2. Pharmaceutical Research Center, Pharmaceutical Technology Institute, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Psoriasis is a chronic immune-mediated skin disease with a strong genetic background and major impact on quality of life. Key mechanisms include persistent inflammation, accelerated keratinocyte proliferation, and activation of the IL-23/IL-17 axis. Mutations in genes such as CARD14 and IL36RN are associated with severe forms of the disease. Because conventional therapies have limitations, interest in natural compounds is increasing.
Methods: This review summarizes experimental and clinical evidence on Aloe vera, Centella asiatica, Nigella sativa, coffee, and curcumin in psoriasis. Data were collected from recent studies focusing on pharmacological properties and effects on inflammatory and immune pathways.
Results: Aloe vera showed anti-inflammatory, antioxidant, moisturizing, and keratolytic actions that improved psoriatic plaques. Centella asiatica triterpenoids reduced keratinocyte proliferation and modulated IL-23/IL-17 signaling. Thymoquinone from Nigella sativa decreased pro-inflammatory cytokines and oxidative stress. Coffee intake produced dose-dependent immunomodulatory effects, with moderate consumption showing anti-inflammatory benefits. Curcumin improved psoriasis in animal models and clinical trials by inhibiting NF-κB and MAPK pathways.
Conclusion: These natural compounds exert anti-inflammatory, antioxidant, immunomodulatory, and keratolytic effects relevant to psoriasis pathogenesis. They may serve as complementary options alongside standard treatments, but more controlled trials are needed to define optimal doses, formulations, safety, and long-term efficacy.
Keywords: Autoimmune, Thymoquinone, Chronic Inflammation, Keratinocytes, Centella asiatica

P724, The effect of hydroalcoholic extract of *Capsella bursa-pastoris* leaves on the cardiovascular system of male rats

Faezeh Zarei[1], Aminollah Bahaoddini[1], Hajar Ebrahimiyan[1], Mohammad J. Saharkhiz[2]
Maryam Ehsannejad[1]
1. Department of Biology, College of Sciences, Shiraz University, Shiraz, Iran
2. Department of Horticultural Sciences, College of Agriculture, Shiraz University, Shiraz, Iran

Background: Blood pressure disorders are important risk factors of the cardiovascular system and affects approximately thirty percent of adults. The use of chemical drugs, in addition to curing diseases, has also had undesirable and unwanted effects, while the use of traditional medicine and medicinal plants has fewer complications. *Capsella bursa pas*toris is one of the most commonly used plants in traditional medicine for various purposes. Present study was performed to investigate the effect *Capsella bursa pas*toris extract on cardiovascular system of healthy male rats.
Methods: Hydroalcoholic extract (300mg/kg) was intravenously injected to anaesthetized rats then heart rate, systolic, diastolic, mean arterial and pulse pressure were recorded.
Results: the results showed significant increase of systolic, diastolic and mean arterial pressures with no changes of heart rate and pulse pressure after *Capsella bursa pastoris* extract administration.
Conclusion: it can be concluded that *Capsella bursa pas*toris extract may be suggested as anti-hypotensive agent.
Keywords: Hydroalcoholic extract, *Capsella bursa pas*toris, Blood pressure

P725, Therapeutic effects of Kombucha in lung cancer

Maryam Sarshar[1], Leyla Azmayesh[2], Faeze Khoshhal[3], Samira Kbudani [4], Majid Rajabian Noghondar[5]
1. Department of biology, Payam Noor University, Tehran, Iran

Background: Lung cancer remains a formidable clinical challenge with limited treatment options for advanced stages. The emergence of drug-resistant phenotypes necessitates exploration of complementary approaches. Kombucha tea, a fermented beverage containing bioactive polyphenols, organic acids, and theophylline, demonstrates multimodal biological activities potentially relevant to lung cancer management.
Methods: We conducted a systematic review (2010-2023) across EMBASE, Cochrane, and MEDLINE databases using MeSH terms "kombucha," "lung neoplasms," and "drug therapy." Twenty-two preclinical studies met our inclusion criteria of employing standardized kombucha preparations in lung cancer models with quantitative outcome measures.
Results: The analyzed studies revealed consistent anticancer effects across multiple pathways: Kombucha extracts (200-400 μg/mL) inhibited NSCLC proliferation through cell cycle arrest and apoptosis induction. Matrix metalloproteinase activity (MMP-2/9) was reduced by 40-50%, suggesting anti-metastatic potential. Significant anti-angiogenic effects were observed via VEGF suppression, while immunomodulation occurred through IL-10 upregulation and pro-inflammatory cytokine downregulation. The beverage's theophylline content (1.44 mg/cup) demonstrated bronchodilatory activity that may alleviate cancer-associated respiratory symptoms.
Conclusion: Current evidence supports kombucha's potential as an adjunctive therapy for lung cancer, particularly for early-stage disease. Its multimodal mechanisms target proliferation, metastasis, angiogenesis, and inflammation while potentially improving respiratory function. Future research should investigate standardized preparations, pharmacokinetics, and clinical applications in combination therapies.
Keywords: Kombucha, Lung neoplasms, Matrix metalloproteinases, Angiogenesis inhibitors, Complementary therapies.

P726, Synthesis and evalution of optical and morphological properties of chitosan-rosmarinic acid-galic acid nanoparticles for the treatment of diabetic wounds

Razieh Sanjari[1], Mohsen Forouzanfar[2], Fatemeh Honarasa[3], Mohammad Amin Edalatmanesh[1], Heydar Aqababa[5]

1. Department of Biology, Shi. C., Islamic Azad University, Shiraz, Iran
2. Department of Biology, Marv. C., Islamic Azad University, Marvdasht, Iran
3. Department of Chemistry, Shi. C., Islamic Azad University, Shiraz, Iran
5. Department of Biology, Ars. C., Islamic Azad University, Arsanjan, Iran

Background: Chitosan, a natural polysaccharide derived from chitin, is recognized for its antimicrobial properties and ability to promote tissue regeneration. Incorporating bioactive compounds like rosmarinic acid and gallic acid, known for their antioxidant and anti- inflammatory effects into chitosan formulations may enhance wound healing. This research aims to develop a chitosan based nanogel containing these acids to improve therapeutic outcomes in diabetic wounds.
Methods: Chitosan nanofibers were prepared using an electrospinning process, with rosmarinic acid extracted from dried plants using ethanol. This extract was combined with chitosan, Gallic acid, and distilled water, followed by the addition of olive or sunflower oil. This structure and functional properties of the nanoparticles were evaluated using Scanning Electron Microscopy (SEM and TEM), FT-IR spectroscopy, UV-VIS spectroscopy, and X-Ray Diffraction (XRD).
Results: Electron microscopy revealed homogenous, nearly spherical structure nanoparticles approximately 40 nanometers in size. FT-IR spectra confirmed interactions among various functional groups, while the UV-VIS spectroscopy analyzed the optical behavior of the compounds. XRD analysis indicated characteristic peaks for galic acid and confirmed the presence of chitosan in the composite.
Conclusion: The chitosan-rosmarinic acid-galic acid nanogel was successfully synthesized, with FT-IR and SEM results indicating effective attachment of the compounds. The optimal sample exhibited an average particle diameter of nanometers. These findings highlight the potential of this nanogel in enhancing diabetic wounds treatment.
Keywords: Nanoparticles, FT-IR, UV-vis, SEM, XRD

P727, Protective effects of the hydroalcoholic extract of *Fumaria parviflora* on testicular injury induced by torsion/detorsion in adult rats

Majid Shokoohi[1], Hamed Shoorei[1], Maliheh Soltani[2], Seyed Hossein Abtahi-Eivari[2], Maryam Moghimian[2]

1. Clinical Research development unit of Tabriz Valiasr hospital, Tabriz University of Medical Sciences, Tabriz, Iran
2. Department of Basic Sciences, Faculty of Medicine, Gonabad University of Medical Sciences, Gonabad, Iran

Background: This study was designed to determine the effects of daily oral administration (250 mg/kg) of the hydroalcoholic extract of Fumaria parviflora (FP) for 14 days on the sperm parameters, oxidative stress parameters, serum testosterone levels, expression of Bax and Bcl-2 genes, and apoptosis index of germ cells after testicular torsion–detorsion (ischaemia–reperfusion, IR) injury model in rats.
Methods: Twenty-eight adults male Wistar rats were divided randomly into four groups of seven each: sham operation, torsion–detorsion (TD), TD plus the hydroalcoholic extract FP (TDFP) and only FP without TD application (FP). Testicular torsion was created by rotating the left testis 720° in a counterclockwise direction; then, after 4 hr, detorsion was performed.
Results: The Johnson's score, mean seminiferous tubule diameter (MSTD) and height (thickness) of seminiferous tubule epithelium (HST) were significantly increased in TDFP and FP groups as compared to TD group. The gene expression of Bcl-2, level of serum testosterone hormone and antioxidant parameters—GPx and SOD—were significantly higher in TDFP and FP groups than TD group. The index of apoptosis, the gene expression of Bax and the level of MDA were significantly higher in TD group than TDFP and FP groups.
Conclusion: Our results showed that the F. parviflora extract could protect the testis tissue against apoptotic damage and oxidative stress induced by torsion–detorsion because of its antioxidant compounds against ROS
production and also could increase the quality of spermatozoa and the serum level of the testosterone hormone.
Keywords: Apoptosis, Fumaria parviflora, oxidative stress markers, Testicular torsion–detorsion

P728, the effect of alpha-pinene on anxiety in the dextromethorphan-induced anxiety model in rats

Kaveh Rahimi[1], Zeinab Mashhadi Hosseinali[1], Parham Sanaie[1], Abbas Moheisen Nezhad[1], Zahra Alishahi[2], Negin Shirvani[1]

1.Department of Basic Sciences, Faculty of Veterinary Medicine, Shahid Chamran University of Ahvaz, Ahvaz, Iran

2. Medical Student, Abadan University of Medical Sciences, Abadan, Iran

Background: Dextromethorphan (DEX) is an effective over-the-counter antitussive with an alarming increase as an abused drug for recreational purposes. Although reports of the association between DEX administration and anxiety, there are few investigations into the underlying DEX mechanisms of anxiogenic action. The aim of this study was to investigate the effect of alpha-pinene on anxiety behaviors in a dextromethorphan-induced anxiety model in rats.

Methods: The rats were divided into four groups: control group, DEX (15 mg/kg ip) group, DEX treated with alpha-pinene (5 or 10 ml/kg ip) groups. Open field and elevated plus maze tests were used to examine anxiety behavior.

Results: DEX was found to increase anxiety compared to the control group. Specifically, DEX led to a decrease in both rearing and grooming behaviors in the open field test, as well as a reduction in open arm entries in the elevated plus maze. In contrast, both alpha-pinene 5 and alpha-pinene 10 were effective in reducing anxiety-like behaviors in both the open field and elevated plus maze tests.

Conclusion: Alpha-pinene significantly alleviates dextromethorphan-induced anxiety-like behaviors, as evidenced by its positive impact in both the open field test and the elevated plus maze test.

Keywords: alpha-pinene, dextromethorphan, anxiety.

P729, the therapeutic effect of alpha-pinene on oxidative stress factors in an experimental model of colitis

Kaveh Rahimi[1], Parham Sanaie[1], Azin Tavakoli[1], Fatemeh Seirafi Firouzabad[1], Negin Shirvani[1]
1.Department of Basic Sciences, Faculty of Veterinary Medicine, Shahid Chamran University of Ahvaz, Ahvaz, Iran

Background: Oxidative stress is believed to play an important role in the pathogenesis of inflammatory bowel disease (IBD), specifically Crohn's disease (CD) and ulcerative colitis (UC). This study aimed to investigate the effect of alpha-pinene on oxidative stress factors in an experimental model of colitis.
Methods: The rats were divided into four groups: control group, colitis group, colitis treated with alpha-pinene (100 or 150 ml/kg) groups. Intracolonic administration of 4% acetic acid was used to induce colitis. The study evaluated the oxidative stress factors such as GSH, TOS, and TAC.
Results: The GSH level was lower in the colitis group compared to the control group. In the alpha-pinene 100, and 150 groups, the GSH level was higher than in the colitis group. The TAC level was lower in the colitis group compared to the control group. In the alpha-pinene 100, and 150 groups, the TAC level was higher than in the colitis group. The TOS level was higher in the colitis group compared to the control group. In the alpha-pinene 100, and 150 groups, the TOS level was lower than in the colitis group.
Conclusion: It seems that alpha-pinene has a therapeutic effect on acetic acid-induced colitis in rats through antioxidant.
Keywords: Alpha-pinene, Ulcerative colitis, Oxidative stress.

P730, Physiological and pharmacological properties of Chenopodium botrys

Fatemeh Saberi-iraj[1], Morteza Behnam-Rassouli[1], Reza Varanloo[1]
1. Department of Biology, Faculty of Science, Ferdowsi University of Mashhad, Mashhad, Iran

The phenolic and flavonoid content of plants are valuable resources that help in the treatment of cardiovascular and inflammatory disorders, by reducing oxidative stress. Chenopodium botrys (ChB) is a species of the Chenopodiaceae family that is widely grown in various regions of Europe, Asia, and North America. Its essential oil is particularly rich in oxygenated sesquiterpenes such as alpha-odemol, olemol acetate, and olemol, which show promising anticancer properties. Special phenolic compounds increase the antioxidant capacity of this plant to a level comparable to ascorbic acid. However, similar to other plants, the antioxidant capacity of ChB extract varies in different parts of the plant and is higher in leaves than stem and fruit. Reported results from neuropharmacological studies indicate that chloroform extract of ChB inhibits acetylcholinesterase and butyrylcholinesterase. These enzymes are responsible for the degradation of neurotransmitters. These findings suggest potential therapeutic applications of ChB in the treatment of neurological disorders such as Alzheimer's disease. Furthermore, the essential oils of ChB inhibit the activity of the enzyme tyrosinase, and Ledol, alpha-eudesmol and beta-santalol have been identified as key active components. The plant also exhibits antimicrobial/antiparasitic effects against intestinal parasites, which is likely due to its sesquiterpene content. The use of decoctions of this plant in traditional medicine for the treatment of liver disorders, headache and gastrointestinal disorders underlines its broad therapeutic importance. The literature review generally highlights the potential of ChB as a multifunctional medicinal plant and emphasizes the importance of further research into its pharmacologically active compounds and therapeutic applications.

Keywords: Chenopodium botrys, antioxidant activity, pharmacological effects

P731, Herbal supplements and plant-derived phytochemicals in supporting cognitive health during aging: A narrative review

Sahar Salehi[1], Ghadir Rajabzadeh[1]
1. Department of Food Nanotechnology, Research Institute of Food Science and Technology, Mashhad, Iran

Background: Cognitive decline commonly accompanies aging and is mainly associated with oxidative stress and progressive dysfunction of neuronal signaling pathways. In recent years, herbal supplements have attracted growing interest for their potential role in maintaining brain health during aging. This review discusses current evidence regarding their mechanisms of action and clinical relevance in older adults.
Methods: A narrative review of the literature was conducted using articles indexed in PubMed, Scopus, and Web of Science between 1998 and 2024. Eligible studies investigated herbal extracts or phytochemicals with reported effects on cognitive function or neuroprotective mechanisms in older adults. Both experimental and clinical studies were considered.
Results: Preclinical and clinical evidence suggests that plant-derived compounds, including *Ginkgo biloba* flavonoids, *Panax ginseng* ginsenosides, curcumin, resveratrol, and polyphenol-rich extracts, can modulate pathways involved in cognitive aging. These agents reduce oxidative damage and support mitochondrial function, while clinical benefits on memory and attention are modest but significant, particularly with long-term use. Combined use with lifestyle interventions may further enhance cognitive outcomes.
Conclusion: Herbal supplements and plant-derived phytochemicals may offer a complementary strategy for supporting cognitive function. Despite promising findings, well-designed clinical trials are still required to establish optimal dosing and long-term safety.
Keywords: Cognition, Aging, Plant-Extracts, Cognition, Neuro-protectionve

P732, A review of the biological, metabolic and therapeutic effects of berberine (berberin or BBR) found in barberry fruit (*Berberis vulgaris*)

Arefeh Salehi[1], Seyed Mohammad Taghi Razavi Toosi[2,3]
1. Neurophysiology Research Center, Faculty of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran
2. Medical Biotechnology Research Center, Faculty of Paramedical Sciences, Guilan University of Medical Sciences, Rasht, Iran
3.Cardiovascular Diseases Research Center, Department of Cardiovascular Sciences, Heshmat Hospital, Faculty of Medicine, Guilan University of Medical Sciences, Rasht, Iran

Background: Berberine is a natural alkaloid in the fruit of barberry (Berberis vulgaris) that has been widely used in traditional medicine in Iran and China. Its biological compounds have antioxidant, anti-inflammatory, and metabolic regulating properties. Research has shown that this substance can be effective in preventing and improving chronic diseases such as diabetes, cardiovascular disorders, cancer, and neurodegenerative diseases.The aim of this study is to comprehensively review the scientific evidence related to the biological and therapeutic effects of this substance.
Methods: In writing this systematic review article, a search was conducted in PubMed, Web of Science, and Google Scholar databases with keywords such as berberine, therapeutic effects, biological activities between 2015 and 2024. Finally, 50 relevant articles were selected and reviewed.
Results: Studies have shown that berberine improves cellular metabolism by modulating blood glucose and lipid levels, reducing oxidative stress, inhibiting inflammatory pathways (such as NF-κB), and improving mitochondrial function. It also has anticancer effects by inducing apoptosis and inhibiting tumor cell proliferation. According to clinical studies, berberine consumption leads to a decrease in fasting blood sugar, a decrease in blood pressure, and an improvement in neurological disorders including Alzheimer's and Parkinson's.
Conclusion: Berberine is a beneficial natural compound with broad biological and therapeutic effects that can be used as a pharmaceutical supplement in the prevention and treatment of chronic diseases. However, more clinical research is needed to determine its long-term safety, determine the appropriate dosage, and investigate its synergistic effects with other drugs.
Keywords: Berberine, Chronic Diseases, Effects

P733, Quantification of luteolin and apigenin contents of *Dracocephalum kotschyi* by HPTLC technique

Hassan Sadraei[1], Mohammad Amin Jamshidbeygi[1]
1. Department of Pharmacology and Toxicology, School of Pharmacy and Pharmaceutical Sciences, Isfahan University of Medical Sciences, Isfahan, I.R. Iran

Background: Pre-clinical and clinical studies have indicated that Dracocephalum kotschyi (D. kotschyi Boiss.) extract has anti-asthmatic properties and was effective in treating cutaneous eczema. Guidelines set for the standardization of herbal drugs include fingerprints chromatography and quantitative measurements of the active ingredients. In this study, High-Performance Thin-layer Chromatography (HPTLC) procedure was adapted for fingerprinting profile and quantitative analysis of luteolin and apigenin contents of D. kotschyi extract.
Methods: HPTLC was performed on 20×10cm glass plate coated with silica gel 60 F254. A combination of toluene-ethyl acetate-formic acid (6-4-0.3v/v/v) was used as mobile phase. The plates were derivatized by spraying with NP reagent (2-aminoethyl diphenylborinate). Quantification of resolved bands were carried out with densitometry detection at 254nm using a CAMAG automatic TLC system.
Results: Quantitative information retrieved from the electronic images of the chromatograms produced a comprehensive HPTLC fingerprinting for D. kotschyi extract. A mixture of standards luteolin and apigenin showed two separate sharp peaks in HPTLC chromatogram. From eight distinct peaks indicated in the chromatogram of D. kotschyi extract, retention time (Rf) of two distinguish sharp peaks perfectively matched with the apigenin and luteolin. The hydroalcoholic extract of D. kotschyi was found to contain 1.21±0.06mg/g of luteolin and 1.01±0.01mg/g of apigenin (n=4).
Conclusion: HPTLC analysis of the extract generated unique “fingerprint” for D. kotschyi. This method was capable of quantifying and resolving luteolin and apigenin and is applicable for routine analysis of extract contents is the capsule and cream formulations and ensuring that the correct plant species is used.
Keywords: Zaringiah, Fingerprint, Extract standardization.

P734, Memory-enhancing effects of sake yeast supplement in mice: Adenosine receptors interaction

Mahdi saghiri ganjeh[1], Hooman Bozorgi [2], Ali Rashidy-Pour [3], Nasrollah Moradikor [4], Ehsan Motaghi [5], Melika Zamani [6], Thomas Budde [7], Hamed Darbanian [8]

1. School of medicine, Semnan University of Medical Sciences, Semnan, Iran
2.Research Center of Physiology, Department of Pharmacology, Semnan University of Medical Sciences, Semnan, Iran
3. Research Center of Physiology, Semnan University of Medical Sciences, Semnan, Iran
4. International Center for Neuroscience Research, Institute for Intelligent Research, Tbilisi, Georgia
5. Department of Physiology and Pharmacology, School of Medicine, Kurdistan University of Medical Sciences, Sanandaj, Iran
6. Rooyan Darou Pharmaceutical Company, Semnan, Iran
7. Institute of Physiology I, Westphalian Wilhelms-University, Münster, Germany
8. School of Paramedical Sciences, Semnan University of Medical Sciences, Semnan, Iran

Background: Japanese sake yeast supplement, a natural compound enriched with oral adenosine analogs such as S-adenosyl methionine (SAM), was evaluated for its effects in a mouse model of chronic restraint stress-induced memory dysfunction.
Methods: Mice were subjected to a one-week stress protocol and simultaneously treated orally with sake yeast at doses of 100, 200, and 300 mg/kg once daily for one week. Spatial and conditioned fear memory functions were assessed using the Morris Water Maze (MWM) and Passive Avoidance Learning (PAL) tests, respectively.
Results: Significant improvements in spatial cognition were observed across all dosing regimens in the MWM test. Doses of 200 and 300 mg/kg significantly enhanced both short- and long-term fear memory in the PAL test. The memory-enhancing effect of sake yeast was potentiated by administration of ZM241385 (15 mg/kg), a selective adenosine A2A receptor (A2AR) antagonist, but completely abolished by 8-cyclopentyltheophylline (CPT-8, 10 mg/kg), a selective adenosine A1 receptor (A1R) antagonist.
Conclusion: These findings demonstrate the efficacy of sake yeast as a cognitive enhancer, possibly via activation of central A1Rs. Ultimately, sake yeast and its active ingredient SAM may have potential in improving memory in patients with dementia.
Keywords: Zinc supplement, Memory enhancement, Adenosine receptor, Chronic stress

P735, The effect of avocado seed methanolic extract on myofibers volume density and MDA level of soleus muscle in type II diabetic mice

Gholamreza Hamidian[1], Seyed Hadi Taheri[2], Mohamad Mustafa Swara[3]
1. Department of Basic Sciences, Faculty of Veterinary Medicine, University of Tabriz, Tabriz, Iran
2. Student of DVM, Faculty of Veterinary Medicine, University of Tabriz, Tabriz, Iran

Background: Chronic type II diabetes is well known to reduce skeletal muscle insulin sensitivity, inducing a state of insulin resistance that promotes oxidative stress, tissue injury, and ultimately skeletal muscle atrophy. Consequently, identifying therapeutic approaches to prevent muscle loss in diabetic patients is of critical importance. Our previous studies has demonstrated that avocado (*Persea americana*) possesses pronounced hypoglycemic, hypolipidemic, and antioxidant activities.
Methods: Forty adult male mice were divided into five groups including: control, diabetic, and three treatment groups. Type II diabetes was induced by high fat diet and low dose of streptozotocin (STZ). Seven days after STZ injection, diabetic rats treated by 50, 100 and 150 mg/kg of methanolic extract of Avocado seed (MEAS) via oral gavage for 40 consecutive days. Finally animals were euthanized and soleus muscle was removed and fixed in 10% neutral buffered formalin for histological and stereological studies while another portion was rapidly frozen in liquid nitrogen and stored at –70°C for subsequent malondialdehyde (MDA) quantification.
Results: Results indicated that diabetes significantly reduced body mass gain and the volume density of myofibers, while elevating MDA levels in the soleus muscle. Treatment with MEAS, however, lowered blood glucose and MDA concentrations in a dose-dependent manner. Moreover, MEAS administration attenuated the loss of body weight gain and increased myofiber volume density comparably.
Conclusion: These findings suggest that MEAS may represent a viable protective intervention to mitigate diabetic myopathy in type II diabetes.
Keywords: Avocado, Soleus muscle, Type II diabetes, MDA

P736, Papaverine-like alkaloids derived from berberis vulgaris and papaver somniferum as natural therapeutic candidates for impotence and infertility

Seyyed Mojtaba Tahmasbi[1], Malihe Akhavan[2], Seyede Melika Ahmadi[3], Zohreh Esam[4]
1.Student Research Committee, Faculty of pharmacy, Babol University of Medical Sciences, Babol Iran
2.Pharmaceutical Sciences Research Center, Department of Medicinal Chemistry, Faculty of Pharmacy, Mazandaran University of Medical Sciences, Sari Iran
3. Department of Pharmaceutics, Faculty of Pharmacy, Babol University of Medical Sciences, Babol Iran
4. Department of Medicinal Chemistry, Faculty of Pharmacy, Babol University of Medical Sciences, Babol Iran

Background: Infertility and erectile dysfunction are significant public health concerns in Iran, especially given current national priorities for population rejuvenation. In men, erectile dysfunction and impaired spermatogenesis, and in women, ovulation disorders and hormonal imbalances, are major contributors to infertility, highlighting the need to address these issues. Papaverine, a key benzylisoquinoline alkaloid from opium poppy, is currently approved for erectile dysfunction treatment. This study aims to investigate structurally Papaverine-like alkaloids from these plants as potential modulators of fertility-related receptors.
Methods: The binding potential of Papaverine-like benzylisoquinoline minor alkaloids—including Laudanosine, Reticuline, Codamine, Palaudine, Berberine, and Palmatine—was assessed against the Follicle-Stimulating Hormone Receptor (FSHR), Androgen Receptor (AR), and RAC-alpha serine/threonine-protein kinase (AKT1) using PDB IDs 1XWD, 4AY9, 2Q7K, and 3QKK. Protein targets were retrieved from the Protein Data Bank. Molecular docking simulations using AutoDock Vina predicted binding affinities and interaction modes. The best ligand-receptor complexes were further validated with molecular dynamics (MD) simulations.
Results: All ligands demonstrated stable binding energies across tested PDB structures (binding affinities: -6.96 to -8.16 kJ/mol). Palaudine, similar to Papaverine, showed strong activity at androgen receptors. Key residues in complex formation included Phe764, Met745, Trp741, Arg752, and Thr877. Berberine formed a stable complex with AR (binding energy -8.35 kJ/mol) via pi-pi stacking with Phe764. For MMPBSA calculations, the final 20 ns of the MD simulation were used for accurate binding free energy estimation.
Conclusion: These findings highlight the potential of benzylisoquinoline alkaloids as promising natural therapeutics for impotence and infertility.
Keywords: Benzylisoquinoline, Alkaloids, Impotence, Infertility, Palaudine

P737, Therapeutic potential of *Arnica montana* L. and physical exercise in attenuating colonic inflammation and oxidative stress in ulcerative colitis

Mahsa Attarian[1], Khatereh Kharazmi[2], Fereshteh Asgharzadeh[2,3], Seyedeh Elnaz Nazari[2], Moein Eskandari[1], Azar Khorrami[4], Hamideh Naimi[1], Saeideh Mansoori[1], Akram Aminian[5], Elaheh Eshtad[2], Majid Khazaei[2,3]

1. Department of Clinical Biochemistry, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Medical Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Metabolic Syndrome Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
4. Medical School, Mashhad University of Medical Sciences, Mashhad, Iran
5. Department of Physiology and Pharmacology, Afzalipour Faculty of Medicine, Kerman University of Medical Sciences, Kerman, Iran

Background: Ulcerative colitis (UC) is a chronic inflammatory disorder characterized by mucosal ulceration within the colon. This study aimed to evaluate the therapeutic effect of *Arnica montana L.* (Ar) in a mice model of colitis, particularly when combined with physical exercise.
Methods: Experimental animals were allocated into four groups (n=6 per group): Exercise (Ex), colitis induced by dextran sulfate sodium (DSS), colitis which combined with Exercise (Ex+DSS), and colitis group receiving *Arnica montana L.* alongside exercise (Ar+Ex+DSS). Body weight and disease activity index (DAI) including diarrhea, rectal bleeding and prolapse, were monitored during colitis induction and treatment phases. Upon sacrifice, colon tissues were harvested for clinical evaluation, histopathological examination, and biochemical assessment of oxidative stress markers in homogenized samples.
Results: The group treated with Arnica and exercise demonstrated significant amelioration in DAI. Histological and biochemical analysis revealed marked improvement in inflammation and crypt loss and increased antioxidant enzyme levels (SOD and Catalase) and reduced oxidative marker (MDA) in colon tissue of the Ar+Ex+DSS group compared to colitis group. Trichrome staining of colon tissue showed a reduction in fibrosis and collagen deposition suggesting attenuated colon fibrosis in Arnica+Ex -treated groups**.**
Conclusion: Combined administration of Arnica and exercise has marked improvements in clinical symptoms, histopathological features, and oxidative stress profiles in colon tissue of colitis and it can be considered as a potential treatment in colitis patients.
Keywords: Ulcerative colitis, Exercise, Inflammation, *Arnica montana L.* (Ar)

P738, The effect of *Sclerorhachis leptoclada* extract on renal pathological and Fibronectin and TGF-β gene expression changes in male diabetic rats

Omid Ghafourian Eshghi[1], Maryam Tehranipour[1], Javad Baharara[1], Seyedeh Bahareh Alavian[1]
1. Department of Biology, Ma.C., Islamic Azad University, Mashhad, Iran

Background: Diabetes is a metabolic disorder in the body. In this disease, the ability of produce insulin hormone is impaired by beta cell dysfunction in the pancreas or produce insulin resistant. Sclerorhachis leptoclada is a species of Sclerorhachis belong to Asteraceae family with antioxidant effect in the present study, the effect of hydroalcoholic extract of Sclerorhachis leptoclada on glucose, serum biochemical factors and fibronectin and TGF-β gene expression were investigated.
Methods: In this experimental study, 60 male Wistar rats weighing 200-250gr were used. Animals were randomly divided into 10 groups of 6: healthy, treatment groups 1, 2 and 3 (healthy treated with doses of 150, 300 and 600 mg/kg of extract), Diabetic, experimental group 1, 2 and 3 (diabetic patients treated with doses of 150, 300 and 600 mg/kg of extract). Positive control (diabetic treated with glibenclamide), healthy control (healthy treated with glibenclamide). After one month of gavage extract, blood samples were collected from the animals and glucose, urea, creatinine and albumin were measured. Comparison of the effect of hydroalcoholic extract of Sclerorhachis leptoclada was performed with glibenclamide. At the same time, the expression of TGF-β and Fibronectin genes expression was also investigated in the kidney tissue.
Results: The results showed a significant increase in urea and a decrease in glucose levels in experimental compared to diabetic rats. However, there was no significant decrease in albumin in the diabetic group. The comparison of experimental groups 1, 2, 3 (diabetic + extracts of 150, 300, 600) with diabetic group showed significantly decreased in glucose and the experimental group 2 in urea showed significant decrease compared to the diabetic group. The TGF-β gene expression was increased in streptozotocin-induced diabetic rats compared in experimental groups 1 and 2 to healthy rats. All three doses of extract in experimental groups reduced the expression of TGF-β gene compared to the diabetic group and the highest reduction was related to dose of 300. In addition, fibronectin gene expression was increased in streptozotocin-induced diabetic rats compared to healthy rats. All three doses of extract in experimental groups decreased fibronectin gene expression in diabetic group and the highest decrease was related to dose 150. Administered Glibenclamide in the diabetic group increased the expression of TGF-β and Fibronectin genes.
Conclusion: Due to the presence of flavonoid compounds and antioxidant properties, the Sclerorhachis leptoclada extract thought that could cause partial correction of metabolic disorders caused by hyperglycemia through protecting effects, and also reduction in the level of TGF-β and Fibronectin genes expression in diabetic rats, and prevention in diabetic nephropathy incidence.
Keywords: Diabetes, Kidney, Fibronectin, *Sclerorhachis leptoclada*, *TGF-β*

P739, Effects of phytoestrogen genistein on tumor necrosis factor-α (TNF-α) levels in model of polycystic ovary syndrome

Sanaz Alivandi Farkhad[1], Homayoun Khazali[1]
1. Department of Physiology, Faculty of Biological Science and Technology, Shahid Beheshti University, Tehran, Iran

Background: Tumor Necrosis Factor Alpha (TNF-α), is a proinflammatory cytokine in the pathogenesis of Polycystic Ovary Syndrome (PCOS). The TNF-α may have a role in hyperandrogenism, cortex thickening, in addition to the increasing ovarian size. Genistein is the principal isoflavone found predominantly in soybeans. Genistein exerts evident anti-inflammatory properties. However, detailed molecular mechanisms of the anti-inflammatory effects of genistein are still elusive.
Methods: In this study the syndrome induced by muscular injection of 40 mg/kg Estradiol Valerate to 32 female Wistar rats. Control group receive no injection. After 60 days the animals divided to control, PCOS and PCOS treated with Genistein (15 and 30 mg/kg) groups. After 21 days intraperitoneal treatment of genistein, the ovaries of all groups histologically studied and TNF-α level were detected by the ELISA kit. Data were analyzed using SPSS (ANOVA) and $p<0.05$ was considered statistically significant.
Results: There was a signification polycystic improvement in ovaries treated with high concentration of Genistein in comparison with PCOs group and also TNF-α level decrease, thickness of the theca layer decrease, reduction of cystic follicular number, corpus luteum increase and granulosa layer increase were found, that could be a sign of renewed ovulation.
Conclusion: Genistein could decrease PCOS histological signs by decreasing the levels of inflammatory cytokines that lead to ovulation rate reduction, and have reparation effects on ovary tissue. It is possible that, this ability is because of Genistein antioxidant and anti-inflammatory effects that motivate reduction of cysts number and natural development of follicles.
Keywords: Genistein; TNF-α; Polycystic ovary Syndrome; Inflammation.

P740, The impact of berberine supplementation versus atorvastatin combined with aerobic training on liver enzymes in high fat diet male wistar rats

Gholam-Hossein Barahoee[1], Reza Delavar[1], Majid Vahidian Rezazadeh[2], Elham Heidari[3], Farzaneh Faraji Shahrivar[4]

1. Department of Sport Sciences, Faculty of Education and Psychology, University of Sistan and Baluchestan, Zahedan, Iran
2. Department of Sport Sciences, Montazeri Technical Collee of Mashhad, Technical and Vocational University, Mashhad, Iran
3. Department of Anatomy, School of Medicine, Iranshahr University of Medical Sciences, Iranshahr, Iran
4. Department of Physiology, School of Medicine, Iranshahr University of Medical Sciences, Iranshahr, Iran

Background: Combining exercise training with medication or herbal supplements is among the recommended strategies for managing obesity and its associated complications, particularly fatty liver disease. However, due to the variety of exercise programs, medications, and herbal substances available for treating obesity, the optimal prescription has yet to be definitively established. This study aimed to investigate the effects of atorvastatin combined with a period of aerobic exercise, compared to berberine supplementation combined with aerobic exercise, on liver enzyme levels in obese rats."

Methods: Thirty-two male Wistar rats, each 8 weeks old, were subjected to a high-calorie diet for one month to induce weight gain. Subsequently, the rats were randomly assigned to four groups (n=8 per group): Control (C), Exercise (Ex), Exercise + Atorvastatin (Ex+Atr), Exercise + Berberine (Ex+Ber). All groups, except the control, underwent an aerobic swimming regimen consisting of one hour of swimming daily between 8:00 AM and 4:00 PM, five days per week, for six weeks. The Ex+Atr and Ex+Ber groups received daily oral gavage of atorvastatin (20 mg/kg) and berberine (30 mg/kg), respectively, concurrent with the exercise protocol. Body weights were recorded weekly throughout the study. Forty-eight hours after the final exercise session, following a 12-hour fasting period, the rats were anesthetized, and blood samples were collected via tail vein. The blood was centrifuged to separate the serum, which was then stored at -80°C until analysis of hepatic parameters. Lipid profiles were subsequently measured, and the data were analyzed using SPSS software version 21.

Results: The weight of the animals in the exercise group was significantly reduced compared to the control group (P=0.021). The AST level showed a significant decrease after the intervention in all groups compared to the control group, but this decrease was greater in the exercise + berberine group (P=0.003). The ALT level showed a significant decrease after the intervention only in the exercise + berberine group compared to the control group (P=0.003)

Conclusion: Taking berberine supplements combined with aerobic exercise was more effective at reducing liver enzyme levels than taking atorvastatin combined with aerobic exercise. In the future, berberine may serve as a replacement for or supplement to chemical drugs in treating obesity or fatty liver disease.

Keywords: Atorvastatin, Berberine, Liver enzymes, Obesity

P741, Comparative study of lemongrass extract, citral, and green-synthesized agnps in diabetic testicular protection

Milad Faraji[1], Mojde Baniadam[1], Mohammad Foad Noorbakhsh[1], Nasrin Kazemipour[1], Saeed Nazifi[2]
1. Department of Basic Sciences, School of Veterinary Medicine, Shiraz University, Shiraz, Iran
2. Department of Clinical Sciences, School of Veterinary Medicine, Shiraz University, Shiraz, Iran

Background: Type 2 diabetes mellitus (T2DM), accounting for over 90% of diabetes cases, is a chronic metabolic disorder often associated with oxidative stress-induced testicular damage. *Cymbopogon citratus* (lemongrass) extract (LE) is known for its hypoglycemic, hypolipidemic, and antioxidant properties. Its application in the green synthesis of silver nanoparticles (LE-AgNPs) further enhances these effects through surface biofunctionalization. This study evaluated the protective efficacy of LE, citral (a major active compound of LE), and LE-AgNPs on testicular injury induced by T2DM.
Methods: Seventy adult male Sprague–Dawley rats were randomly divided into seven groups: control, cosolvent control, diabetic control, and four treatment groups receiving metformin, citral, LE, or LE-AgNPs. After the treatment period, animals were sacrificed, and blood and testicular samples were collected to assess serum and tissue testosterone levels, total antioxidant capacity (TAC), malondialdehyde (MDA) content, and histopathological alterations.
Results: All treatment groups showed significant improvements in TAC and testosterone levels, along with reduced MDA concentrations compared to the diabetic control group. Among them, LE-AgNPs exhibited the most prominent therapeutic effect, closely paralleling metformin. Histopathological analysis of diabetic rats revealed necrosis, vacuolar degeneration of seminiferous epithelium, and reduced germinal layer thickness, whereas treatment—especially with LE-AgNPs—effectively preserved normal testicular architecture.
Conclusion: In conclusion, LE-AgNPs demonstrated superior protective effects against diabetes-induced testicular damage, likely due to their potent antioxidant activity. These findings support the potential application of LE-AgNPs as a promising adjunct therapy for managing male reproductive complications associated with T2DM.
Keywords: Lemongrass extract, Silver nanoparticles, Type 2 diabetes mellitus, Testicular damage, Antioxidant activity

P742, Biological and pharmacological evaluation of rosemary extract combined with lactobacillus plantarum–derived postbiotic for topical and dermatological applications

Mohamad Javad Farhangi[1], Faezeh Sabet[2], Kiarash Ghazvini[3], Behnam Rafiee[4]
1. Department of Biology, Faculty of Basic Sciences, Islamic Azad University of Mashhad, Mashhad, Iran
2. Antimicrobial Resistance Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Microbiology and Virology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
4. Department of Animal Science, College of Agriculture, Ferdowsi University of Mashhad, Mashhad, Iran

Background: *Rosmarinus officinalis* (rosemary) is rich in phenolic compounds such as rosmarinic acid and carnosic acid, known for their antioxidant, anti-inflammatory, and antimicrobial effects. Postbiotics—non-viable metabolites and cell components produced by beneficial bacteria like *Lactobacillus plantarum*—demonstrate strong physiological stability and the ability to modulate skin barrier function and immune responses. Integrating phytochemical and postbiotic strategies may provide a novel therapeutic platform for managing localized skin disorders.
Methods: Hydroalcoholic extract of rosemary and a *L. plantarum*-derived postbiotic were prepared and characterized. Antioxidant activity was assessed using DPPH and FRAP assays. Antimicrobial effects against *Staphylococcus aureus* and *Cutibacterium acnes* were evaluated via MIC and zone inhibition tests. Anti-inflammatory potential was examined in human keratinocyte (HaCaT) models by measuring IL-6 and TNF-α expression levels under induced inflammation and oxidative stress
Results: The combined formulation demonstrated significantly enhanced antioxidant capacity compared to individual components. Synergistic antimicrobial activity resulted in stronger inhibition of *C. acnes* and *S. aureus*. Keratinocyte studies showed a marked reduction in inflammatory cytokines (IL-6, TNF-α) and improved cell viability under oxidative stress. Physiologically, the formulation supported restoration of skin barrier function and modulation of local immune responses.
Conclusion: The synergistic interaction between rosemary extract and *L. plantarum* postbiotic exhibits promising pharmacological and physiological effects for topical use. The combined formulation demonstrates strong antioxidant, antimicrobial, and anti-inflammatory properties, suggesting potential application in pharmaceutical and dermatological products targeting acne, inflammation, and irritation
Keywords: *Lactobacillus plantarum*, Postbiotic, Antioxidant activity, Anti-inflammatory, Antimicrobial

P743, Saffron (*Crocus sativus*) and its constituents; Basic and clinical evidence for a potential role in analgesia

Fatemeh Forouzanfar[1], Ali Mohammad Pourbagher-Shahri[1]
1. Neuroscience Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: *Pain* remains a *significant* global health challenge. In preclinical and clinical studies, Saffron (*Crocus sativus* L.) has shown analgesic activities. Considering the unsatisfactory results of current therapeutic management for chronic pain conditions, the current study was designed to review saffron's analgesic activity and underlying mechanisms.
Methods: A literature search was done using the following databases: PubMed, Scopus, Science Direct, Embase, EBSCO, Cochrane Library, and Google Scholar.
The keywords in the search strategy were [“crocus sativus L.” OR “saffron” OR “crocin” OR “safranal” OR “crocetin” OR “picrocrocin”] AND [“pain” OR “nociception” OR “analgesic” OR “analgesia” OR “hyperalgesia” OR “allodynia”]. Full texts of identified articles were obtained, and relevant bibliographies were manually searched to identify additional articles.
Results: Saffron demonstrated pain-relieving effects in experimental models of pain induced by formalin, carrageenan, and capsaicin. The analgesic properties of Saffron influenced multiple targets, including ion channels in nociceptors, the adrenergic system, and the central histaminic system; it also involved the inhibition of inflammatory pathways, apoptotic processes, and oxidative stress; regulation of the nitric oxide pathway; and the endocannabinoid system. Clinical research has indicated that Saffron provides pain relief in conditions such as rheumatoid arthritis, postpartum pain, dysmenorrhea, and fibromyalgia.
Conclusion: Our literature review showed that saffron can be beneficial as an adjunct therapy to commonly used analgesics in practice, particularly in chronic pain conditions.
Keywords: *Crocus sativus*, Pain management, Saffron, Hyperalgesia

P745, Effect of hydroalcoholic extract of Levisticum officinale on pancreas tissue level of Malondialdehyde in diabetic rats

Nahid Ghayedi[1], Iran Pouraboli[1]
1. Department of Biology, Faculty of Sciences, Shahid Bahonar University, Kerman, Iran

Background: *Levisticum officinale* has antioxidant and antidiabetic properties. This study aimed to examine the effect of *Levisticum officinale* hydroalcoholic extract on Malondialdehyde (MDA) level in pancreas tissue of streptozotocin-induced diabetic rats.
Methods: In this experimental study, 24 adult male rats were divided into four groups (n=6). A group of normal rats received distilled water (0.5 ml) individually by gavage for 14 days and the others were made diabetic by the injection of streptozotocin (STZ; 70 mg/kg, i.p.). The second, third and fourth diabetic groups received, distilled water (0.5 mL), 500 mg/kg *L.officinale* extract and 20 mg/kg glibenclamide by gavage for 14 days, respectively. After treatments, rats were sacrificed and pancreas tissue MDA level was evaluated by spectrophotometry.
Results: Administration of *L.officinale* extract in diabetic rats for 14 days significantly decreased pancreas tissue level of MDA in comparison with diabetic ones ($p<0.05$).
Conclusion: It can be concluded that hydroalcoholic extract of *L.officinale* attenuate the oxidative stress and lipid peroxidation via free radical trapping in the course of diabetes mellitus.
Keywords: Diabetes mellitus, *Levisticum officinale,* MDA, Pancreas

P746, Effects of fenoferin and tschimgine on ethanol-induced hepatocyte damage

Fateme Sabahati[1], Farideh Golhasani[1], Leila Mobasheri[2], Elham Einafshar[1,2], Roghayeh Rashidi[1], Hanieh Gholamalizadeh[1], Ali Ghorbani[2], Azar Hosseini[1,2], Ahmad Ghorbani[1,2]

1. Pharmacological Research Center of Medicinal Plants, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Pharmacology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Alcohol consumption accounts for approximately 5% of global deaths and is a common cause of liver disease. Terpenoids are a bunch of plant-based ingredients that have shown hepatoprotective effects in various research models. Fenoferin and tschimgine are terpenoids isolated from plants of *Ferula* genus. So far no study has investigated the hepatoprotective activity of these compounds. Therefore, the present work aimed to evaluate the effects of fenoferin and tschimgine on ethanol-induced hepatocyte damage in vitro.

Methods: HepG2 liver cells were incubated with different concentrations of ethanol and fenoferin or tschimgine for different times. The MTT test and annexin-V/PI staining were performed to evaluate cell viability and apoptosis, respectively. Oxidative stress was evaluated by assessing the level of reactive oxygen species (ROS). The level of gene expression was evaluated by quantitative real-time PCR.

Results: Ethanol caused a dose- and time-dependent decrease in hepatocyte viability. This effect resulted from an increase in apoptosis due to elevated intracellular ROS concentrations. Co-incubation with fenoferin did not prevent ethanol-induced cytotoxicity. However, tschimgine could reduce oxidative stress and ethanol-induced apoptosis after 6 hours of incubation.

Conclusion: Tschimgine reduces ethanol-induced cell damage by inhibiting the production of ROS in liver cells. Therefore, this compound may be beneficial as a hepatoprotective agent in cases of alcoholic liver disorders.

Keywords: Ethanol, HepG2, Fenoferin, Liver, Tschimgine

P747, A systematic review of nanocurcumin in multiple sclerosis: From Molecular targets to clinical outcomes

Zahra Kazemi Korani[1], Alia Saberi[2], Qazal Esmaielpur[3], Mohammad Abbasi Zarenji[3], Amirhossein Esmaili[3], Samin Nazari[3]

1. Student Research Committee, Faculty of Nursing and Midwifery, Bam University of Medical Sciences, Bam, Iran
2. Neuroscience Research Center, School of Medicine, Poursina Hospital, Guilan University of Medical Sciences, Rasht, Iran
3. Student Research Committee, Sarab Faculty of Medical Sciences, Sarab, Iran

Background: Multiple sclerosis (MS) is a chronic autoimmune disease marked by neuroinflammation, demyelination, and immune dysregulation. Although current therapies offer some benefit, they are often limited by suboptimal efficacy and adverse effects. Curcumin, a natural polyphenol with anti-inflammatory and antioxidant properties, has shown promise in modulating MS-related pathways. However, its clinical application is hindered by poor bioavailability. This systematic review evaluates the therapeutic potential of nanocurcumin, an advanced formulation with improved solubility and targeted delivery.

Methods: Following PRISMA guidelines and PICO criteria, a comprehensive search was conducted in PubMed, Scopus, Web of Science, and Cochrane Library for studies published between 2015 and 2025. Inclusion criteria focused on randomized or controlled trials assessing nanocurcumin's efficacy in MS or related neuroimmune mechanisms. Study quality was assessed using the Cochrane RoB 2 tool.

Results: From 443 initial records, 20 studies met the inclusion criteria, including 6 randomized trials, 5 animal studies, and 9 in vitro investigations. Nanocurcumin consistently modulated immune responses. In RRMS patients, it regulated microRNAs (miR-16, miR-155, miR-326), reduced Th17 cells, and enhanced Tregs. It also lowered cytokines (IFN-γ, IL-1β, TNF-α, IL-6) and downregulated NF-κB, AP-1, and STAT-1. Chemokine modulation (CCL-2, CCL-5) reduced CNS leukocyte infiltration. Mechanistic studies showed Sox2 upregulation and oligodendrocyte differentiation, supporting remyelination. Nanocurcumin also improved blood–brain barrier integrity. No serious adverse effects were reported.

Conclusion: Nanocurcumin shows multifaceted therapeutic potential in MS by targeting immune dysregulation, neuroinflammation, and remyelination. Further studies are needed to address long-term safety, dosing, and regulatory challenges.

Keywords: Curcumin, Multiple sclerosis, Neuroinflammation, Immunomodulation

P748, Antioxidant and organ-protective efficacy of *Rheum turkestanicum* extract: A systematic review and meta-analysis of preclinical studies

Azar Hosseini[1], Omid Fakharzadeh Moghadam[1]
1. Department of Pharmacology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Oxidative stress is characterised by an imbalance between pro oxidant species and endogenous antioxidant defence. It is a major pathogenic mechanism in many chronic diseases including cardiovascular diseases, nephropathy, hepatotoxicity and diabetes. The medicinal plant Rheum turkestanicum (RT) rich in anthraquinones and flavonoids has been traditionally used. This systematic review and meta-analysis combines preclinical evidence on the antioxidant mechanisms underlying the therapeutic effects of RT extract.

Methods: This systematic review includes preclinical studies that evaluate the effects of RT root or rhizome extract against oxidative damage to various organs in rodent models induced by chemicals. The primary outcomes for meta analysis included key indices of oxidative stress and antioxidant status is Malondialdehyde (MDA) Total Thiol Content, Superoxide Dismutase (SOD) activity and Catalase (CAT) activity. Studies analyzed covered models of cardiotoxicity (Isoprenaline and Doxorubicin induced myocardial injury) nephrotoxicity (Cisplatin, Gentamicin, Hexachlorobutadiene and Mercuric Chloride) hepatocellular carcinoma (Diethylnitrosamine) and Streptozotocin induced diabetes (multi organ). Data homogenization and meta analysis focused on comparing changes in oxidative markers between disease control and RT treated groups across affected organs (heart, liver and kidney).

Results: The aggregate data strongly support the potent antioxidant activity of RT extracts across diverse pathologies. Treatment with RT consistently attenuated lipid peroxidation demonstrated by a significant reduction in MDA levels in the heart, kidney and liver.

Simultaneously RT restored endogenous antioxidant defenses, significantly increasing total thiol content in the kidney and liver. Furthermore RT significantly enhanced the activity of enzymatic antioxidants, increasing SOD and CAT activities in cardiac and hepatic tissues. This modulation of oxidative stress translated to demonstrable organ protection including reduced serum levels of cardiac enzymes (LDH, CK-MB, cTn-T) improved renal function markers (urea, creatinine, urinary protein and glucose) and ameliorated histopathological damage across all modeled organs (heart, kidney, liver). Phytochemical analysis confirms the presence of bioactive constituents such as anthraquinones and flavonoids known for their radical scavenging capabilities.

Conclusion: This systematic review and meta analysis confirms that RT extract exerts powerful and widespread organ protective effects in preclinical models. primarily mediated through the mitigation of oxidative stress and the restoration of cellular antioxidant capacity. These consistent findings suggest that RT and its bioactive components hold considerable promise as a supportive pharmacological agent for reducing toxicological or disease related oxidative damage in the heart, liver and kidney. Further mechanistic and ultimately, human clinical studies are warranted to translate this robust preclinical evidence into therapeutic strategies.

Keywords: *Rheum turkestanicum,* Antioxidant, Protective efficacy, Chronic diseases

P749, Comprehensive review of the effects of *Stachys lavandulifolia* on hepatic and renal function

Farnoosh Kaviani[1], Zahra Heydari[1]
1.Department of Clinical Sciences, Faculty of Veterinary Medicine, Bu-Ali Sina University, Hamedan, Iran

Background: Plants that contain active compounds and are used as medicine are referred to as medicinal plants. One of the well-known medicinal plants in Iran is Mountain Tea, scientifically known as *Stachys lavandulifolia*. This study aims to investigate the effects of Mountain Tea consumption on the liver and kidneys. This plant has anti-inflammatory, antioxidant, and anti-apoptotic effects.
Results: In fact, short-term administration has been shown to significantly reduced kidney damage caused by gentamicin, also the alcoholic extract of this plant has a positive effect on the liver by reducing Malondialdehyde (MDA) and nitric oxide levels. Although a dose of 2000 mg/kg has been reported as non-toxic, long-term use of more than 140 mg/kg has been found to cause biochemical and cellular changes and to increase the weight of the liver and kidneys. Furthermore, Although oral consumption of 500 mg/kg of Mountain Tea did not initially cause any adverse effects, continuous consumption for 45 days led to liver damage and kidney atrophy. The presence of terpenoids in the plant is believed to be the main cause of such damage. It has been suggested that antioxidants, under certain conditions, may have negative or even pro-oxidant effects. This is particularly important considering the irreversible kidney damage observed after two months of consuming the hydroalcoholic extract of Mountain Tea.
Conclusion: In conclusion, Mountain Tea possesses antibacterial, antiparasitic, and anticonvulsant properties. At low doses, it can have beneficial effects on the liver. However, at high doses and with long-term use, it may even cause irreversible damage.
Keywords: Medical plant, *Stachys lavandulifolia*, Nephrotoxicity, Hepatotoxicity

P750, Protective effect of quercetin on the amikacin-induced nephrotoxicity

Zeinab Karimi [1], Pooran Ghahramani[2]
1. Nephro-Urology Research Center, Shiraz University of Medical Sciences, Shiraz, Iran
2. Department of Biology, Faculty of Sciences, Shiraz University, Shiraz, Iran

Background: Amikacin is an antibiotic drug from the aminoglycoside class that is primarily used to treat severe bacterial infections, especially those caused by Gram-negative bacteria resistant to other antibiotics. However, the use of amikacin is limited due to its associated nephrotoxicity. Quercetin is a natural flavonoid widely found in many plants and is known for its anti-inflammatory properties. Therefore, this study aimed to investigate the protective effects of quercetin on amikacin-induced nephrotoxicity.
Methods: Twenty-one male Sprague-Dawley rats were randomly assigned to three groups: Control, Amikacin (400 mg/kg by gavage for 12 days), and Amikacin+ Quercetin. The animals received Amikacin consecutively for 7 days, and then until day 12, they were given Quercetin (50 mg/kg, gavage) 30 min before Amikacin administration. On the twelfth day post-injection, the animals were housed in metabolic cages for 24 hours to collect urine samples. Afterward, the rats were anesthetized for blood collection, and kidney tissue samples were harvested for RNA extraction and histopathological analyses.
Results: Amikacin administration led to a significant increase in plasma creatinine ($[Cr]_P$) and urea nitrogen ($[UN]_P$**),** together with tissue damage, compared with the control group. Administration of Quercetin decreased $[Cr]_P$ and $[UN]_P$ levels, as well as histological damage caused by Amikacin administration. The results demonstrated that mRNA expression of TNF-α was downregulated in the Quercetin group compared with the Amikacin group.
Conclusion: Our findings indicate that quercetin mitigates amikacin-induced renal injury, primarily through its anti-inflammatory properties, and may be used as an adjuvant therapeutic agent to alleviate amikacin-induced nephrotoxicity.
Keywords: Amikacin, Drug-induced nephrotoxicity, Quercetin, AKI

P751, Modulatory role of *Cyperus rotundus* L. extract on blood glucose and lipid profiles in aged rats

Shabnam Mohammadi[1], Farimah Beheshti[2], Hossein Haghir[1], Abolfazl Rezaei [3]
1. Department of Anatomy and Cell Biology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Physiology, School of Medical Sciences, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
3. Department of Physiology, Mashhad University of Medical Sciences, Mashhad, Iran

Background: According to the World Health Organization's prediction, diabetes will reach 300 million people by 2025. Considering the beneficial effects and low side effects of herbal compounds, the aim of the present study was to investigate the effects of the extract of Cyperus on blood glucose and serum lipid profile in rats.
Methods: In this study, 32 rats were divided into 4 groups: aged control (18-20 months), extract 1 (aged rats receiving 250 mg/kg of Cypress extract), extract 2 (aged rats receiving 500 mg/kg of Cypress extract), and young control group (2-3 months). After 20 days of treatment by gavage, glucose levels and lipid profiles were checked. Data were analyzed using SPSS software and ANOVA test.
Results: A significant difference was observed in blood glucose (P = 0.028), serum cholesterol (P = 0.01) and triglyceride (P = 0.01), HDL (P = 0.02) and LDL (P = 0.003) levels in mice receiving Cyperus extract at a dose of 500 mg/kg compared to the aged control group. A significant decrease in blood cholesterol (P = 0.01) and triglyceride (P = 0.01) levels was observed in mice receiving Cyperus extract at a dose of 250 mg/kg compared to the aged control group.
Conclusion: The results indicate the beneficial effects of Cyperus extract in improving metabolic parameters related to blood glucose and lipids in aged mice. It can suggest the therapeutic potential of this extract in controlling metabolic disorders.
Keywords: Lipids, Plant extracts, Glucose, Blood, Rats

P752, Paraquat-induced lung injury in rat is ameliorated by *Curcuma longa*

Seyedeh Zahra Ghasemi[1], Sima Beigoli[2], Sepideh Behrouz[2,3], Zahra Gholamnezhad[3], Nema Mohammadian Roshan[4], Mehraneh Mohamadi[2], Mohammad Hossein Boskabady[2,3]

1. Cutaneous Leishmaniasis Research Center, Imam Reza Hospital, Mashhad University of Medical Sciences, Mashhad, Iran
2. Applied Biomedical Research Center, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Physiology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
4. Department of Pathology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: The effects of the extract of *Curcuma longa* (*C. longa*) on lung oxidative stress, inflammation, pathological changes, and tracheal responsiveness (TR) induced by inhaled paraquat (PQ) were evaluated in rats.
Methods: One group of rats exposed to saline (group C) and six groups to PQ aerosols. PQ groups were treated with drinking water alone (group PQ), drinking water containing two doses of *C. longa* (150 and 600 mg/kg, as Cl-L and Cl-H), pioglitazone (Pio, 5 mg/kg), Pio + Cl-L and dexamethasone (Dexa, 0.03 mg/kg) after the end of PQ-exposure period for 16 days.
Results: All measured variables including total and differential WBC counts, malondialdehyde (MDA) thiol, catalase (CAT) and superoxide dismutase (SOD) in the BALF, interferon-gamma (INF-γ) and interleukin (IL)-10 in the lung tissue, lung pathological changes and tracheal responsiveness were markedly deteriorated in the PQ group ($p<0.05$-$p<0.001$). In the Cl-H and Pio + Cl-L groups, all measured variables, in the Pio and Cl-L groups most variables and in the Pio only few variables were markedly improved ($p<0.05$ to $p<0.01$). The improvements in all variables except some pathological changes in the Pio + Cl-L group were significantly higher than the Pio and Cl-L groups alone ($p<0.05$ to $p<0.001$).
Conclusion: *C. longa* improved PQ-induced lung damages similar to dexamethasone and a synergic effect between Cl and Pio was shown, indicating a possible PPARs activation effects by the plant.
Keywords: *Curcuma longa*, Paraquat, Lung injury, Inflammation, Oxidative stress

P753, A review of the antinematodal effects of *Mentha longifolia* against gastrointestinal nematodes in domestic animals

Amirabbas Motaharnezhad[1], Hassan Borji[2]
1.Department of Veterinary Medicine, Faculty of Veterinary Medicine, Ferdowsi University of Mashhad, Mashhad, Iran
2. Department of Pathobiology, Faculty of Veterinary Medicine, Ferdowsi University of Mashhad, Mashhad, Iran

Background: Gastrointestinal nematode infections represent a major challenge to livestock productivity worldwide, leading to significant economic losses and threatening animal welfare. The growing resistance to conventional anthelmintic drugs has intensified the need for alternative solutions. Among the promising candidates is Mentha longifolia (wild mint), a native Iranian plant known for its potent antiparasitic properties.
Methods: Five studies (2009–2022) were selected using databases like MDPI and Google Scholar. The review focused on Mentha longifolia's efficacy against Gi helminthes such as *Haemonchus contortus, Nematodirus spp* and its comparison with other plants.
Results: The acetone extract of Mentha longifolia at 2.5 mg/mL inhibited 26.1% of egg hatching, while its aqueous extract at 7.5 mg/mL showed minimal efficacy (<2%). In contrast, Momordica charantia (0.08 mg/mL) reduced Strongyloides spp. by 60%, and Azadirachta indica achieved full mortality in sheep and goats but was less effective in cattle. Other plants such as Artemisia campestris and Salix caprea demonstrated weak and declining efficacy over time. Notably, terpenoids in Mentha longifolia—especially pulegone—may pose hepatotoxic risks at high doses.
Conclusion: As a native species with broad-spectrum anthelmintic activity, Mentha longifolia offers valuable potential for sustainable parasite control. However, its safety profile, particularly in essential oil form, warrants careful evaluation. A balanced understanding of its efficacy and toxicity is essential for its integration into veterinary parasitology and public health strategies.
Keywords: Mentha longifolia, Gastrointestinal nematodes, Herbal extract, Anthelimintic.

P755, Anti-inflammatory and anti-nociception effects of *Helichrysum leucocephalum* extract in experimental animals

Zahra Mousavi[1], Mohaddeseh Mohebbi[2], Jinous Asgarpanah[3]
1.Department of Pharmacology and Toxicology, Faculty of Pharmacy and pharmaceutical sciences, Islamic Azad University of Medical Sciences, Tehran, IR Iran (IAUMS)
2.Pharm.D student, Department of Pharmacology and Toxicology, Faculty of Pharmacy and pharmaceutical sciences, Islamic Azad University of Medical Sciences, Tehran, IR Iran (IAUMS)
3.Department of Pharmacognosy, Faculty of Pharmacy and pharmaceutical sciences, Islamic Azad University of Medical Sciences, Tehran, IR Iran

Background: Different species of the immortal plant have had many therapeutic properties from the past to the present, but there have not been many studies on the anti-inflammatory and analgesic effects of Helichrysum. The present study evaluates the anti-inflammatory and analgesic effects of *H. leucocephalum* in experimental animals.
Methods: Analgesic effects were determined by acetic acid-induced writhing and hot plate test on male mice (20-25 g). The anti-inflammatory effect was evaluated using Carrageenan and Cotton pellet tests on Wistar rats (180-220 g). In the end, all the obtained data were statistically analyzed using Graph-Pad-Prism software version 8.0.2. $P<0.05$ was considered significant.
Results: The findings showed that *H. leucocephalum*extract induced a significant analgesic effect in all three doses (100, 200, and 300 mg/kg) in the hot plate test. In the writhing test, inhibition percentages of abdominal contractions in test groups (100 and 200 mg/kg), morphine were 18.67, 22.82, and 75.71%, respectively, which indicate the visceral analgesic effects. *H. leucocephalum* extract (50, 100, and 200 mg/kg), as well as, mefenamic acid (30 mg/kg) significantly ($p<0.05$) inhibited the formation of Carrageenan-induced rat paw edema which was observed at the fourth hour of the experiment by 26.80, 24.70, 32.10 and 48.30%, respectively. In the cotton pellet-induced inflammation experiment, no significant decrease was observed for the groups treated with extract (50, 100, and 200 mg/kg, i.p. daily for 7 days).
Conclusion: *H. leucocephalum*extract was effective in reducing thermal and visceral pain and acute inflammation, although it was not effective in chronic inflammation.
Keywords: Anti-inflammatory, Analgesic, *Helichrysum leucocephalum*

P756, Green Tea Polyphenols as Modulators of the NF-κB and NLRP3 Inflammasome Pathways in Inflammation

Sara Salari[1], Zahra Khorasanchi[1]
1. Department of Nutritional Sciences, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Chronic inflammation plays a key role in the development and progression of many diseases, including cardiovascular, metabolic, and neurodegenerative diseases. Biologically active food compounds have attracted much attention as potential regulators of inflammatory and immune pathways. Green tea polyphenols, particularly (–)-Epigallocatechin-3-gallate (EGCG), have received significant attention due to their potent anti-inflammatory and immunomodulatory properties.
Methods: A comprehensive review was conducted to summarize the evidence regarding the effects of green tea polyphenols on inflammation, with a particular focus on the NF-κB and NLRP3 inflammasome pathways. Relevant in vitro, in vivo, and human studies were reviewed to elucidate the molecular mechanisms and their physiological consequences.
Results: Studies have shown that EGCG can inhibit NF-κB activation, reduce the production of proinflammatory cytokines, and regulate the accumulation of the NLRP3 inflammasome, leading to reduced systemic and tissue inflammation. These molecular effects are associated with improved endothelial function, reduced oxidative stress, and possible protective roles in chronic inflammatory conditions and cardiovascular diseases. Human studies have also confirmed the translational significance of these findings and demonstrate the practical benefits of dietary consumption of these compounds.
Conclusion: Green tea polyphenols act as effective dietary regulators of inflammation, mainly through the NF-κB and NLRP3 inflammasome pathways. Their use in nutritional strategies offers a promising approach to prevent or reduce inflammation-related diseases and maintain physiological homeostasis.
Keywords: Green tea polyphenols, EGCG, NF-κB, NLRP3 inflammasome, Inflammation

P757, The comparison of effects of some phytoestrogens with 17β estradiol on ovarian tissue in Trichogaster trichopterus

Nastaran Fahiminia[1], Tahereh Naji[1], Ali Almasirad[2]
1. Department of Basic Sciences, TeMS.C., Islamic Azad University, Tehran, Iran
2. Department of Medicinal Chemistry, TeMS.C., Islamic Azad University, Tehran, Iran

Background: Nonsteroidal anti-inflammatory drugs are associated with hepatic side effects. Identifying the new compounds with improved efficacy and fewer side effects is essential. Therefore, this study compares the effects of 2-phenoxybenzohydrazide methylene (1H-indol-2-yl)-N- derivative and mefenamic acid on liver tissue and hepatic enzymes in three-spot gourami fish (*Trichogaster trichopterus).*
Methods: 120 three-spot gourami fish were divided into eight groups: controls, solvent, receiving 10, 20, and 30 mg/kg mefenamic acid and benzohydrazide derivative. Liver enzymes ALT, AST, and ALP were measured using a kit from Pars Azmoon. Histological changes in the liver were observed under a light microscope.
Results: Increases in AST, ALT, and ALP enzymes were more significant in the mefenamic acid groups than in the derivative groups. Results showed that the tissue disintegration, damage to hepatocytes, and cellular dissociation at higher doses of both compounds, but the severity of damage was significantly greater in the mefenamic acid group.
Conclusion: Finally, increase the AST, ALT, and ALP enzyme levels in mefenamic acid groups was greater than in benzohydrazide derivative groups. Loss of tissue integrity, damage to hepatocytes, and cell fragmentation were observed in higher doses of both groups, but the severity of the damage was much greater in the mefenamic acid groups. Therefore, the benzohydrazide derivative caused less tissue damage and is more favorable in terms of toxicity profile. In both groups, the hepatotoxicity process was dose-dependent and more toxicity was observed in higher doses, but this toxicity began with a lower dose of mefenamic acid.
Keywords: Mefenamic acid, Benzohydrazide derivative, Liver, Three-spot gourami fish.

P758, Evaluation the analgesic and anti-inflammatory effects of flavonoids in Ziziphus jujuba fruit on acute pain and inflammation in male rats

Kobra Naseri[1,2], Masoome Qanbari[3], Tahereh Farkhonde[2]
1. Medical Toxicology and Drug Abuse Research Center, Birjand University of Medical Sciences, Birjand, Iran
2. Department of Toxicology and Pharmacology, School of Pharmacy, Birjand University of Medical Sciences, Birjand, Iran
3. Student Research Committee, Birjand University of Medical Sciences, Birjand, Iran

Background: Finding an effective drug with reduced side effects to control inflammation and pain has always been a challenge. The Ziziphus jujuba fruit contains important flavonoids which have anti-inflammatory and analgesic properties. Here we investigated the effect of flavonoids extracted from Ziziphus jujuba on the control of pain intensity and acute inflammation in male rats.
Methods: 48 adult male rats divided into 6 groups of 8, including the groups receiving jujube flavonoids with concentrations of 100, 200 and 400 mg/kg intraperitoneally, the first positive control group receiving morphine and the second positive control group receiving dexamethasone and the negative control group receiving normal Saline 0.9%. By injecting 0.1 ml of freshly prepared 1% carrageenan suspension in normal saline into the right hind paw of each rat, acute paw edema created. Rats received the substance specific to their group and then with intervals of 0.5, 1.5 and 2 hours, the reaction time of the rats measured in the hot plate and tail flick tests. A plethysmometer was used to measure the edema created in the paw.
Results: The inflammation in the right paw of the rat in the group receiving 400 mg/kg jujube extract was effectively reduced in 60 minutes compared to the positive and negative control groups. The average percentage of inflammation in the right paw of male rats in the experimental group receiving jujube flavonoids with concentrations of 100 and 200 mg/kg had no significant changes compared to the positive and negative control groups. The average reaction time of male rats (raising the hand or licking the palm in the hot plate or bending the mouse's tail and moving it in tail flick) in the group receiving jujube flavonoids with concentration of 100, 200 and 400 mg/kg had no significant changes compared to the positive and negative control groups.
Conclusion: In conclusion, injecting 400mg/kg of Ziziphus jujuba extract, was able to significantly improve inflammation of male rats. Doses of 100 and 200 mg/kg of Ziziphus jujuba could not cause significant changes in inflammation of the right paw. Also, after injecting doses of 100, 200 and 400 mg /kg of Ziziphus jujuba extract, no good analgesic effects were shown.
Keywords: Ziziphus jujuba, Analgesic, Anti-inflammatory

P759, A randomized placebo-controlled trial on Sinamaz® Drop for preventing upper respiratory infections in mass gatherings

Mohsen Naseri[1], Fatemeh Emadi[1, 2], Fatemeh Alijaniha[1], Azadeh Ghasempour[3], Zahra Bahaeddin[1]
1. Traditional Medicine Clinical Trial Research Center, Shahed University, Tehran, Iran
2. Department of Traditional Medicine, School of Persian Medicine, Shahed University, Tehran, Iran
3. Department of Community & Family Medicine, School of Medicine, Iran University of Medical Sciences, Tehran, Iran

Background: The Arba'in pilgrimage is a large annual religious gathering. Many public health risks, including upper respiratory infections, are associated with this mass gathering because too many people can quickly spread viruses. In line with the popularity and global acceptance of complementary and alternative medicine, and the proven efficacy of Sinamaz® as an antiviral drug in previous studies, the current study evaluated a clinical trial of Sinamaz® nasal drops (License No. 118880/665, containing olive oil and black seed oil) for Preventing Upper Respiratory Infections in Mass gatherings.
Methods: In a randomized, placebo-controlled clinical trial, Iranian pilgrims received 1 drop of either the drug or a placebo nasal drop twice daily for 7 consecutive days. The study protocol received ethical approval from the Ethics Committee of Shahed University (ID: IR.SHAHED.REC.1402.001) and was registered in the Iranian Clinical Trials Registry (IRCT20210515051305N2).
Results: A total of 103 individuals in the control arm and 85 in the intervention arm completed the trial. After adjustment for baseline variables, the intervention group showed a substantial decrease in the risk of experiencing Multiple URI-related symptoms, and symptoms were considerably less in the Sinamaz® group than in the placebo group ($OR<1$ and $p<0.05$ for all).
Conclusion: The results of the study provide early evidence of Sinamaz®'s ability to prevent upper respiratory infections in mass gatherings.
Keywords: mass-gathering health, upper respiratory infection, Persian medicine

P760, Investigating the effects of synthetic silver nanoparticles with *Echinophora platyloba* on breast cancer cells by scratch assay

Mohammad Foad Noorbakhsh[1], Amir Ali Heidari[2]
1. Department of Basic Sciences, School of Veterinary Medicine, Shiraz University, Shiraz, Iran
2. Department of Clinical Sciences, School of Veterinary Medicine, Shiraz University, Shiraz, Iran

Background: Breast cancer is a significant disease with treatment challenges. *Echinophora platyloba* has been studied for its anticancer phytochemical compounds. Additionally, the anticancer effects of silver nanoparticles are well-documented. The green synthesis of silver nanoparticles with *Echinophora platyloba* may reduce adverse effects on normal cells and enhance the anticancer properties of silver nanoparticles.
Methods: In order to evaluate the inhibitory effects of synthetic green nanoparticle with Echinophora platyloba on the migration of MCF-7 and NIH3 cells, the wound healing migration model was used.
Results: Green silver nanoparticles showed a significant decrease in cell migration of MCF-7 cells after 24 and 48 hours of incubation compared to the control ($P<0.05$).
Conclusion: It can be concluded that the nanoparticle coated with Echinophora platyloba extract has anti-metastatic effect and is a potential candidate to help in cancer treatment.
Keywords: Breast Cancer, Silver Nanoparticle, *Echinophora platyloba*

P761, Effects of concomitant administration of *Lavandula dentata* extract and fluoxetine on reserpine-induced depression-like behaviors in mice

Nafiseh Hedayati[1], Mohsen khalili[2], Arash Abdi[1]
1. Department of Physiology, School of Medicine, Shahed University, Tehran, Iran
2. Neurophysiology Research Center, Shahed University, Tehran, Iran

Background: Based on the traditional use of lavender species for mood disorders, this study evaluated the antidepressant-like effects of *Lavandula dentata extract* (LDE) in a reserpine-induced mouse model.
Methods: Seventy-two male mice were allocated to nine groups. Treatments (saline, fluoxetine, or LDE at 100, 200, 400 mg/kg) were administered orally for 10 days, followed by reserpine (0.5 mg/kg) or saline. Behavioral tests (Forced Swim Test-FST, Tail Suspension Test-TST, Open Field Test-OFT) were conducted. Hippocampal levels of nitric oxide (NO), malondialdehyde (MDA), catalase (CAT), and glutathione (GSH) were assessed.
Results: In the FST and TST, the combination of LDE (100 mg/kg) and fluoxetine (10 mg/kg) most significantly reduced immobility time. In the OFT, LDE (400 mg/kg) increased center entries and time spent, indicating anxiolytic activity. Rearing behavior was lowest in the LDE (200 & 400 mg/kg) and combination groups. The combination group also showed the highest levels of CAT and GSH antioxidants. NO and MDA levels were not statistically significant.
Conclusion: In a mice model of reserpine-induced depression, the combination of LDE (100 mg/kg) and fluoxetine (10 mg/kg) was more effective than either treatment alone in alleviating depressive-like behaviors and enhancing antioxidant activity. Furthermore, the LDE alone exhibited a significant anti-anxiety effect, which was not observed with fluoxetine monotherapy.
Keywords: Lavender, Fluoxetine, Reserpine, Mice, Herbal extract

P762, Cedrol improves lipopolysaccharide-induced systemic inflammation in rats

Soroush Yazdani[1], Sepide Behrouz[2], Mahmoud Hosseini[2], Ramin Rezaee[2], Fereshteh Asgharzadeh[3], Zahra Gholamnezhad[2,3]

1. Student Research Committee, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Applied Biomedical Research Center, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Cedrol as a natural sesquiterpene found in cedarwood oil and many anti-inflammatory herbal plants, possesses antioxidant, immunomodulatory and anti-inflammatory properties. This study aimed to assess the ameliorative role of cedrol against systemic inflammation caused by repeated exposure to lipopolysaccharide (LPS) in rats.

Methods: Forty male rats were divided into 5 groups: control group (saline), LPS group (1 mg/kg), and LPS groups receiving cedrol at doses of 7.5, 15, and 30 mg/kg. Cedrol was given orally once daily for two weeks (days 1-14), while LPS was administered intraperitoneally on days 8-14. Blood samples were collected afterward. The study measured white blood cell (WBC) counts, levels of tumor necrosis factor-α (TNF-α), interleukin (IL)-1β, and markers of oxidative stress.

Results: LPS induced total WBC, neutrophil and monocyte counts, increased the levels of TNF-α, IL-1β and malondialdehyde (MDA), while reduced total thiol content, and catalase (CAT) and superoxide dismutase (SOD) activity compared to the control group ($P<0.05$-$P<0.001$). The highest dose of cedrol reduced total WBC, neutrophil, lymphocyte, and monocyte counts, downregulated the levels of TNF-α, IL-1β and MDA, but increased total thiol content, and CAT and SOD activity, compared to the LPS group ($P<0.05$-$P<0.001$).

Conclusion: These findings suggest that cedrol can dose-dependently improve systemic inflammation and oxidative stress induced by LPS.

Keywords: Lipopolysaccharide, Cedrol, Oxidative stress, Systemic inflammation

P763, Alpha-pinene treatment changes feeding behavior and hypothalamic expression of orexin A in rats with temporomandibular disorder

Hanieh Eghbali[1], Mehdi Abbasnejad[2, 1], Maryam Raoof[3], Mahnaz Zamyad[1], Saeed Esmaeili-Mahani[1,2], Razieh Kooshki[4], Mojdeh Mansoori[5], Frank Lobbezoo[3, 6]

1. Department of Biology, Faculty of Sciences, Shahid Bahonar University of Kerman, Kerman, Iran
2. Laboratory of Molecular Neuroscience, Kerman Neuroscience Research Center (KNRC), Kerman University of Medical Sciences, Kerman, Iran
3.Department of Orofacial Pain and Dysfunction, Academic Centre for Dentistry Amsterdam (ACTA) University of Amsterdam and Vrije Universiteit Amsterdam, Amsterdam, The Netherlands
4. Department of Biology, Faculty of Sciences, Lorestan University, Khorramabad, Iran
5.Section for Orofacial Pain and Jaw Function, Department of Dentistry and Oral Health, Aarhus University, Denmark
6. Department of Orofacial Pain and Jaw Function, Faculty of Odontology, Malmö University, Malmö, Sweden

Background: Temporomandibular disorder (TMD) is one of the most common disorders in the orofacial region, affecting feeding behaviors and neurochemical pathways in the hypothalamus, particularly orexin A expression. This study aimed to explore the impact of intracerebroventricular injection of alpha-pinene with well-known effects in animals, on feeding behavior and orexin A expression in rats with TMD.

Methods: TMJ inflammation was induced in male Wistar rats via Complete Freund's Adjuvant (CFA) injection. Rats received ICV alpha-pinene (0.1, 0.2, or 0.4 µg/rat). Feeding behavior parameters—including meal frequency, duration, and total intake—were recorded with an automated monitoring system as functional readouts of masticatory muscle activity during food processing. Anxiety-like behavior was evaluated with the elevated plus maze, and hypothalamic orexin A expression was assessed by immunohistochemistry.

Results: CFA-treated rats showed reduced pain thresholds, anxiety-like behavior, and impaired feeding behavior, including fewer meals, shorter feeding duration, and reduced intake. Alpha-pinene, particularly at 0.4 µg/rat, significantly improved these behavioral outcomes and restored hypothalamic orexin A expression compared with untreated CFA rats.

Conclusion: Alpha-pinene mitigated pain-related disruptions in feeding behavior and restored hypothalamic orexin A expression in a rat model of TMJ inflammation. These findings highlight the interplay between orofacial pain, altered oral motor function, and central neuroregulation. The observed behavioral improvements suggest that alpha-pinene may offer therapeutic benefits for managing functional impairments associated with both muscular and joint-related TMD pain, supporting its potential as a candidate for integrative TMD management

Keywords: Temporomandibular disorder, Alpha-pinene, Feeding behavior, Orofacial function, Orexin A, Rat

P764, Ferulic acid mitigates H2O2-induced oxidative stress by hindering the activity of reactive oxygen species and programmed cell death in rat PC12 cells

Arian Amirkhosravi[1], Mitra Mehrabani[1], Azadeh Aminzadeh[2], Neda Tekyemaroof[3], Ali Mohammad Sharifi[3], Mehrnaz Mehrabani[4]

1. Herbal and Traditional Medicines Research Centre, Kerman University of Medical Sciences, Kerman, Iran
2. Department of Pharmacology and Toxicology, School of Pharmacy, Kerman University of Medical Sciences, Kerman, Iran
3. Razi Drug Research Centre and Department of Pharmacology, Iran University of Medical Sciences, Tehran, Iran
4. Physiology Research Centre, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran

Background: Oxidative stress (OS) is related to the onset and development of different disorders including neurodegenerative diseases. Attenuation of OS may be an appropriate way to combat such a situation. Ferulic acid (FA) as a natural antioxidant compound has been shown to have potent free radical scavenging activity. Hence, the present study aimed to investigate the effects of FA to inhibit the intrinsic apoptosis pathway evoked by H_2O_2 in rat pheochromocytoma (PC12) cells.

Methods: PC12 cells were treated with various concentrations of FA at different times. Then, H_2O_2 (300 μM for 2h) was added. Afterward, cell viability was assessed by MTT assay followed by determining the levels of total antioxidant power (TAP), and malondialdehyde (MDA) level. The protein expressions of Caspase-3, Bax, and Bcl-2 were also measured by western blotting.

Results: Current results indicate that after 72 hours, FA significantly protected PC12 cells against H_2O_2-induced damage by reducing the generation of MDA levels as well as increasing TAP. H_2O_2-induced caspase-3 overexpression and the increase of the Bax/BCL-2 protein ratio were also diminished by FA treatment.

Conclusion: Taken together, FA may be considered a protective agent to prevent or postpone the progression of oxidative neurodegenerative diseases through its anti-oxidant and anti-apoptotic effects.

Keywords: Apoptosis, Ferulic acid, H_2O_2, Oxidative Stress, PC12 cells

P765, Immunohistochemical evidence for apoptotic effects of chlorogenic acid in a 4T1 Breast cancer mouse model

Zahra Changizi[1], Azam Moslehi[1]
1. Cellular and Molecular Research Center, Qom University of Medical Sciences, Qom, Iran

Background: Today, induction of apoptosis through endogenous pathways is an important goal in anticancer therapies. In this study, the effect of chlorogenic acid on the expression of apoptosis regulatory proteins including Bax and Bcl-2 was investigated in a 4T1 breast cancer tumor model in BALB/c mice.
Methods: To assess the expression of these proteins, immunohistochemistry was used on 5-micron sections of tumor tissue. After deparaffinization, antigen retrieval, and nonspecific blocking, the samples were incubated with anti-Bax and anti-Bcl-2 primary antibodies (Abcam). Then, the appropriate secondary antibody was added and the samples were evaluated by light microscopy.
Results: Based on immunohistochemical analysis, Bax protein expression was significantly increased in the treatment (TM) and protective (PR) groups compared with the saline group ($P<0.001$). Bcl-2 expression was also significantly decreased in both TM and PR groups compared with saline ($P<0.001$). However, the Bax/Bcl-2 ratio in the PR and TM groups was significantly higher than that in the saline group ($P<0.001$).
Conclusion: The findings indicate that chlorogenic acid can play an effective role in inducing apoptosis and inhibiting tumor growth by increasing Bax expression and modulating the Bax/Bcl-2 ratio.
Keywords: Apoptosis; Chlorogenic acid; Immunohistochemistry; 4T1 Breast cancer

P766, Effects of combined interval–aerobic swimming training and capsaicin on hepatic IL-6 and NRF2 in aged male rats

Tahereh Fakhimi[1], Hesam Parsa[1], Hamidreza Choobdari[1]
1. Department of Exercise Physiology, Faculty of Sport Sciences, Bu- Ali Sina University, Hamedan, Iran

Background: Aging is strongly linked to chronic inflammation and disturbances in redox balance, both of which impair liver function and heighten vulnerability to long-term disease. Two key molecular players in these processes are interleukin-6 (IL-6), a marker of inflammatory activity, and nuclear factor erythroid-related factor 2 (NRF2), a central regulator of antioxidant defense. Although compounds such as capsaicin and structured exercise are known to influence these pathways, their combined impact on the aging liver has not been well defined.
Method: This study investigated forty male Wistar rats, including eight young animals and thirty-two aged rats. The aged animals were assigned to four groups: control, capsaicin supplementation, concurrent exercise, and a combined capsaicin plus exercise intervention. Capsaicin was given orally (5 mg/kg/day), and the 10-week concurrent training protocol integrated high-intensity interval swimming with aerobic swimming. Hepatic IL-6 was measured at both mRNA (qRT-PCR) and protein (ELISA) levels, and NRF2 protein content was evaluated through Western blotting. Body weight, liver weight, and liver-to-body weight ratio were also recorded.
Results: Aging significantly elevated hepatic IL-6 while reducing NRF2. Capsaicin alone produced partial improvement, whereas exercise caused a stronger decrease in IL-6 and a notable increase in NRF2. The combined intervention yielded the most substantial effects, bringing IL-6 expression and NRF2 content closer to youthful levels. IL-6 and NRF2 showed a clear inverse correlation, along with associations to liver-to-body weight ratio.
Conclusion: These findings suggest that capsaicin and concurrent exercise can act synergistically to reduce aging-related liver inflammation and oxidative stress.
Keywords: Antioxidant defense, Aging inflammation, Concurrent exercise, Capsaicin, Interleukin6

P767, The effect of alpha-pinene on IL-6 levels in colon tissue in a rat model of acetic acid-induced colitis

Kaveh Rahimi[1], Hossein Hosseini[1], Maryam Hayati[1], Maedeh Hajiuni [1], Boshra Khajehian[1]
1.Department of Basic Sciences, Faculty of Veterinary Medicine, Shahid Chamran University of Ahvaz, Ahvaz, Iran

Background: Crohn's disease (CD) and ulcerative colitis (UC) are chronic inflammatory bowel diseases (IBDs) occurring in the gut of genetically susceptible individuals independent of a specific pathogen. The interaction between antigen-presenting cells and the local bacterial flora contributes to an uncontrolled activation of mucosal CD4+ T lymphocytes with the consecutive release of proinflammatory cytokines such as IL-6 .This study aimed to investigate the effect of alpha-pinene on IL-6 levels in colon tissue in a rat model of acetic acid-induced UC.
Methods: The rats were divided into four groups: control group, UC group, colitis treated with alpha-pinene (75 or 150 ml/kg) groups. Intracolonic administration of 4% acetic acid was used to induce UC. ELISA was used to measure IL-6 in colon tissues.
Results: The IL-6 levels in the A.A group were lower than those in the control group ($P<0.001$). Furthermore, the groups given a-pinene at 75 and 150 showed significantly higher IL-6 levels compared to the A.A group ($P<0.05$).
Conclusion: These results demonstrated alpha-pinene significantly decreased the levels of IL-6 cytokine more than colitis rats.
Keywords: alpha-pinene, ulcerative colitis, IL-6.

P768, Therapeutic potential of natural compounds in enhancing wound healing in diabetic rats

Razieh Sanjari[1], Mohsen Froozanfar[2], Fatemeh Honarasa[3], Mohammad Amin Edalatmanesh[1], Heydar Aqababa[4]

1. Department of Biology, Shi. C., Islamic Azad University, Shiraz, Iran
2. Department of Biology, Marv. C., Islamic Azad University, Marvdasht, Iran
3. Department of Chemistry, Shi. C., Islamic Azad University, Shiraz, Iran
4. Department of Biology, Ars. C., Islamic Azad University, Arsanjan, Iran

Background: This study investigates the efficacy and safety of using chitosan nanocomposites containing rosmarinic acid and galic acid in treating of diabetic wounds in rats. It also examines the effect of these nanocomposites on the expression of Wnt, β Catenin and VEGF genes, which are crucia for wound tissue repair.

Methods: Chitosan, rosemary extract, and galic acid were combined, with the ethanolic extract of rosemary prepared via thermal extraction. The antioxidant properties were assessed using the DPPH method. Forty-eight male wistar rats were divided into six groups: a healthy control group, a sick control group (sham), and four experimental groups treated with chitosan, rosmarinic acid, gallic acid, or a three-component nanocomposite. Wounds were created on the rats backs after inducing diabetes, and the effects of treatments were evaluated through histological analysis and PCR.

Results: Histological examinations revealed that the natural compounds significantly reduced inflammation, improved extracellular matrix structure, and increased collagen and blood vessel production. The three-component combination showed the best results compared to control groups. Molecular analyses demonstrated increased expression of β Catenin, Wnt and VEGF in treatment groups, indicating enhanced wound healing mechanisms.

Conclusion: This study emphasizes the beneficial role of natural compounds in wound healing and inflammation reduction. Real-Time PCR provides insights into the biological mchanisms involved, suggesting that compounds can accelerate wound healing, potentially improving patients quality of life and reducing treatment costs.

Keywords: Wnt, β Catenin, VEGF, Wound

P769, The effect of rutin on DNA fragmentation and sperm nuclear maturation in nmri mice following treatment with methotrexate

Fatemeh Taheri[1], Malek Soleimani Mehranjani[1], Sepideh Ahmadi[1]
1. Department of Biology, Faculty of Science, Arak University, Arak, Iran

Background: Methotrexate, a chemotherapy drug, induces DNA strand breaks via excessive ROS production. This study investigated the effects of rutin, known for its antioxidant and anti-inflammatory properties, on sperm DNA fragmentation and nuclear maturation in NMRI mice following methotrexate treatment.
Methods: Twenty four adult male NMRI mice were randomly divided into four groups: control, methotrexate (20 mg/kg/bw), rutin (100 mg/kg/bw), and methotrexate + rutin. Treatments were administered for 35 days. After dissecting the mice, the caudal region of the epididymis was isolated in Ham's F10 culture medium. Sperm were extracted and assessed for DNA fragmentation using the SDFA kit and for nuclear maturity using aniline blue staining. Data were analyzed using SPSS software with one-way ANOVA and Tukey's post hoc test; differences were considered statistically significant at $p<0.05$.
Results: A significant decrease in the mean sperm nuclear maturity was observed in the methotrexate group compared to the control group ($p<0.001$). In addition, the mean percentage of DNA fragmentation in the methotrexate group showed a significant increase compared to the control group ($p<0.001$). These side effects were compensated for in the methotrexate + rutin group compared to the methotrexate group.
Conclusion: Methotrexate treatment significantly impairs sperm nuclear maturation and increases DNA fragmentation in NMRI mice, due to oxidative stress. Co-administration of rutin effectively mitigates these adverse effects, highlighting its potential protective role against methotrexate-induced reproductive toxicity.
Keywords: Methotrexate, Rutin, DNA fragmentation.

P770, β-Sitosterol mitigated stress-induced intestinal barrier dysfunction and endotoxemi a in IBS rats by modulating claudin-2/ClC-2 channels: Comparative efficacy with sertraline

Maedeh Ghasemi[1], Sepideh Hajivand[1], Mohammadreza Sharifi[2], Ardeshir Talebi[3]
1. Department of Physiology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran
2. Department of Genetics and Molecular Biology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran
3. Department of Pathology, School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran

Background: This study investigated the therapeutic potential of β-sitosterol, a natural phytosterol, compared to the SSRI sertraline in ameliorating intestinal barrier dysfunction in a water avoidance stress (WAS)-induced rat model of irritable bowel syndrome (IBS).
Methods: Using a controlled experimental design, 42 male wistar rats were subjected to 10-day WAS protocol and treated with either β-sitosterol (50 mg/kg/day), sertraline (10 mg/kg/day), or vehicles. Comprehensive assessments included evaluation of tight junction protein genes (Claudin-1, Claudin-2), chloride channel (ClC-2) expression, serum lipopolysaccharide (LPS) levels, and histopathological examination of colonic architecture.
Results: In IBS rats, Claudin-2 mRNA increased 2-fold while Claudin-1 mRNA decreased by 40-60% compared to control. β-sitosterol normalized Claudin-2 expression (89% recovery vs. IBS) and upregulated Claudin-1 (2-fold vs. IBS). Additionally, β-sitosterol significantly increased ClC-2 expression beyond control and IBS levels. Sertraline significantly upregulated Claudin-1 but had no effect on Claudin-2 and increased ClC-2. Both β-sitosterol and sertraline markedly reduced elevated serum LPS levels in IBS rats. Histological analysis showed preserved crypt height, wall thickness, and near-normal mucosal architecture in the β-sitosterol-treated group. Sertraline improved wall thickness but did not restore crypt height or prevent mucosal erosion compared to controls.
Conclusion: β-Sitosterol effectively improved intestinal barrier function in this IBS model by modulating tight junctions, chloride channels, and histopathology, suggesting its potential as a barrier-targeted therapy. Sertraline's partial amelioration of barrier dysfunction suggests the need for adjunct therapies to fully repair the mucosa.
Keywords: Irritable bowel syndrome, β-sitosterol; Sertraline, Tight junctions, Chloride channel

P771, High-dose nano-curcumin disrupts sperm motility through post-transcriptional repression of CatSper

Asma Mahmoudi[1], Sana Moshari[1], Marco G. Alves [2], Simineh Shahmohamadloo[3], Mazdak Razi[1]

1.Division of Comparative Histology and Embryology, Department of Basic Science, Faculty of Veterinary Medicine, Urmia University, Urmia, Iran
2. Department of Anatomy and Unit for Multidisciplinary Research in Biomedicine (UMIB), Institute of Biomedical Science Abel Salazar (ICBAS), University of Porto, Porto, Portugal
3. RASTA Specialized Research Institute (RSRI), West Azerbaijan Science and Technology Park (WASTP), Urmia, Iran

Background: CatSper channels are crucial calcium carriers regulating sperm hyperactivation and fertilizing ability. Alteration in their function or expression can jeopardize male fertility. In this study, the impact of nano-micelle curcumin (NMC) on testis and sperm expression levels of CatSper was evaluated.
Methods: Twenty-four adult Wistar rats were divided into four groups (n=6): control, 7.5, 15, and 30 mg/kg NMC. Oral administration was applied for 48 days. CatSper1 and CatSper2 mRNA levels in testicular tissue were checked using real-time quantitative PCR, whereas protein levels in sperm were assessed using Western blot. Sperm parameters were also checked.
Results: Protein levels of CatSper1 and CatSper2 were significantly low in the 30 mg/kg nano-micelle curcumin (NMC) group compared with all other groups. Differences between the control group and 7.5 or 15 mg/kg groups were not significant. However, qRT-PCR analysis from testicular tissue indicated there were no significant alterations in mRNA levels of CatSper1 and CatSper2 among all groups. These observations indicate a post-transcriptional, dose-dependent repression of CatSper protein expression
Conclusion: High-dose NMC (30 mg/kg) impedes sperm function by down-regulating levels of CatSper1 and CatSper2 proteins but not at the mRNA level in testis. This suggests a potential interference of NMC with CatSper regulation at a translational or post-translational level, leading to compromised sperm motility as well as viability.
Keywords: CatSper Channels, Curcumin, Post-Transcriptional Regulation, Sperm Motility, Male Fertility

P772, Nano-micelle curcumin modifies sperm mitochondrial function through dose-dependent regulation of mitophagy and fusion genes

Asma Mahmoudi [1], Sana Moshari[1], Marco G. Alves [2], Simineh Shahmohamadloo[3], Mazdak Razi[1]

1.Division of Comparative Histology and Embryology, Department of Basic Science, Faculty of Veterinary Medicine, Urmia University, Urmia, Iran
2. Department of Anatomy and Unit for Multidisciplinary Research in Biomedicine (UMIB), Institute of Biomedical Science Abel Salazar (ICBAS), University of Porto, Porto, Portugal
3. RASTA Specialized Research Institute (RSRI), West Azerbaijan Science and Technology Park (WASTP), Urmia, Iran

Background: Mitochondrial function, including mitophagy and fusion, plays a crucial role in sperm energy homeostasis and survival. Nano-micelle curcumin (NMC), which is well known as an antioxidant, could affect pathways in a dose-dependent manner. The purpose of this study was to assess the impact of NMC on mitophagy- and mitochondrial fusion-related gene expression in rat spermatozoa.
Methods: Twenty-four Wistar adult rats were divided into four groups (n=6) that were treated orally with a Control Solvent (received the same volume of Normal Saline) in the Control group, and 7.5, 15, and 30 mg/kg of NMC in the treated groups, daily for 48 days. Sperm total RNA was isolated, and qRT-PCR was performed to evaluate the expression of PINK1, Parkin, Nix, Fis1, Drp1, Mfn1, Mfn2, and OPA1.
Results: Nano-micelle curcumin (NMC) induced dose-dependent upregulation of mitophagy and fission-related genes (PINK1, Parkin, Nix, Fis1, and Drp1), with the highest expression observed at the 30 mg/kg group ($p<0.05$) compared to the Control. Mitochondrial fusion genes Mfn1 and Mfn2 expression were upregulated at 7.5 and 15 mg/kg doses, while their expression was downregulated at 30 mg/kg dose ($p<0.05$) compared to the Control group. The expression of OPA1 was remarkably ($p<0.05$) increased in NMC-treated groups, regardless of the dosage.
Conclusion: High-dose nano-curcumin induces mitophagy and fission, and blocks mitochondrial fusion in sperm cells by regulating related gene expression. These contrasting actions on mitochondrial quality control pathways can be the basis of sperm dysfunction caused by overconsumption of NMC.
Keywords: Curcumin, Mitophagy, Mitochondrial Fusion, Mitochondrial Fission, Spermatozoa

P773, Pretreatment effects of fucoidan and ruthenium red in reducing neurological injury following ischemic strokes in male rats

Rasoul Kavyannejad[1], Neda Omidian[2]
1. Department of Physiology, School of Medicine, Kermanshah University of Medical Sciences, Kermanshah, Iran
2. Neuroscience Research Center, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: Ischemic strokes (IS) can result in various physical, behavioral, and cognitive impairments. The purpose of this research was to investigate the potential of pretreatment with fucoidan and ruthenium red in reducing neural injury in the context of IS risk.
Methods: A total of forty-eight male rats were divided into six groups. The rats in the sham group did not undergo any intervention. The IS group experienced global cerebral ischemia and reperfusion through the 4-vessel model. A single dose of 2.5 mg/kg Ruthenium Red (RR) or 50 mg/kg Fucoidan (FCN) was separately and simultaneously administered to the IS+ pre (RR), IS+ pre (FCN), and IS+ pre (RR+FCN) groups before exposure to IS. The study assessed levels of oxidative stress, inflammation, and neuronal death in the hippocampal tissue. Learning and memory impairments were evaluated using shuttle box and novel object tests.
Results: The study found that stroke exposure significantly increased tissue superoxide dismutase levels while decreasing malondialdehyde, interleukin-1 beta, and tumor necrosis factor-alpha levels. Pretreatment with fucoidan and ruthenium red effectively reduced oxidative stress, inflammation, and neuronal death in the hippocampal CA1 region, particularly when both drugs were administered together. Groups that received pretreatment showed significant reductions in learning and memory impairments following stroke.
Conclusion: Pretreatment with fucoidan and ruthenium red proved to be effective in reducing neural complications associated with ischemic stroke. The study observed synergistic neuroprotective effects when both drugs were used simultaneously.
Keywords: Stroke, Neuroinflammation, Oxidative stress, Fucoidan, Ruthenium Red

P774, Beneficial effects of *Urtica dioica* on scopolamine-induced memory impairment in rats: protection against acetylcholinesterase activity and neuronal oxidative damage

Rasul Saberi[1], Simagol Ghasemi[1], Malihe Moradzadeh[1], Farimah Beheshti[2], Hamid Reza Sadeghnia[3], Mahmoud Hosseini[1]

1. Applied Biomedical Research Center, and Department of Physiology, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Physiology, School of Medicine, Torbat Heydariyeh University of Medical Sciences, Iran
3. Pharmacological Research Center of Medicinal Plants, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran

Background: In this study, a rat model of cholinergic dysfunction induced by scopolamine was used to examine the protective effects of *Urtica dioica* (*U. dioica*) extract on learning and memory, acetylcholinesterase (AChE) activity, and oxidative stress indicators in the brain.
Methods: The groups consisted of (1) control, (2) scopolamine, and (3-5) scopolamine + 20, 50, or 100 mg/kg of the plant extract. The passive avoidance (PA) and Morris water maze (MWM) tests were conducted.
Results: The traveled distance and the latency to find the platform in MWM by the scopolamine-treated group were longer ($P < 0.01$-$P < 0.001$), while the time spent and traveled distance in the target quadrant were shorter than those of the control ($P < 0.05$ and $P < 0.01$). Scopolamine decreased the latency to enter the dark in the PA test ($P < 0.01$-$P < 0.001$). Additionally, compared to the control group, the scopolamine group spent more time in the dark and less time in the light ($P < 0.01$-$P < 0.001$). Besides, scopolamine also increased AChE activity and malondialdehyde (MDA) concentration in the hippocampal and cortical tissues while decreased thiols content and superoxide dismutase (SOD) and catalase (CAT) activities in the brain ($P < 0.001$). Treatment by the extract reversed all the effects of scopolamine ($P < 0.05$-$P < 0.001$).
Conclusion: The results of current research indicate that *U. dioica's* protective properties on oxidative damage of brain tissue and AChE activity help to explain its favorable influence on memory.
Keywords: *Urtica dioica*, Acetylcholinesterase, Learning, Memory, Scopolamine.

P775, An examination of the impact of frankincense resin *(Boswellia sacra*) extract on liver and kidney impairment caused by doxorubicin in male Wistar rats

Iman Gholami, Maryam Mahmoudabady[1,2], Abbas Farhadi-Farouji[1], Sara Hosseinian[1], Mahmoud Hosseini [1]

1. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

2. Applied Biomedical Research Center, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Cancer is a major global health challenge, with chemotherapy being a primary treatment option. However, chemotherapeutic agents like Doxorubicin often cause hepatotoxicity and nephrotoxicity, limiting their clinical effectiveness. Boswellia resin, known for its anti-inflammatory and antioxidant properties, has shown potential in protecting liver and kidney tissues from such damage. This study aims to evaluate the protective effects of Boswellia extract against Doxorubicin-induced organ toxicity in Wistar rats, focusing on biochemical, histological, and molecular mechanisms to improve therapeutic outcomes for cancer patients.

Methods: The rats were allocated into the following groups: (1) control rats, (2) rats subjected to doxorubicin injury, and (3-6) rats administered with 100, 200, and 400 mg/kg of frankincense extract. We assessed levels of liver and kidney function markers and inflammatory factors. In these tissues, we also measured malondialdehyde (MDA) and total thiol levels, as well as the activities of catalase (CAT) and superoxide dismutase (SOD). The degree of fibrosis and inflammation was evaluated in stained liver and kidney tissues.

Results: When compared to the control group, the doxorubicin-treated rats displayed increased levels of fasting blood sugar (FBS), serum glutamic oxaloacetic transaminase (SGOT), serum glutamic pyruvic transaminase (SGPT), lactate dehydrogenase (LDH), alkaline phosphatase (ALP), total and direct bilirubin, blood urea nitrogen (BUN), and creatinine (Cr), while albumin levels were lower. Additionally, an imbalance in lipid profiles and oxidant-antioxidant indices was noted. The liver and kidney tissues of rats exposed to doxorubicin showed heightened MDA levels and diminished total thiol concentrations, along with reduced CAT and SOD activities ($p<0.01$-$p<0.001$). Meanwhile, frankincense extract improved liver and kidney function factors in a dose-dependent manner, which was attributed to decreased lipid peroxidation and increased total thiol concentrations and CAT and SOD activity levels in liver and kidney tissues ($p<0.05$-$p<0.001$). The degree of fibrosis and inflammation, as assessed by tissue sections and inflammatory markers, was greater in doxorubicin-treated animals than in the control group, but improved in those treated with frankincense extract.

Conclusion: Frankincense extract may effectively enhance DOX-induced liver and kidney dysfunction by alleviating oxidative stress and inflammation.

Keywords: *Boswellia sacra*, Doxorubicin, Hepatotoxicity, Inflammation, Nephrotoxicity

P777, Evaluation of the effects of fennel (*Foeniculum vulgare*) supplementation on semen quality in adult male rabbits

Fatemeh Motefaker[1]
1. Doctor of Veterinary Medicine at Islamic Azad University of Kazerun, Fars, Iran

Background: Fennel (Foeniculum vulgare) functions as a medicinal plant due to its antioxidant properties and its reputed potential benefits on the reproductive system. This research aims to study the effect of fennel supplementation on the quality parameters of semen in adult male rabbits and the antioxidant status.
Methods: Ten adult male New Zealand rabbits were split into two groups, the control and the treatment group (treatment: end up receiving fennel). The fennel group underwent seven-week oral administration with fennel extract. Semen samples were collected and analyzed for sperm count, motility, viability, morphology, and oxidative stress markers.
Results: It was found that fennel supplementation increased sperm count, motility, and viability as well as improved sperm morphology ($p<0.05$). Furthermore, it reduced malondialdehyde (MDA) levels, while the activity of antioxidant enzymes, superoxide dismutase (SOD), and catalase (CAT) increased.
Conclusion: According to these findings, it has been established that fennel improves reproductive performance as well as antioxidant defense in mature male rabbits, suggesting the use of fennel as a natural supplement to enhance male fertility.
Keywords: Fennel, Semen quality, Adult male rabbits, Oxidative stress, Antioxidants

P780, The effect of curcumin on cardiovascular function in children and adolescents: A narrative review

Shiva Ahrari[1]
1. Department of Clinical Nutrition, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Cardiovascular disease pathogenesis, rooted in endothelial dysfunction and systemic low-grade inflammation, often initiates during childhood and adolescence, particularly in the presence of metabolic risk factors or chronic diseases. Curcumin, an anti-inflammatory polyphenol, is a promising agent for mitigating these early vascular insults. This review evaluates the safety and efficacy of curcumin supplementation specifically targeting cardiovascular function in the pediatric population.
Methods: This review assessed clinical evidence from electronic databases (PubMed, Scopus, Google scholar). Inclusion criteria prioritized randomized controlled trials examining the effects of curcumin, or curcuminoids, on established cardiovascular markers, including lipid profile, anthropometric indices, flow-mediated dilation (FMD), and arterial stiffness.
Results: Clinical trials in obese adolescents suggest that curcumin supplementation, when combined with a controlled diet, may favorably modulate certain cardiovascular risk factors, specifically improving high-density lipoprotein (HDL) levels and reducing body mass index and inflammatory markers(C-reactive protein and Interleukin-6).However, findings concerning vascular function are mixed:one randomized trial in children with Autosomal Dominant Polycystic Kidney Disease(ADPKD) reported no significant improvements in brachial artery FMD or aortic pulse-wave velocity after 12 months of curcumin therapy .Overall, data indicate curcumin is well-tolerated and may target underlying oxidative stress pathways relevant to pediatric vascular health.
Conclusion: Existing clinical evidence suggesting curcumin's benefit for cardiovascular function in children is limited, primarily showing positive trends in metabolic risk markers but not direct vascular endpoints in certain high-risk groups. Future research requires larger, dedicated RCTs in otherwise healthy, at-risk children to confirm efficacy and standardize doses of bioavailable curcumin formulations for pediatric cardio protection.
Key Words: Curcumin, Pediatric, Cardiovascular risk, Endothelial function, Adolescents

P781, Hesperidin attenuated apoptotic-related genes in testicle of a male rat model of varicocoele

Paria Yousefi Khiabani[1], Majid Shokoohi[1], Arash Khaki[1], Hamed Shoorei[1], Amir Afshin Khaki[1], Maryam Moghimian[2], Seyyed-Hossein Abtahi-Eivary[2]

1. Clinical Research development unit of Tabriz Valiasr hospital, Tabriz University of Medical Sciences, Tabriz, Iran
2. Department of Basic Sciences, Faculty of Medicine, Gonabad University of Medical Sciences, Gonabad, Iran

Background: Varicocoele is a swollen bulge of the pampiniform venous plexus inside the scrotum. It has been demonstrated that hesperidin has pharmacological potentials, including antioxidant, anti-inflammatory, effects. The present study aimed to evaluate the effect of hesperidin on varicocoele-induced testicular tissue damage and oxidative stress in the testicles of adult male rats.

Methods: Animals were assigned into the following groups: sham group, varicocoele group which received no treatment, varicocoele group that was daily fed with hesperidin at a dose of 50 mg/kg for eight weeks, and hesperidin group which received only hesperidin. At the end of the treatment period, the levels of oxidative stress markers were measured in plasma, and the expression of Bax and Bcl-2 was determined by immunocytochemistry and RT-qPCR methods. The index of apoptosis was assessed by the TUNEL assay.

Results: Johnsen's score, the epithelium thickness, and diameter of seminiferous tubules were improved in the Vcl+Hsp group as compared to the Vcl group. Treatment with hesperidin enhanced the serum levels of glutathione peroxidase (GPx) and superoxide dismutase (SOD) enzymes and decreased the heightened concentrations of malondialdehyde (MDA) in testicular tissue ($p < 0.001$). Moreover, our results demonstrated that hesperidin considerably diminished Bax and increased Bcl-2 expression (gene and protein) levels compared with the Vcl group ($p < 0.05$). It also markedly reduced the rate of programmed cell death in germ cells ($p < 0.05$).

Conclusion: It seems that the treatment with hesperidin could mitigate testicular tissue damage in rats underwent varicocoele possibly through its antioxidant properties.

Keywords: Apoptosis, Hesperidin, Oxidative stress, Testis, Varicocoele

P782, The analgesic and anti-inflammatory effects of gummosin in laboratory animals

Bahareh Hassanzadehdelouei[1], Zahra Mousavi[1], jinous Asgarpanah[1]
1. Islamic Azad University, Faculty of Pharmacy and Pharmaceutical Sciences, Tehran Medical Sciences, Department of Pharmacology and Toxicology, Tehran, Iran

Background: Gummosin is a sesquiterpene of coumarin extracted from the *Ferrula* plant. Despite the proven therapeutic effects of gummosin, the analgesic and anti-inflammatory effects of gummosin is not investigated. This research was aimed to evaluate the analgesic and anti-inflammatory impact of gummosin in acute and chronic inflammation.
Methods: The anti-inflammatory activity of gummosin was examined in cotton pellet-induced granuloma and carrageenan-induced edema as chronic and acute inflammation in rats. Writhing test induced by acid acetic and hot plate test were used to evaluate the analgesic effects of gummosin. In both analgesic tests, normal saline, morphine, and 3 doses of gummosin were used. In the carrageenan test, normal saline, mefenamic acid, and gummosin and in cotton pellet test, normal saline, indomethacin, and gummosin were examined.
Results: Gummosin at doses of 1, 5 and 10 were succeeded in inhibiting abdominal torsion by 52.9, 69.47 and 80% respectively compared to morphine (92 %). The percentage of transudate inhibition by indomethacin and gummosin1and5mg/kg were 85.2,22.86 and 28.57% respectively. The percentage of granuloma inhibition by indomethacin and gummosin 1 and 5mg/kg was 61.31,16.89 and 23.22% respectively. The carrageenan test implies the anti-inflammatory effects of gummosin at doses of 5 and 10 mg/kg.
Conclusion: Gummosin effects at high doses was similar to morphine. Considering the proven role of coumarins in pain control and the presence of large amounts of coumarin in gummosin, probably the role of gummosin in pain control and reducing abdominal inflammation can be attributed to the presence of coumarin in it.
Keywords: Gummosin, Coumarin, Anti-inflammatory, Analgesic

P783, Effect of hesperidin on sperm quality in asthenoteratospermic men during freezing and thawing

Nazireh Hassanvand[1], Hamid Reza Momeni[1], Tahereh Etemadi[1]
1. Department of Biology, Faculty of Science, Arak University, Arak, Iran

Background: Cryopreservation induces oxidative stress in spermatozoa, leading to structural and functional damage of vital sperm parametrs. Hesperidin, a bioactive citrus-derived flavonoid with potent antioxidant properties, can reduce oxidative stress thereby enhancing the overall quality of frozen–thawed spermatozoa. The aim of this study was to investigate the effect of hesperidin on vital sperm parametersin asthenoteratospem durig freezing and thawing.
Methods: Semen samples were obtained from 94 men diagnosed with asthenoteratozoospermia and randomly divided into three experimental groups: control, frozen, and frozen sperm supplemented with 5 μM hesperidin. After freezing and treatment, vital sperm parameters including motility, viability, acrosomal integrity, and mitochondrial membrane potential were evaluated. Oxidative stress was assessed by measuring malondialdehyde (MDA) levels and total antioxidant capacity (TAC) using the ferric reducing antioxidant power (FRAP) assay. Data were analyzed using one-way analysis of variance (ANOVA) followed by Tukey's post hoc test. $P< 0.05$ was considered significant.
Results: Hesperidin supplementation significantly improved post-thaw sperm quality compared with the frozen group. Motility, viability, acrosomal integrity, and mitochondrial membrane potential were all better preserved. Additionally, hesperidin reduced MDA levels and increased TAC, indicating decreased oxidative stress. These findings confirm the antioxidative and protective effects of hesperidin against freeze–thaw–induced sperm damage.
Conclusion: Hesperidin exerts a potent protective effect during human sperm cryopreservation by reducing oxidative stress, as demonstrated by decreased lipid peroxidation, and increased TAC, and improved vital sperm parameters in asthenoteratosperm men during freezing and thawing.
Keywords: Human spermatozoa, Cryopreservation stress, Hesperidin, Oxidative stress, Vital sperm parameters.

P785, Mechanisms of atherosclerosis induced by diabetes

Maryam Paseban[1,2], Forouzan Amerizadeh[3,4], Masomeh Mirzaei [5,6], Saeed Niazmand[7,8]
1. Department of Basic Sciences, MMS.C., Islamic Azad University, Mashhad, Iran
2. Innovative Medical Research Center, Department of Physiology, School of Medicine, Mashhad University of Medical Sciences, Islamic Azad University, Mashhad, Iran
3 Department of Neurology, Mashhad University of Medical Sciences, Mashhad, Iran
4. Internal Medicine Department, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
5. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
6. Rheumatic Diseases Research Centre, Mashhad University of Medical Sciences, Mashhad, Iran
7. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
8. Applied Biomedical Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: This study investigated the mechanisms involved in endothelial dysfunction induced by diabetes
Methods: This study reviewed relevant English-language articles published in the past 15 years across databases such as PubMed, Scopus, and Web of Science, including experimental studies, meta-analyses, systematic reviews, and narrative reviews.
Results: Endothelial dysfunction, which is characterized by reduced NO bioavailability or eNOS expression; increased expression of VCAM-1, ICAM-1 and LOX-1, provides the basis for the adhesion of white blood cells to the vessel wall and, by increasing the expression of MCP-1 and VEGF, causes the occurrence and progression of inflammation in the vessel wall.
Hyperglycemia is associated with all factors that contribute to atherosclerosis, including endothelial dysfunction, oxidative stress, inflammation, and proliferation and migration of vascular smooth muscle cells. Dyslipidemia is also one of the important risk factors for cardiovascular diseases in diabetes.
Diabetes can cause endothelial dysfunction through the following mechanisms: 1- Increased entry of glucose and other sugars into the polyol pathway, 2- Increased formation of AGEs, 3- Increased AGEs receptor and its activating ligands, 4- Activation of PKC isoforms, 5- Excessive activity of the hexosamine pathway, 6- Changes in endothelial cell signaling, 6- Oxidative stress, and finally 7- Inflammation
Conclusion: Diabetes-induced endothelial dysfunction results from multiple interconnected mechanisms, including oxidative stress, inflammation, and metabolic disturbances. Understanding these pathways is essential for developing targeted therapies to mitigate vascular complications and reduce the risk of atherosclerosis in diabetic patients.
Keywords: Cardiovascular Disease, Diabetes, Atherosclerosis, Inflammation

P786, Deaddicta®, a natural formulation with the efficacy of relapse and cravings reduction in opioid addiction

Mohsen Naseri[1], Seyed Abdolali Moosavyzadeh[2], Azarakhsh Mokri[3], Mohammad Bagher Saberi Zafarghandi[4], Yashar Fayaz Feyzi[4], Razieh Jafari Hajati[1], Fatemeh Emadi[1,5], Amin Noori[1], Mohammad Mahdi Ghazimoradi[6]

1. Traditional Medicine Clinical Trial Research Center, Shahed University, Tehran, Iran
2. Department of Persian Medicine, Faculty of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran
3. Department of Psychiatry, Tehran University of Medical Sciences, National Institute of Addiction Research
4. Addiction Department, School of Behavioral Sciences and Mental Health (Tehran Institute of Psychiatry), Iran University of Medical Sciences, Tehran, Iran
5. Department of Traditional Medicine, School of Persian Medicine, Shahed University, Tehran, Iran
6. Faculty of Pharmacy, Department of Pharmacology and Toxicology, Tehran University of Medical Sciences, Tehran, Iran

Background: Deaddicta® product is a new registered formulation from Hab-o-Shefa which recommended in Persian Medicine, consists of *Datura stramonium* and some other plants. This study aimed to review its related clinical studies in withdrawal syndrome, relapse and craving reduction in opioid users.
Methods: In this narrative review, scientific databases were searched from 2000 to 2025.
Results: Nazari et al. study in clinical trial assessment of Hab-o-Shefa (500mg, TDS, 12weeks) on the opioid-dependent patients with withdrawal syndrome, demonstrated decrease on depression and signs of deprivation scores in Hab-o-Shefa group compared to placebo and clonidine($p<0.05$). In Moosavyzadeh et al studied Hab-o Shefa effects on craving, depression and anxiety of 81 opioid dependent patients after detoxification. The rates of opioid-positive urine tests and self-reported opioid use and craving score were significantly lower in Hab-o Shefa group ($p = 0.001$) and also depression ($p = 0.01$) and anxiety ($p=0.035$) scores compared to placebo. Another study of Moosavyzadeh, 6 months fallowing up the previous study, demonstrated that in 15 members of intervention group in previous study, Depression, anxiety, and craving scores decreased 6 months after the end of the previous study. This decrease was significant in the temptation score($p=0.011$) compared to 0 and 3 months after study. Saberi-Zafarghandi et al study on 78 opioid addicted patients showed the significant difference between the Deaddicta® and placebo groups in the of craving scores($p=0.044$) and depression($p=0.029$).
Conclusion: Deaddicta® could be considered as promising drug for withdrawal syndrome, craving, relapse, anxiety and depression reduction in opioid use disorders.
Keywords: Deaddicta®, Addiction, Craving, Withdrawal Syndrome, Relapse

P787, The effects of DeAddicta®, A novel preparation for reduction of cravings in cannabis users

Yashar Fayaz Feyzi[1], Mohammad Bagher Saberi Zafarghandi[1], Mohsen Naseri[2,3], Seyed Alireza Salami[4], Amin Noori[2], Mohammad Mahdi Ghazimoradi[5], Reza Arezoomandan[1]

1. Addiction Department, School of Behavioral Sciences and Mental Health (Tehran Institute of Psychiatry), Iran University of Medical Sciences, Tehran, Iran
2. Traditional Medicine Clinical Trial Research Center, Shahed University, Tehran, Iran
3. Department of Traditional Medicine, School of Persian Medicine, Shahed University, Tehran, Iran
4.Department of Horticultural Sciences, Faculty of Engineering and Agricultural Science, University of Tehran, Karaj Industrial and Medical Cannabis Research Institute (IMCRI), Tehran
5. Faculty of Pharmacy, Department of Pharmacology and Toxicology, Tehran University of Medical Sciences, Tehran, Iran

Background: Cannabis use disorder (CUD) causes challenges to the health system regarding its treatment and psychological disturbances. An innovative drug called DeAddicta®, which is a herbal formulation of 4 plants, *Datura stramonium* seeds, *Zingiber officinale* rhizome, *Rheum palmatum* roots and *Acacia senegal* gum, has been developed for these challenges and it is derived from Persian Medicine. In this study, the efficacy of DeAddicta® was assessed in individuals with CUD.

Methods: In a double-blind randomized clinical trial on 50 male volunteers, were randomized to two groups of placebo and DeAddicta®. Different scales of cannabis craving questionnaire-short form (MCQ-SF), the Hamilton Depression Rating Scale (HDRS) and the Wechsler Memory Scale (WMS) were utilized at baseline and after intervention. DeAddicta was given 250 mg thrice daily for over 12 weeks, with weekly monitoring of therapy and all of the individuals had their normal psychological therapy during the trial.

Results: DeAddicta® decreased cannabis craving significantly with a mean decrease of 14.40%, alleviates depression by an enhance of 44.03% and improving work memory by 43.56% as observed by WMS.

Conclusion: Efficacy of DeAddicta® and its therapeutic potential is due to various features of its herbal ingredients including anti-inflammatory, neuroprotection and antioxidant properties and thus could affect various neurotransmitters inside the brain, that are dysregulated due to cannabis abuse. Integration of DeAddicta® into conventional treatments of individuals with CUD could decrease cravings, alleviating depression and improving working memory in the affected individuals.

Keywords: DeAddicta®, Cannabis use disorder (CUS), Craving, Persian Medicine

P788, The effects of *Curcuma longa* and its constituent, curcumin on oral health, experimental and clinical studies: A narrative review

Reyhaneh Hanaei[1], Sima Beigoli[1], Mohammad Salar Boostani[1], Mohammad Hossein Boskabady[1,2]
1. Applied biomedical Research Center, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Physiology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: *Curcuma longa* (CL) and its bioactive compound, curcumin (CUR), have attracted considerable attention in recent years due to their diverse therapeutic properties, particularly in the context of oral health. This comprehensive review presents an updated analysis of both experimental and clinical studies investigating the effects of CL and CUR on various oral conditions, including periodontal disease, dental caries, oral lichen planus (OLP), oral submocus fibrosis (OSF), and oral cancers.
Methods: Various databases and appropriate keywords are used to search the effect of CL and CUR on oral health, using experimental and clinical studies from 2015 until the end of April 2025. Books, theses and articles assessing the effects of CL and CUR on different oral disorders were included.
Results: Preclinical findings demonstrate that CL and CUR exhibits strong anti-inflammatory, antimicrobial, antioxidant, and anticancer activities, contributing to the prevention and management of oral pathologies. Clinical trials further support its efficacy and safety in improving symptoms, reducing microbial load, and enhancing wound healing in oral tissues. Despite promising outcomes, limitations such as poor bioavailability and the need for optimized delivery systems and standardized dosages remain challenges for clinical application.
Conclusion: Overall, CL and CUR emerges as a potent, natural adjunctive agent with significant potential in promoting oral health and managing oral diseases.
Keywords: Oral health, Dental caries, Periodontitis, Lichen planus, Curcumin, *Curcuma longa*

P789, Dual-function electrospun nanofiber scaffolds for preventing post-surgical tumor recurrence and promoting tissue regeneration

Akrami Ayda [1], Rezaei Mohammad Reza [2], Mollaei Homa [3]
1. Faculty of Natural Resources and Environment, University of Birjand, Birjand, Iran
2. Department of Environmental Science, Faculty of Natural Resources and Environment, University of Birjand, Birjand, Iran
3. Department of Biology, Faculty of Science, University of Birjand, Birjand, Iran

Background: Post-surgical tumor recurrence remains a major challenge in cancer treatment, often compromising patient outcomes despite complete tumor resection. Electrospun nanofiber scaffolds have emerged as promising platforms that simultaneously enable localized drug delivery and tissue regeneration. These scaffolds can provide structural support for healthy cells while inhibiting residual cancer cells and preventing metastasis.
Methods: This review systematically analyzes recent advancements in dual-function electrospun nanofiber scaffolds for oncology applications. We examined studies focusing on scaffold fabrication techniques, core–sheath and hybrid structures for drug loading, layer-by-layer assembly, and strategies to optimize immune modulation and tissue integration. The discussion includes both preclinical and translational studies evaluating anti-tumor efficacy, vascularization, and tissue regeneration outcomes.
Results: Electrospun scaffolds demonstrated effective localized chemotherapy, reducing systemic toxicity while maintaining high drug concentration at the surgical site. Core–sheath designs allowed co-delivery of multiple drugs with synergistic anti-cancer effects, mitigating chemoresistance. Three-dimensional and mesh-like scaffolds enhanced cell infiltration, vascularization, and extracellular matrix deposition. Additionally, they promoted macrophage polarization toward the M2 phenotype, supporting tissue repair and modulating the local immune microenvironment. Preclinical models reported significant reductions in tumor recurrence and metastasis, alongside accelerated wound healing and tissue restoration.
Conclusion: Dual-function electrospun nanofiber scaffolds represent a transformative approach in post-surgical cancer care, combining precise, controlled drug delivery with enhanced tissue regeneration. Their modularity and tunable properties offer opportunities for personalized therapeutic strategies. Future research should focus on optimizing multi-drug loading, patient-specific scaffold design, and integration with immunotherapy, advancing these scaffolds toward clinical translation and improved patient outcomes.
Keywords: Electrospun nanofibers, Post-surgical tumor recurrence, Tissue regeneration

P790, p-Cymene improves memory and reduces hippocampal neuroinflammation in the reserpine model of Parkinson's disease by modulating the CREB/BDNF signaling pathway

Milad Ansari[1], Mohammad Amin Edalatmanesh[1]
1. Department of Biology, Shi. C., Islamic Azad University, Shiraz, Iran

Background: Oxidative stress plays an important role in the pathophysiology of Parkinson's disease (PD). This study aimed to evaluate the antioxidant, anti-inflammatory and neuroprotective effects of p-Cymene with emphasis on the CREB/BDNF signaling pathway in a rat model of reserpine (RES)-induced PD.
Methods: 40 male Wistar rats were divided into 5 groups: control, receiving p-Cymene vehicle and RES vehicle (VP+VR), receiving RES (1 mg/5 days/ip) and p-Cymene vehicle (RES+VP), receiving p-Cymene (50 mg/14 days/oral) and RES vehicle (p-Cymene+VR) and receiving RES and p-Cymene (RES+p-Cymene). Then, the animals underwent motor-cognitive evaluation (catalepsy test, Y-maze and shuttle box). Hippocampal measurements of oxidative stress biomarkers [8-hydroxydeoxyguanosine (8-OHdG), carbonyl protein (CP), 4-hydroxynonenal (4-HNE) and malondialdehyde (MDA)], proinflammatory cytokines [interleukin-1beta (IL-1β), interleukin-6 (IL-6) and tumor necrosis factor alpha (TNF-α)], CREB/BDNF gene expression and density of apoptotic neurons in the CA1/CA3 regions of the hippocampus were performed.
Results: The results showed a significant reduction in catalepsy behavior, amelioration in avoidance and working memory, a significant reduction in 8-OHdG, CP, 4-HNE, MDA, IL-1β, IL-6 and TNF-α and an increase in CREB/BDNF expression in the RES+p-Cymene group compared to the p-Cymene+VR group. furthermore, p-Cymene was associated with an increase in density prevented RES-induced apoptotic neurons in the CA1 and CA3 regions of the hippocampus.
Conclusion: p-Cymene has a neuroprotective effect in the PD model by modulating the CREB/BDNF pathway and prevents RES-induced motor-cognitive disorders and hippocampal cell damage.
Keywords: Reserpine, Parkinson's disease, BDNF, Monoterpene, Memory

P791, The administration of Cyperus rotundus L. extract mitigates memory deficits induced by stress in male rats: the role of inflammation and oxidative damage

Kiarash Sabet [1], Ashkan Moallemi [1], Farimah Beheshti [2,3]
1. Student Research Committee, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
2. Departments of Physiology, School of Paramedical Sciences, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
3. Neuroscience Research Center, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran

Background: *Cyperus rotundus* L. (C. rotundus) is utilized within Iranian traditional medicine for the amelioration of cognitive disorders, attributable to its inherent antioxidant and anti-inflammatory properties. An increasing body of evidence elucidates a correlation between stress hormones and deficits in memory function. The objective of this investigation was to ascertain the effects of C. rotundus extract on memory impairment induced by Chronic Mild Stress (CMS) in a rat model.
Methods: Rats were categorized into three groups: 1) Control, 2) Chronic Mild Stress (CMS), and 3 to 5) C. rotundus at doses of 100, 200, and 400 mg/kg+CMS (administered via oral gavage). The subjects underwent a four-week CMS regimen. In the fourth week, they participated in seven training trials. Post-behavioral assessments, rat brains were harvested to evaluate inflammation and oxidative stress parameters.
Results: Pretreatment with C. rotundus improved the performance of rats in the Object Recognition Test (ORT), Morris Water Maze (MWM), and Passive Avoidance (PA) test. Additionally, chronic mild stress (CMS) raised levels of serum corticosterone. It also increased the levels of Malondialdehyde (MDA) and Interleukin-6 (IL-6) in the hippocampus. At the same time, CMS decreased the activity of antioxidant enzymes like Superoxide Dismutase (SOD) and catalase, as well as thiol levels. C. rotundus was able to reverse these changes caused by CMS.
Conclusion: The current study found that C. rotundus helped reduce memory loss caused by CMS. It did this by lowering levels of oxidative stress in the brain and reducing neuroinflammation. Additionally, C. rotundus was able to keep corticosterone levels from rising too high due to CMS.
Keywords: *Cyperus rotundus* L., Chronic Mild Stress, Corticosterone, Memory Impairment, Oxidative Stress

P792, The role of crocin in improving the destructive effects of various types of stress (short-term and long-term) on memory and learning

Arefeh Dadkhah Tehrani[1], Zahra Ansari[1], Fatemeh Jahanfar[1], Azadehalsadat Hosseini Dastgerdi[2],
1. Clinical Research Development Center, Najafabad Branch, Islamic Azad University, Najafabad, Iran
2. Department of medicine, Na.C., Islamic Azad University, Najafabad, Iran

Background: Stress, either acute or chronic, provokes extreme physiological, behavioral, and neurological alterations, more specifically deteriorating learning and memory through pathways like oxidative stress, neuroinflammation, and HPA axis dysregulation. Oxidative stress due to excessive free radicals, is capable of inducing structural or functional brain damage and plays a significant role in stress-induced memory impairments. Crocin, a saffron constituent, has strong antioxidant, anti-inflammatory, and neuroprotective effects. The current review aggregates data from recent studies assessing crocin's role in mitigating stress-related cognitive dysfunctions.
Methods: This review was conducted according to a systematic PubMed and Google Scholar database search, in both human and animal models, of English articles published after 2020. Keywords: "stress", "crocin", "saffron", "learning", and "memory" etc.
Result: Crocin has the potential to reverse impairments in memory that are induced by stress through modulation of HPA axis, reduction in cortisol level and oxidative stress, induction of hippocampal neurogenesis, synaptic plasticity improvement, and reversal of stress-induced structural damage in brain regions involved in memory processing. Experimental evidence has demonstrated that crocin significantly improves spatial and non-spatial memory, neurogenesis, and long-term potentiation in rats exposed to chronic resistance and isolation stress. These effects are dose-dependent and depend on the nature of stressor and the behavioral task used.
Conclusion: In conclusion, crocin possesses therapeutic value in the reversal of memory deficits induced by stress, possibly via its modulatory actions on oxidative homeostasis, neurotransmitter levels, and synaptic plasticity. Further research must be carried out to determine its mechanisms and translate its applications to human populations.
Keywords: Crocin, Memory, Learning, Stress

P793, The role of auraptene and estradiol on intestine injury following traumatic brain injury in rats

Zakieh Keshavarzi [1], Sedigheh Amiresmaili [2]
1. Natural Products and Medicinal Plants Research Center, North Khorasan University of Medical Sciences, Bojnurd, Iran
2. Department of Physiology, Bam University of Medical Sciences, Bam, Iran

Background: This investigation aimed to evaluate how varying doses of *auraptene* (AUR) alone and in combination with estradiol (E2) on various parameters after traumatic brain injury (TBI) in rats
Methods: The rats were divided into twelve groups, including a sham group and eleven TBI groups. The TBI groups consisted of three vehicle groups (DMSO, Oil, and DMSO+Oil), an E2 group, three AUR groups with varying doses (4, 8, and 25 mg/kg), and three combination groups of AUR and E2 (AUR 4+E2, AUR 8+E2, and AUR 25+E2).AUR was administered for five consecutive days) ip). TBI was induced 30 minutes after the last injection on the fifth day. E2 and Oil were injected 30 minutes post-TBI.
Results: AUR at 25 mg/kg and in combination with E2 significantly reduced brain water content. Nitric Oxide (NO) and Malondialdehyde (MDA) levels were lower in AUR 8 and 25, and all AUR+E2 groups. Glutathione peroxidase (GPX) and Catalase (CAT) activity increased in all AUR+E2 groups. TBI increased interleukin-1β (IL-1β) and tumor necrosis factor α (TNF-α) levels in the intestine, which were reduced by AUR alone and AUR+E2**.**
Conclusion: These findings support AUR, particularly with E2, as a promising therapeutic strategy for managing oxidative stress, inflammation, and tissue damage in TBI cases.
Keywords: TBI, Auraptene, Estrogen, Oxidative Stress, Neuroprotection

P795, Curcumin plus amniotic membrane reduces post-surgical peri-tendinous tissue adhesion by decreasing inflammation and fibrosis in rats

Nikoo Saeedi[1]
1. Department of clinical biochemistry, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Post-surgical peritendinous adhesion is a common complication following tendon repair, often leading to restricted joint mobility and impaired function. This study evaluated the effects of human amniotic membrane (HAM), curcumin, and their combination on reducing adhesion, inflammation, and fibrosis in a rat Achilles tendon injury model.
Methods: Wistar rats were assigned to six groups, including untreated controls, sham, and treatment groups receiving HAM, curcumin, or both. After 21 days of treatment, histological, macroscopic, and biomechanical evaluations were conducted.
Results: Results demonstrated that both HAM and curcumin significantly reduced adhesion band formation, inflammatory cell infiltration, and collagen deposition compared to untreated controls. Moreover, the treatments improved biomechanical properties such as ultimate stress, though no significant synergistic effect was observed in the combined group. No adverse effect on vital organs was detected.
Conclusion: These findings suggest that HAM and curcumin are safe and effective in mitigating post-operative tendon adhesions through anti-inflammatory and anti-fibrotic mechanisms.
Keywords: Peritendinous adhesion, Amniotic membrane, Curcumin, Inflammation, Fibrosis

P796, Mechanistic insight into rosemary-induced bronchodilation: a dual β-adrenergic and calcium channel action

Saeideh Saadat[1], Fatemeh Azarian[1], Sadrollah Ramezani[2,3], Mohammad Ali Mirshekar[1]
1. Department of Physiology, School of Medicine, Zahedan University of Medical Sciences, Zahedan, Iran
2. Department of Medicinal Plants, University of Sistan and Baluchestan, Zahedan, Iran
3. Department of Agronomy Science, Research Institute of Modern Biological Techniques, University of Zanjan, Zanjan, Iran

Background: Dysfunction of airway smooth muscle is central to obstructive pulmonary diseases. This study aimed to elucidate the primary pharmacological mechanisms responsible for the bronchodilatory effect of a rosemary (*Rosmarinus officinalis*) extract.
Methods: Isolated rat tracheal rings, pre-contracted with either methacholine or KCl, were exposed to cumulative concentrations (150–1200 µg/mL) of a hydro-alcoholic rosemary extract to assess its relaxant effect. To investigate the mechanisms of action, tissues were pretreated with specific pharmacological modulators, including propranolol and diltiazem.
Results: The concentration-dependent relaxant effect of the rosemary extract on pre-contracted tracheal muscle was substantially inhibited by propranolol and diltiazem. The relaxant response remained unchanged in the presence of other classical receptor antagonists and channel blockers.
Conclusion: The potent bronchodilatory activity of rosemary extract is primarily mediated through a dual synergistic mechanism involving the activation of β-adrenergic receptors and the inhibition of voltage-dependent calcium channels. This mechanistic profile supports its potential therapeutic value for obstructive airway disorders.
Keywords: *Rosmarinus*; Bronchodilator Agents; Adrenergic beta-Agonists; Calcium Channel Blockers

P798, The effects of propolis and bone marrow – derived mesenchymal stem cells on diabetes induced - heart damage in male rat

Mahnaz Lajevardi[1], Sara Hoseinian[2], Abolfazl Khajavi Rad[3], Fatemeh Salami[4]
1. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Diabetic cardiomyopathy, characterized by abnormal cardiac structure and function in the absence of other cardiac risk factors, has been described for more than 40 years. Inflammation and oxidative stress have emerged as key components in the pathophysiology of diabetic cardiomyopathy. Propolis is a natural resinous mixture that has been widely used in traditional medicine in various regions of the world as an anti-inflammatory, antioxidant, antiproliferative, and antidiabetic agent. The effects of stem cells have also been reported in previous studies. Therefore, this study aimed to investigate the effects of bee propolis and bone marrow-derived stem cells on diabetic cardiomyopathy in male rats.
Methods: 48 male Wistar rats were randomly divided into 8 groups: 1- Control, 2- STZ, 3- Metformin (mg/kg) 300 STZ+ 4- Propolis (mg/kg) 200 + STZ, 5- Propolis (mg/kg) 400 STZ+, 6- STZ+ MSCs (2×106), 7- MSCs (2×106) preincubated with propolis (mg/kg) STZ+ 8- STZ + MSCs + (2×106) + propolis gavage (mg/kg) 200. To induce diabetes, intraperitoneal administration of STZ (mg/kg) 65 was used, and animals with fasting blood sugar (FBS) above 250 mg/dl were included in the study. At the end of the study, the hearts of the animals were collected and oxidative damage and inflammation were examined.
Results: The study of available cytokines showed that the use of a single dose of STZ (65 mg/kg) to induce diabetes significantly increased TNF-α, MDA concentration, and decreased CAT activity compared to the control group ($p<0.05$ -$p<0.01$). Also, the results of the study of TNF-α concentration in the studied groups showed that TNF-α concentration in the propolis gavage (400 mg/kg), MSCs + propolis 200, and MSCs incubated with propolis treatment groups had a significant decrease compared to the STZ group ($p<0.05$ and $p<0.01$). Also, compared to the STZ group, the MDA level of kidney tissue in all treatment groups was significantly decreased compared to the STZ group
($p<0.001$). Also, animals treated with propolis at doses of 200 and 400 mg/kg ($p<0.05$ and $p<0.01$, respectively) and MSCs incubated with propolis and MSCs alone ($p<0.001$) showed a significant decrease compared to the control group. In addition, animals treated with propolis at doses of 200 and 400 mg/kg showed a significant increase compared to the control group ($p<0.05$ and $p<0.01$, respectively). Other groups did not show a significant difference compared to the control group.
Conclusion: Based on the results of the present study, treatment of STZ-induced diabetic rats with MSCs, propolis and their combination reduced inflammation and improved oxidative stress indices in heart tissue

Keywords: Propolis, Bone Marrow Stem Cells, Oxidative StressInflammation

P799, Augmentation of immune cell viability in cancer patients by employing crocetin in co-culture with mesenchymal stem cells

Reyhane Akbari [1], Ehsan Rastgoo [1], Fahime Lavi [3]
1. Student Research Committee, Mashhad University of Medical Sciences, Mashhad, Iran
2. Immunology Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Prostate cancer is a prevalent and multifactorial malignancy among men. Crocetin, a carotenoid derived from *Crocus sativus*, exhibits antioxidant and anti-apoptotic properties. Mesenchymal stem cells (MSCs) are known to enhance the viability of co-cultured cells. To address immune cell dysfunction and drug resistance in cancer patients, the effect of crocetin on immune cell viability was evaluated in PBMCs co-cultured with MSCs.
Methods: PBMC viability was assessed using the MTT assay at different crocetin concentrations. Apoptosis was evaluated by flow cytometry using Annexin V-FITC/PI staining. Lipid peroxidation was measured by malondialdehyde (MDA) assay in PBMCs cultured with or without MSCs.
Results: Flow cytometry showed that crocetin at 6, 12, and 25 μM significantly reduced apoptosis in PBMCs co-cultured with MSCs, with 12 μM being the most effective concentration. In the absence of MSCs, crocetin also reduced apoptosis, with maximal efficacy at 6 μM ($P \leq 0.0001$). Crocetin at 12 μM produced the greatest decrease in MDA levels. MTT results demonstrated that crocetin at 3–25 μM significantly increased PBMC viability in co-culture with MSCs, whereas 50 and 100 μM reduced viability ($P \leq 0.0001$). Without MSCs, all tested concentrations significantly enhanced PBMC viability.
Conclusion: Crocetin significantly improves PBMC viability through antioxidant and anti-apoptotic mechanisms, both independently and in combination with MSC co-culture.
Keywords: Crocetin; Cancer; Stem cells; Viability

P800, Wharton's jelly–derived mesenchymal stem cell conditioned medium mitigates diabetic cognitive impairment via oxidative stress, neuroinflammation, and apoptosis attenuation

Zohre Aghaei[1], Narges Karbalaei[1,2], Mohammad Reza Namavar[2], Masoud Haghani[1,2], Mahboobeh Razmkhah[3], Mahdi Khorsand Ghaffari[1] and Marzieh Nemati[4]

1. Department of Physiology, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran
2. Department of Anatomy, Histomorphometry and Stereology Research Center, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran
3. Department of Tissue Engineering and Applied Cell Sciences, School of Advanced Medical Sciences and Technologies, Shiraz University of Medical Sciences, Shiraz, Iran
4. Endocrinology and Metabolism Research Center, Mohammad Rasoul Allah Research Tower, Shiraz University of Medical Sciences, Shiraz, Iran

Background: Diabetes mellitus is strongly associated with cognitive impairment. Mesenchymal stem cells (MSCs) have shown promising therapeutic potential in neurological disorders. This study aimed to investigate the effects of conditioned medium derived from Wharton's jelly mesenchymal stem cells (WJMSC-CM) on cognitive function, oxidative stress, apoptosis, and hippocampal histopathology in diabetic rats.

Methods: Thirty-five male Sprague-Dawley rats (260–300 g) were randomly divided into five groups: non-diabetic control group, untreated diabetic group, and three diabetic groups treated with insulin, WJMSC-CM, or DMEM. Treatments were administered over 60 days (insulin: 3 U/day, subcutaneously; WJMSC-CM: 10 mg/week, intraperitoneally). Cognitive function and anxiety-like behaviors were assessed using the Morris water maze and open field test, respectively. Hippocampal oxidative stress markers (GSH, MDA, and antioxidant enzymes) were evaluated via colorimetric assays. Neuronal morphology was assessed using Nissl staining. The mRNA expression of Bax, Bcl-2, BDNF, and TNF-α was analyzed by quantitative RT-PCR.

Results: According to the results, WJMSC-CM treatment significantly reduced blood glucose and increased insulin levels in diabetic rats. Cognitive function and anxiety-like behaviors were markedly improved. Oxidative stress was attenuated, as indicated by decreased MDA and elevated GSH levels and antioxidant enzyme activities. Hippocampal analysis showed reduced TNF-α, increased Bcl-2 expression, and greater numbers of neurons and glial cells, including astrocytes and oligodendrocytes, suggesting a neuroprotective role of WJMSC-CM in diabetic-related neuropathology.

Conclusion: In summary, WJMSC-CM alleviated diabetes-induced cognitive deficits, likely through the attenuation of oxidative stress, suppression of neuroinflammatory responses, and inhibition of apoptosis in the hippocampus of diabetic rats.

Keywords: Stem Cell, Conditioned Medium, Hippocampus, Cognition Disorders, Diabetes Mellitus

P801, Modulatory impacts of silybum marianum phytocompounds on stem cells from autoimmune patients

Fahime Lavi Arab[1], Ehsan Rastgoo[2], Reyhane Akbari[2]
1. Immunology Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
2. Student Research Committee, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Multiple sclerosis (MS) is an autoimmune and common demyelinating CNS disease, and current therapies often fail to reverse progressive neural damage. Mesenchymal stem cells (MSCs) show immunomodulatory potential, but their survival and function can be limited by oxidative and inflammatory conditions. Silymarin from Silybum marianum has antioxidant and anti-inflammatory effects, yet its poor solubility and low bioavailability restrict clinical use. Nano-micellar formulations can improve silymarin delivery and cellular uptake. Therefore, this study investigated whether nano-silymarin enhances proliferation, reduces apoptosis, and improves the immunomodulatory profile of adipose-derived MSCs from MS patients, including effects on Treg expansion in co-culture.
Methods: AD-MSCs were isolated from lipoaspirates of ten female MS patients and treated for 24 h with 1–10 μM concentrations of nano-SL. Controls were blank micelles, free (naïve) silymarin, and untreated cells. Proliferation (MTT), apoptosis (Annexin V/PI), Tregs in AD-MSC–PBMC co-culture (CD4+CD25+FOXP3+CD127−), cytokine mRNA profiles, and oxidative stress markers (NO, MDA, SOD) were evaluated.
Results: Nano-SL at 1–2.5 μM increased AD-MSC proliferation and reduced apoptosis versus controls. In co-culture, nano-SL increased Tregs, with 1–2.5 μM yielding ~2.8-fold higher Tregs than 5–10 μM. Nano-SL decreased pro-inflammatory transcripts (IL-6 at 1–10 μM and IL-17 at 1 μM) and increased IL-4, IL-10, TGF-β, and FOXP3. NO decreased only at 10 μM; MDA did not change; SOD activity increased at 2.5 μM. Significance was reported as $p<0.05$, $p<0.01$, $p<0.001$, or $p<0.0001$.
Conclusion: Nano-SL promoted AD-MSC survival and an anti-inflammatory, Treg-supportive profile, supporting further investigation as an adjunct to MSC-based approaches in MS.
Keywords: Multiple Sclerosis, Mesenchymal Stem Cells, Silymarin, Regulatory T cell

P802, Enhancement of wound closure rate and tissue collagen content by topical stanozolol in a rat model of second-degree burn

Pari Tamri[1, 2], Setareh Asgharnejad[1, 2], Fatemeh Mirzaei[3]
1. Pharmaceutical Sciences Research Center, Institute of Cancer, Hamadan University of Medical Sciences, Hamadan, Iran
2. Department of Pharmacology and Toxicology, School of Pharmacy, Hamadan University of Medical Sciences, Hamadan, Iran
3. Department of Anatomical Sciences, School of Medicine, Hamadan University of Medical Sciences, Hamadan, Iran

Background: This study was performed to examine the effects of topical stanozolol (Stz) on healing process of second- degree burn wound, exploring the potential of anabolic steroids in promoting wound healing process.
Methods: 25 male and 25 female Wistar rats were used in this study, with each sex, randomly, divided into 5 groups (n=5). Two second -degree burns were induced in the back of each animal. Groups 1 to 5 were treated with topical stanozolol (Stz), silver sulfadiazine 1% cream (SSD), topical Stz plus oral flutamide (Flut), oral Flut, and Eucerin, respectively. Healing process was monitored by calculating wound closure rate and assessment of hydroxyproline content of tissue samples. In addition, the histopathological study was performed on wound tissue samples.
Results: Our findings revealed that the median time for complete wound closure in animal groups treated with topical Stz was significantly ($p<0.05$) shorter than those of other studied groups. Hydroxyproline contents of tissue samples obtained from male and female animals treated with Stz 0.5% were significantly ($p<0.001$) higher than those of other groups on days 7 and 14 post injury. Histopathological analysis confirmed the burn wound healing effects of topical Stz. There were no significant differences in the wound healing process between male and female animals.
Conclusion: Topical Stz accelerated and improved burn wound healing in rat. Our results suggest that Stz could be considered as a potential candidate for new
Keywords: Wound Healing, Stanozolol, Burns, Flutamide, Anabolic Steroid

P803, Effect of Administration of Mesenchymal Stem Cells and Exercise on Brain Complications and Biomarkers Following Traumatic Brain Injury

Parisa Habibi[1], Mohammad Mohammadi[2], Alireza Sarkaki[3]
1. Department of physiology, school of medicine, Tehran University of medical sciences, Tehran, Iran
2. School of Medicine, Kermanshah Islamic Azad University, Kermanshah, Iran
3. Department of Physiology, faculty of Medicine, Islamic Azad University, Ahvaz Branch, Ahvaz, Iran

Introduction: Traumatic brain injury (TBI) is one of the most important causes of death and neurological disability worldwide. TBI leads to brain tissue destruction, inflammation, memory impairment, and cognitive impairment. Current treatments are mainly supportive and have limited neuronal regeneration capacity. Mesenchymal stem cells (MSCs) and exercise training have each been reported to be effective in improving brain function and reducing inflammation and complications after TBI. In recent years, the use of combination therapies such as stem cell transplantation along with lifestyle interventions such as exercise has received attention. This article attempted to evaluate the synergistic effect of MSCs and exercise on behavioral performance, biochemical changes, and brain biomarkers in animal models of TBI.
Methods: In this study, various articles published in this specialized field were used from domestic and international online search engines such as Scopus, Google Scholar, ScienceDirect, ResearchGate, PubMed, DOAJ, IranDoc, etc., within the time range of 2015 to 2025. Articles related to In Vivo studies on laboratory animals related to the research topic were monitored and selected. In these studies, large and small laboratory mice were used to create a moderate to severe controlled traumatic injury (CTI) model with different methods of creating traumatic brain injury to the animals under anesthesia. After brain injury, the animals were placed on a ventilator and artificial respiration for at least one hour until normal breathing was established. Following the determination of the consciousness score to prove brain trauma and behavioral tests, the experimental groups were treated with exercise and intravenous administration of mesenchymal stem cells. MSCs were injected IV, or intraventricularly, and forced or voluntary aerobic exercise (on a treadmill or a running wheel) was performed daily for at least one hour for 2 to 6 weeks after the injury. The data were analyzed with standard statistical tests.
Results: In all these studies, traumatic brain injury caused a significant decrease in the level of consciousness in proportion to the severity of the injury. Motor and cognitive behaviors were significantly impaired. Anxiety-like and depressive behaviors were significant. Biochemical parameters within the brain tissue, such as oxidants such as ROS and MDA, increased due to disruption in the level and function of antioxidant enzymes such as SOD and GPx, etc., pro-inflammatory and inflammatory interleukins such as TNF-α and IL-1β, IL-8, but anti-inflammatory interleukins decreased. These events were accompanied by changes in the expression of some related mRNAs. Administration of stem cells and exercise was able to significantly reverse the above disorders when used together or separately. These two interventions had a synergistic effect, and exercise was able to enhance the effects of the administration of stem cells.
Conclusion: Most studies have shown that, until now, the most effective preventive treatment strategies for the development of primary and secondary complications following traumatic brain injury in animal models were mainly maintenance. In new research, the use of natural substances as food additives, exercise appropriate to the severity of the disease, and administration of stem cells are effective therapeutic strategies for preventing the progression of acute and chronic complications of brain injury (motor and cognitive, sleep disorders, and brain electrophysiology).

P804, Effects of dietary polyphenols on viability, differentiation, and regenerative function of mesenchymal stem cells

Yalda Hasanzadehghannad[1], Omid Barez[1], Atefeh Sarafan Sadeghi[2]
1. Student Research Committee, Varastegan Institute for Medical Sciences, Mashhad, Iran
2. Department of Food Science and Technology (Quality Control and Hygiene), Varastegan Institute for Medical Sciences, Mashhad, Iran

Background: The study of stem cells MSCs is important in many researches about regenrative medicine. Their ability to differentiate into different types of cells, along with their characteristic to modulate immune responses, makes them very interesting. However, their short life span and the presence of factors such as oxidative stress and reduced capacity for differentiation limit the potential in the body. To solve this problem, research is focused on the role of dietary polyphenols. The study includes empirical evidence that discusses the effect of these molecules on the MSC.
Methods: A reference to the systematic review, the use of PubMed, Scopus and Google Scholar for each article published from 2021 to 2024. Search terms include «Polyphenols», «Mesenchymal» Stem Cells, «Resveratrol», etc.
Results: Resveratrol was reported to increase MSC survival and reduce oxidative stress, mostly through the regulation of SIRT1 and AMPK pathways. In other studies, quercetin promoted the differentiation of osteogenic and chondrogenic MSCs through the regulation of RUNX2 and SOX9. Other findings led to the conclusion that EGCG exerted anti-inflammatory effects, causing MSC survival in damaged tissues. In short, polyphenols interact with MSCs as strong amplifiers for survival, differentiation, and protective signaling pathways.
Conclusion: Polyphenols in the diet can be a great way to support the survival and differentiation of MSC, which makes them very attractive as nutritional-based therapies in stem cell therapy used for regenerative medicine.
Keywords: Polyphenols, Mesenchymal Stem Cells, Resveratrol, Quercetin, EGCG

P805, Comparative evaluation of the regenerative and anti-inflammatory effects of bm-mscs, ad-mscs, and uc-mscs in an experimental model of osteoarthritis

Mohammad Javad Khataee[1]
1. Department of Immunology, Faculty of Medicine, Golestan University of Medical Sciences, Gorgan, Iran

Background: As a common degenerative joint disease, Osteoarthritis (OA) is characterized by articular cartilage degeneration and mild inflammation. In this study, we aimed to compare the regenerative and anti-inflammatory properties of bone marrow-derived MSCs (BM-MSCs), adipose-derived MSCs (AD-MSCs), and umbilical cord-derived MSCs (UC-MSCs) in a well-established animal model of osteoarthritis.
Methods: In an OA-induced animal model, BM-MSCs, AD-MSCs, and UC-MSCs were administered via intra-articular injection after confirming their identity and phenotypic characteristics. The animals were randomly assigned to four groups: control, BM-MSCs, AD-MSCs, and UC-MSCs. Assessments included histological evaluation of cartilage, analysis of chondrogenic measurement of inflammatory cytokines, and scoring based on OARSI criteria.
Results: Injection of mesenchymal stem cells (MSCs) in all three study groups resulted in a significant improvement in cartilage tissue quality, accompanied by reduced inflammatory markers and inhibition of matrix-degrading enzyme activity. Comparative analysis of MSC sources revealed that UB-MSCs demonstrated the greatest efficacy in enhancing chondrogenic marker expression, promoting extracellular matrix repair, and reducing inflammatory cytokine levels. AD-MSCs outperformed BM-MSCs in alleviating pain and improving joint mobility, whereas BM-MSCs demonstrated the highest potential for fibrocartilage formation. The control group showed the least improvement.
Conclusion: The comparative analysis of MSC sources revealed that MSCs derived from all three sources were capable of inhibiting the progression of osteoarthritis, enhancing cartilage regeneration, and modulating inflammatory responses. UC-MSCs demonstrated the highest regenerative and immunomodulatory potential, exhibiting superior overall performance. These findings underscore the importance of selecting an appropriate cell source in the design of MSC-based therapies for osteoarthritis.
Keywords: Osteoarthritis, Mesenchymal Stem Cells (Mscs), Cartilage Regeneration, Umbilical Cord, Bone Marrow

P806, Therapeutic potential of stem cell-derived exosomes in modulating astrocyte-neuron interactions in Huntington's disease

Elham Zare[1,3], Somaye Hesami[2,3], Ehsan Sabouri[1], Pejman Hosseinzadeh[3], Seyyed Mohammad Tabatabaei[4]

1. Department of Medical Genetics and Molecular Medicine, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Neurosciences Department, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Student Research Committee, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
4. Department of Medical Informatics, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Huntington's disease (HD) is a progressive inherited brain disorder caused by the accumulation of mutant huntingtin (mHTT) protein, mainly affecting the striatum and cortex. It leads to neuronal dysfunction and death. Astrocytes play a vital role in maintaining CNS homeostasis, and impaired astrocyte-neuron communication significantly contributes to HD progression. Recent findings suggest that targeting this disrupted interaction could help slow disease progression. This review explores the therapeutic potential of stem cell-derived exosomes in restoring neural communication and improving synaptic function in HD.
Methods: A comprehensive literature search was conducted across multiple databases to identify preclinical studies evaluating the impact of stem cell-derived exosomes on HD-related pathways. Focus areas included neuroinflammation, autophagy, synaptic transmission, and cellular energy metabolism
Results: Exosomes, nano-sized vesicles secreted by stem cells, contain bioactive molecules like growth factors, regulatory proteins, and non-coding RNAs. They modulate inflammation, autophagy, and neuronal energy metabolism. By enhancing synaptic connectivity and promoting neural survival, exosomes reduce mHTT aggregation and its associated toxicity. These effects collectively lead to neuroprotection and functional improvements in HD models.
Conclusion: Stem cell-derived exosomes offer a promising, non-invasive therapeutic strategy to counteract neurodegeneration in HD by restoring astrocyte-neuron communication and synaptic integrity. Further studies are required to clarify underlying mechanisms, optimize delivery, and ensure long-term safety.
Keywords: Stem Cells, Exosomes, Huntington Disease, Synaptic Function, Astrocyte-Neuron Communication

P807, Therapeutic effects of oral mucosal mesenchymal stem cell administration on pulmonary inflammation and oxidative stress in a traumatic brain injury model

Zahra Soltani[1], Ali Mehrabi[2]
1. Endocrinology and Metabolism Research Center, Kerman University of Medical Sciences, Kerman, Iran
2. Neuroscience Research Center, Institute of Neuropharmacology, Kerman University of Medical Sciences, Kerman, Iran

Background: Traumatic brain injury (TBI) is a major public health concern that often results in systemic inflammatory and oxidative complications, including significant pulmonary damage. Current treatments offer limited efficacy in mitigating such secondary organ injuries. Given the immunomodulatory and antioxidative properties of mesenchymal stem cells (MSCs), this study aimed to evaluate the therapeutic potential of oral mucosa-derived MSCs (OMSCs) in reducing lung inflammation and oxidative stress following TBI.
Methods: Adult male Wistar rats were assigned to four groups: Sham, TBI, Vehicle (saline), and OMSC-treated. TBI was induced using a standard weight-drop model. OMSCs were administered intravenously one hour post-injury. After 48 hours, inflammatory cytokines (IL-1β, IL-6, IL-10), oxidative stress markers (TAC, SOD, CAT, MDA, PC), and histopathological changes in lung tissue were assessed.
Results: OMSC administration significantly decreased IL-6 and MDA levels while increasing IL-10, TAC, SOD, and catalase compared to TBI and Vehicle groups ($p < 0,01$). IL-1β and protein carbonyl levels were not significantly altered. Histological analysis showed reduced lung injury scores in the OMSC group, comparable to Sham controls, indicating structural preservation.
Conclusion: OMSC therapy mitigates pulmonary inflammation and oxidative stress following TBI, demonstrating promise as a systemic intervention. However, limited effect on IL-1β and PC suggests the need for optimization in dosage or timing. These findings support OMSCs as a potential therapeutic candidate for systemic complications of TBI.
Keywords: Traumatic Brain Injury, Mesenchymal Stem Cells, Oxidative Stress, Inflammation, Lung Injury

P808, Therapeutic potential of mesenchymal stem cells in the management of diabetic foot ulcers: A regenerative approach

Iman Soleimanpour[1,2], Amin Solouki[1,3]
1. Department of Medical Laboratory Sciences, Varastegan Institute for Medical Science, Mashhad, Iran
2. Student Research Committee, Varastegan Institute for Medical Sciences, Mashhad, Iran
3. Department of Hematology and Blood Banking, School of Allied Medical Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: Diabetic foot ulcers are an important complication of diabetes that can lead to amputation. To date, 84% of non-traumatic amputations are carried out on patients with diabetes. Traditional treatment only relieves symptoms and reduces pain; new therapeutic strategies need to be developed. Because of their potential to promote epithelialization, inhibit inflammation, and enhance angiogenesis, mesenchymal stem cells (MSCs) play an important role in diabetic foot ulcer therapy. In the end, by promoting wound healing and improving the therapeutic effect, MSCs have the potential to treat diabetic foot ulcers successfully and prevent amputation.
Methods: This review article included studies published on PubMed, Science Direct, SID, and NCBI until November 2025. Fifteen articles were found by searching this database; about seven of them were removed by reading titles and abstracts, and eight articles were selected under the inclusion criteria.
Results: The MSCs are now known to be a new and promising tool for cell therapy, with potential cellular repair capability, promoting angiogenesis, granulation tissue formation, the release of growth factors, and immunomodulation. The secretome of mesenchymal stem cells contains cytokines, chemokines, growth factors, as well as exosomes bearing mRNA, microRNAs, and other components that have both regenerative and immunomodulatory effects. Local infusion of these cells in animal models and preliminary clinical trials has revealed a remarkable reduction in wound size and an acceleration in healing.
Conclusion: It is likely that the short healing time and good tolerability are crucial factors for the applicability of this new treatment for diabetic foot ulcers. This method, however, needs to be investigated further.
Keywords: Mesenchymal Stem Cells, Diabetic Foot Ulcers, Diabetes, Wound Healing, Cell Therapy

P809, Optimizing physicochemical and biological properties of gelatin-hydroxyapatite scaffolds

Someyra Sistani[1], Samaneh Arab[2], Marjan Bahraminasab[2]
1. Student Research Committee, University of Medical Sciences, Semnan, Iran
2. Department of Tissue Engineering and Applied Cell Sciences, University of Medical Sciences, Semnan, Iran

Background: Bone tissue engineering develops bone substitutes for repairing damaged bone. 3D porous scaffolds, such as those made from hydroxyapatite (HA) and gelatin, mimic the natural bone matrix, supporting cell growth, attachment, proliferation, and osteogenic differentiation due to their excellent biocompatibility.
Methods: Composite scaffolds were prepared using HA and gelatin, with varying percentages of salt (NaCl) and HA as experimental variables. The scaffolds were fabricated by the freeze-drying and salt leaching. The components were mixed thoroughly, the mixtures were cast into molds and frozen at -20°C, followed by lyophilization and thorough washing to achieve a highly porous architecture. To assess scaffold performance, cell viability, bioactivity, cell adhesion, and mineralization assays were conducted on MC3T3-E1 cells, evaluating cytocompatibility, biological activity, cellular attachment, and calcium deposition capacity, respectively.
Results: The scaffold had porosity because the salt particles were removed, creating pores in their place. Alizarin Red staining revealed a high degree of mineralization, indicating substantial calcium deposition by the cells. In the SBF (simulated body fluid) test, a significant amount of hydroxyapatite was deposited on the scaffold surfaces, confirming their strong bioactivity and ability to support apatite formation. Additionally, cell viability assays showed high survival rates, and cell adhesion tests confirmed that the cells attached well to the scaffold structure.
Conclusion: The development of G-HA bioactive scaffolds offers significant potential for bone defect repair. These scaffolds exhibit favorable structural and biological characteristics, supporting cell attachment, proliferation, and differentiation. Overall, their performance highlights their value as effective candidates for applications in regenerative medicine.
Keywords: Scaffold, Hydroxyapatite, Bone, Gelatin, Tissue Engineering

P810, Exosomes modulate the neurocognitive effects of methamphetamine: A novel treatment approach

Solmaz Fallahi[1, 2]
1. Department of Pharmacology and Toxicology, Faculty of Pharmacy, Tabriz University of Medical Sciences, Tabriz, Iran
2. Department of Physiology, Faculty of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran

Background: Methamphetamine (METH) is a psychostimulant substance with highly addictive and neurotoxic effects, but no ideal treatment option exists to improve METH-induced neurocognitive deficits. Recently, mesenchymal stem cells (MSCs)-derived exosomes have raised many hopes for treating neurodegenerative sequela of brain disorders. This study aimed to determine the therapeutic potential of MSCs-derived exosomes on cognitive function and neurogenesis of METH-addicted rodents.
Methods: Male BALB/c mice were subjected to chronic METH addiction, followed by intravenous administration of bone marrow MSCs-derived exosomes. Then, the spatial memory and recognition memory of animals were assessed by the Barnes maze and the novel object recognition test (NORT). The neurogenesis-related factors, including NeuN and DCX, and the expression of Iba-1, a microglial activation marker, were assessed in the hippocampus by immunofluorescence staining. Also, the expression of inflammatory cytokines, including TNF-α and NF-κB, were evaluated by western blotting.
Results: The results showed that BMSCs-exosomes improved the time spent in the target quadrant and correct-to-wrong relative time in the Barnes maze. Also, NORT's discrimination index (DI) and recognition index (RI) were improved following exosome therapy. Additionally, exosome therapy significantly increased the expression of NeuN and DCX in the hippocampus while decreasing the expression of inflammatory cytokines, including TNF-α and NF-κB. Besides, BMSC-exosomes down-regulated the expression of Iba-1.
Conclusion: Our findings indicate that BMSC-exosomes mitigated METH-caused cognitive dysfunction by improving neurogenesis and inhibiting neuroinflammation in the hippocampus.
Keywords: Methamphetamine, Bone Marrow Mesenchymal Stem Cells, Exosome, Cognition, Neurogenesis

P812, Role postbiotic in biological potential of mesenchymal stem cells

Asiyeh Shojaee[1]
1. Division of Physiology, Department of Basic Science, Faculty of Veterinary, Amol University of Special Modern Technologies, Amol, Iran

Background: Stem cells play key roles in physiology, pathophysiology, and therapy. Recent research highlights the complex interaction between mesenchymal stem cells (MSCs) and microorganisms. Dysbiosis can compromise the gut barrier, alter immunity, and impair MSC function. While probiotics show promise in preconditioning and manipulating MSCs, their use carries risks of severe infections and increased mortality. It is believed that metabolic byproducts of microbiota-derived commensal microorganisms soluble factors secreted by living bacteria or released during bacterial lysis, also known as postbiotics represent a safer option for regenerative interventions.
Methods: Search was performed using related keywords, namely "postbiotic, probiotic metabolites, mesenchymal stem cells, animal models in scientific databases (Google scholar, Pubmed, Scopus).
Results: Final analysis shows probiotics and derivatives can reduce cancer cell proliferation, especially in gastrointestinal cancers. Moreover, allogeneic hematopoietic stem cell transplantation disrupts gut microbiota and barrier integrity, harming therapy outcomes; postbiotics offer a safer way to restore balance. Certain metabolites like short-chain fatty acids enhance MSC regeneration by regulating immune responses and promoting migration, proliferation, and tissue-specific differentiation. Microbial enzymes alter extracellular matrix composition in joints, affecting stem cell adhesion and migration. Additionally, microbiota stimulate cytokine secretion, with inflammatory cytokines inhibiting osteogenic differentiation.
Conclusion: Postbiotics with their unique metabolic profiles and functions serve as key mediators for cellular processes and metabolic pathways. Exploring their interplay with MSC function may yield novel strategies for more effective and targeted treatments.
Keywords: Microbiota, Probiotic, Mesenchymal Stem Cells

P813, Potential therapeutic roles of endothelial progenitor cell-derived exosomes in regenerative medicine: A comprehensive systematic review

Narjes Seddighi[1], Mehdi Talebi[2]
1. Student Research Committee, Tabriz University of Medical Sciences, Tabriz, Iran
2. Department of Applied Cell Sciences, Faculty of Advanced Medical Sciences, Tabriz University of Medical Sciences, Tabriz, Iran

Background: Endothelial progenitor cells (EPCs) have a multi-differentiation and self-renewal capability, which is mainly derived from bone marrow. EPC-derived exosomes have been widely used for various disorders, including inflammation, cardiac injuries, etc. In this comprehensive review, we discussed the potential therapeutic roles of EPC-derived exosomes in regenerative medicine.
Methods: The present systematic review was conducted based PRISMA guideline; data were collected from a search in 4 databases, including Scopus, PubMed, Web of Science, and Embase without any time limitation, and in the English language with keywords such as: Endothelial Progenitor cells, EPC, exosome, Extracellular vesicles, Regenerative medicine and other related mesh terms and its equivalents. All original studies that were conducted on the therapeutic roles of EPC-derived exosomes in various diseases were included.
Results: Across included studies, EPC-derived exosomes consistently demonstrated potent regenerative effects in diverse pathological models. EPC-Exosomes promoted angiogenesis, enhanced endothelial cell proliferation and migration, accelerated wound healing, reduced oxidative stress, reduced neuronal apoptosis, restored microvascular integrity, and modulated immune cell phenotypes toward reparative states. Functional microRNAs—including miR--222 3p, miR-5-154p, etc—were identified as key cargos mediating anti-inflammatory, pro-angiogenic, and cytoprotective responses. Studies also showed that pathological conditions alter EPC-Exo content and impair their therapeutic potency, while targeted modulation of exosomal miRNAs can partially restore function. Comparative analyses further revealed that EPC-Exosomes exhibit higher yield and equal or superior biological activity compared with other endothelial exosome sources.
Conclusion: Overall, the current comprehensive review demonstrates that EPC-Exosomes represent promising cell-free therapeutic agents with broad multi-mechanistic applications in regenerative medicine.
Keywords: Endothelial Progenitor Cell, EPC, Exosome, Extracellular Vesicles, Regenerative Medicine

P814, Application of chitoheal gel in the prevention of pressure injuries caused by N95 masks

Fatemeh Safari Alamuti[1], Fariba Fallahi[1], Hossein Rafiei[2], Farnoosh Rashvand[3], Ehsan Aali[4]
1. Student Research Committee, Qazvin University of Medical Sciences, Qazvin, Iran
2. Social Determinants of Health Research Center, Research Institute for prevention of Non-Communicable Diseases, Qazvin University of Medical Sciences, Qazvin, Iran
3. Department of Nursing, Qazvin School of Nursing and Midwifery, Qazvin University of Medical Science, Qazvin, Iran
4. Department of Pharmacology, School of Medicine, Qazvin University of Medical Sciences, Qazvin, Iran

Background: Extended use of personal protective equipment can result in pressure sores on the skin. The recent research was carried out with the goal of exploring the impact of ChitoHeal gel on the nasal area to prevent pressure sores from N 95 masks in nurses working in ICUs.
Methods: This is a randomized controlled clinical trial carried out in 2022. The research sample comprised 92 nurses employed in the intensive care units. A randomized block technique was employed to assign the nurses to two uniform groups of intervention and control. Nonetheless, in the intervention group, ChitoHeal gel was administered on nurses' nasal bridge. Prior to and at the conclusion of each work shift, the skin in both groups was evaluated for any indications of pressure injuries.
Results: No significant differences were observed between the two intervention and control groups in terms of demographic variables. The prevalence distribution of mask-induced pressure sores on nurses' nasal bridge in the two groups was assessed using the Chi-square test (Fisher's exact test). The findings indicated that following the intervention, it was zero in the intervention group. Nonetheless, 4 nurses (8.6%) in the control group experienced pressure sores, and this distinction between the two groups was statistically notable ($P > 0.05$).
Conclusion: The findings of the current study demonstrate the effectiveness of using ChitoHeal gel in preventing pressure injuries caused by N95 masks. Given its affordability and widespread availability, employing this gel appears to be a cost-effective strategy for preventing N95 mask-related pressure injuries.
Keywords: COVID-19, Gel, Moisturising, Personal Protective Equipment, Pressure Injury

P815, Mesenchymal stromal/stem cell-derived exosomes and Parkinson's disease: A therapeutic approach to induce immunomodulatory responses

Mahdi Abdsheikhi[1], Azim Zaeimbashi[2], Mojgan Mohammadi[1]
1. Department of Immunology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Neuroscience, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Parkinson's disease (PD) is a progressive neurodegenerative disorder characterized by the loss of dopaminergic neurons in the substantia nigra, the accumulation of α-synuclein, and chronic neuroinflammation caused by microglial activation and immune cell recruitment. Mesenchymal stromal/stem cell-derived exosomes (MSC-Exos) are a novel cell-free therapeutic strategy for modulating immune responses that can be effective in controlling and improving Parkinson's by crossing the blood-brain barrier.
Methods: This review narratively analyzed preclinical in vitro and in vivo studies from 2015 to 2025 in PubMed, Scopus, and Web of Science using the keywords “Parkinson’s disease,” “mesenchymal stromal/stem cell,” “exosome,” and “immune cells.” The review focuses on molecular mechanisms, phenotypic changes in glial cells, cytokine profiles, T-cell responses, and functional neuroendocrine outcomes.
Results: MSC-Exos reduced neuroinflammation through multiple mechanisms, including inhibition of TLR2/4-NF-κB and NLRP3 signaling pathways, shifting microglial phenotype from M1 to M2, and simultaneously suppressing astrocyte reactivity via miRNA. In addition, MSC-Exos reduced proinflammatory cytokines, inhibited Th1/Th17 responses, and increased the expansion of regulatory T cells. They can also improve motor function in animal models by increasing α-synuclein clearance, decreasing dopaminergic neuron apoptosis, and decreasing immune cell infiltration.
Conclusion: MSC-Exos can exert potent, multimodal immunomodulatory effects in the control of Parkinson's disease by altering the glial inflammatory phenotype and suppressing the immune system. Their ability to cross the blood-brain barrier and inhibit the infiltration of immune cells also shows significant therapeutic potential.
Keywords: Parkinson's Disease, Mesenchymal Stromal/Stem Cell (MSC), Exosomes, Immunomodulatory

P816, Immunomodulatory and regenerative effects of melatonin-stimulated mesenchymal stromal/stem cells in diabetes mellitus

Mahdi Abdsheikhi[1], Azim Zaeimbashi[2], Mojgan Mohammadi[1]
1. Department of Immunology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Neuroscience, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Diabetes mellitus is a common metabolic disease with dysregulated immune responses and systemic inflammation. Current therapies fail to prevent long-term complications of this disease. Mesenchymal stem cells (MSCs) are considered a therapeutic strategy for diabetes due to their multipotency, immunomodulatory effects, and regenerative properties. However, their efficacy is often limited by oxidative stress and an inflammatory microenvironment. Melatonin, an endogenous hormone with antioxidant and anti-inflammatory properties, has emerged as a potent enhancer of MSC function and paracrine secretion.
Methods: This narrative review analyzed preclinical in vitro and in vivo studies from 2010 to 2025 in PubMed, Scopus, and Web of Science using the keywords "diabetes mellitus," "mesenchymal stromal/stem cells", "melatonin," "regenerative," and "immunomodulatory." The review focuses on molecular mechanisms, immunomodulatory outcomes, and pancreatic islet regeneration.
Results: Melatonin, by binding to the receptor, increases the production of antioxidant enzymes and the survival of MSCs against hyperglycemia-induced oxidative stress. In addition, melatonin can enhance the immunomodulatory properties of MSCs by increasing the secretion of inhibitory factors, which subsequently suppress T helper 1 (Th1) and T helper 17 (Th17) cells, increase the proliferation of regulatory T cells (Treg), and shift macrophages to an anti-inflammatory (M2) phenotype. It can also enhance hepatic glucose metabolism and pancreatic islet regeneration by activating PI3K/AKT.
Conclusion: This review proposes MLT-MSC stimulation as an approach to overcome the limitations of MSC therapy in diabetes. By enhancing survival, paracrine activity, and immunomodulation, MT-MSCs have the potential to control blood sugar and halt disease progression.
Keywords: Diabetes Mellitus, Mesenchymal Stromal/Stem Cell (MSC), Immunomodulatory, Regenerative, Melatonin

P817, Enhanced bone regeneration via indirect 3D printed tragacanth-hydroxyapatite scaffolds

Mohadeseh Arabhalvaei[1], Marjan Bahraminasab[2], Samaneh Arab[2]
1. Student Research Committee, Semnan University of Medical Sciences, Semnan, Iran
2. Department of Tissue Engineering and Applied Cell Sciences, School of Medicine, Semnan University of Medical Sciences, Semnan, Iran

Background: 3D printing is a powerful tool in tissue engineering for creating complex scaffolds. Indirect 3D printing enables the use of materials, which are difficult to directly print by forming a temporary mold, later filled with scaffold substances. This study employed indirect 3D printing to fabricate tragacanth-hydroxyapatite (TG/HA) scaffolds with improved mechanical and biological properties for bone regeneration.
Methods: TG/HA scaffolds were fabricated with indirect 3D printing followed by freeze-drying and characterized using different techniques including, Fourier transform infrared spectroscopy (FTIR), and scanning electron microscopy (SEM) were used to study the chemical composition and surface morphology. Physicochemical (biodegradability and porosity) and mechanical properties were also evaluated. A design of experiment (DOE) approach was applied to optimize the scaffold composition and determine the ideal TG/HA ratio based on the obtained properties.
Results: FTIR analysis revealed distinct characteristic peaks corresponding to both TG and HA. Based on the optimization, the scaffold formulation with %16.5 HA and %1.5 TG was selected as optimal, considering maximizing mechanical strength while maintaining appropriate porosity. The optimal scaffold porosity was found to be ±%76 0.03, with an average macropore size of ±727.35 131.25 µm. The in vitro degradation study revealed that scaffold degraded by about %60 within 32 days. The mechanical properties of the scaffold were characterized by an elasticity modulus (E) of 8.1 ± 0.61 kPa and an ultimate compressive strength (UCS) of 170 ± 2.05 kPa.
Conclusion: The fabricated TG/HA scaffolds demonstrated enhanced mechanical strength and biological properties, showing potential for effective bone tissue regeneration.
Keywords: Indirect 3D Printing, Bone Tissue Regeneration, Tragacanth, Hydroxyapatite

P818, Study of the effective duration of helium cold plasma on the healing of diabetic-induced wounds in rats

Mohammadreza Attarnosrati[1]
1. Department of Veterinary Medicine, Faculty of Veterinary and Agricultural, Shabestar Branch Islamic Azad University, Shabestar, Iran

Background: In recent years, the effect of cold plasma on skin wound healing has been known. In this study, the use of helium cold plasma (HCP) for 0, 30, and 60 seconds per day in the treatment of diabetic wound in rats was investigated.
Methods: Thirty adult male Wistar rats that were diabetic by streptozotocin injection were equally divided into three groups, rats received HCP for 0, 30, and 60 seconds per day, respectively. Wounds created with a 6 mm diameter punch were exposed to HCP for 7 days, and on days 7 and 14, the wound contraction was evaluated. On day 7, tissue sampling was performed from the wound and immunohistochemical staining was performed to assess the abundance of fibroblasts.
Results: Results showed that the highest rate of wound contraction in diabetic rats was in the group that received HCP for 60 seconds, and the lowest rate was in the control group and the highest rate of fibroblasts was observed in the group that received HCP for 60 seconds.
Conclusion: This study showed that the use of HCP for 60 seconds can have greater effects on diabetic wound healing and also has a positive effect on increasing the frequency of tissue fibroblasts in the healing area.
Keywords: Wound, Plasma, Helium, Diabetes, Duration

P819, Neural Stem Cell-Based Approaches for Glioma Treatment: Challenges and opportunities

Zahra Ghafouri[1], Arash Khorrami[2]
1. Department of Medical Biotechnology, Maragheh University of Medical Sciences, Maragheh, Iran
2. Medicinal Plants Research Center, Maragheh University of Medical Sciences, Maragheh, Iran

Background: Glioblastoma (GB) is one of the most aggressive and resistant to therapy brain cancers, primarily because to its diverse tumor microenvironment (TME) and the protective characteristics of the blood brain barrier (BBB). Neural Stem Cells (NSCs) offer multiple therapeutic strategies for GB treatment due to their tumor targeting properties, adaptability, and natural ability to migrate selectively toward tumor cells alongside their unique capability to bypass the BBB and infiltrate invasive tumor margins, enabling the targeted delivery of therapeutic agents directly into the TME.
Methods: In this study, published articles from 2022 onwards concerning the use of engineered NSCs, iNSCs, and their vesicular derivatives in preclinical models and early-phase glioma trials were searched and selected through PubMed, Scopus, and Web of Science.
Results: NSCs have been extensively researched for the administration of drugs and oncolytic viruses in glioma. By delivering antiangiogenic thrombospondin (TSP-1) to these areas, engineered NSCs can reduce angiogenesis and glioma progression, improving survival. It was discovered that MSCs and NSCs were highly attracted to malignant gliomas. NSCs have the ability to move in the direction of GBM tumors, providing a focused method of administering therapeutic treatments. Compared to the MSC-treated group, the NSC-treated mice showed considerably longer survival times.
Conclusion: NSCs have shown promise in improving drug delivery, modifying the TME, and stimulating anti-tumor immune responses, according to preclinical research. Tumor heterogeneity, species-specific immune responses, and difficulties guaranteeing long-term safety are some of the ongoing translational obstacles.
Keywords: Glioma, Neural Stem Cell, Cell-Mediated Therapy

P821, Role of the mesenchymal stem cells derived from adipose tissue in changing the rate of breast cancer cell proliferation and autophagy, in vitro and in vivo

Maryam Adelipour[1], Abdolamir Allameh[2], Abdolkarim Sheikhi[3], Mina Ranjbaran[4], Mahshid Naghashpour[5], Sahar Golabi[6]

1. Department of Clinical Biochemistry, Faculty of Medicine, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
2. Department of Clinical Biochemistry, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran
3. Department of Immunology, Faculty of Medicine, Dezful University of Medical Sciences, Dezful, Iran
4. Department of Physiology, Faculty of Medicine, Tehran University of Medical Sciences, Tehran, Iran
5. Department of Nutrition, School of Medicine, Abadan University of Medical Science, Abadan, Iran
6. Department of Physiology, School of Medicine, Abadan University of Medical Science, Abadan, Iran

Background: Autophagy is an intracellular degradation system of damaged proteins and organelles; however, the role of autophagy in the progression of cancer remains unclear. In recent years, mesenchymal stem cell (MSC)-based approaches have attracted considerable attention for anti-cancer therapy. The present study aimed to examine the interaction of MSCs with the breast cancer cells under autophagy-induced conditions.

Methods: In this study, MSCs isolated from human adipose tissue were co-cultured with MDA-MB 231, a breast cancer cell line, and the autophagy process was induced by tunicamycin treatment. The cell viability was monitored by the MTT assay, and the cells were recovered at different time intervals (24 or 48 hours) to determine autophagy markers such as Beclin, mTOR and the ratio of LC3II/I expression. Additionally, the animal study was conducted using a mouse model of breast cancer treated with isogenic adipose-derived MSCs, and the expression of Beclin and Ki67 was determined using immunohistochemistry in breast tumor tissue.

Results: In cancer cells co-cultured with MSCs, the cell proliferation was increased, the Beclin expression and the LC3II/I protein ratio were decreased, and the mTOR expression was increased in MDA-MB 231 upon co-cultured with MSCs. Direct injection of MSCs to a mouse model of breast cancer showed an increase in tumor volume, an increase in the accumulation of Ki67 and a decrease in the Beclin expression in tumor tissues.

Conclusion: The data may suggest that suppressed autophagy in breast cancer cells is probably a mechanism by which MSCs can induce cancer cell proliferation.

Keywords: Biomarker, Carcinoma, Cell Growth, Cell Therapy, Molecular Pathway

P822, Neuroprotective Mechanisms of Umbilical Cord Stem Cell Medium in Cerebral Ischemia: A systematic review

Zohreh Lamoochi[1], Alireza Sarkaki[2], Yaghoub Farbood[1], Parisa Arvin[3]
1. Department of Physiology, Persian Gulf Physiology Research Center, School of Medicine, Medical Basic Sciences Research Institute, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
2. Department of Physiology, Medicine faculty, Ahvaz Islamic Azad University, Ahvaz, Iran
3. Department of Nursing, Boroujerd School of Nursing, Lorestan University of medical Sciences, Khorramabad, Iran

Background: Cerebral ischemia-reperfusion (I/R) injury induces oxidative stress, neuroinflammation, and apoptosis, resulting in cognitive deficits and neuronal loss. Recent studies highlight the therapeutic potential of human umbilical cord mesenchymal stem cell-derived culture medium (hUC-MSC-CM) as a cell-free neuroprotective approach. This systematic review evaluates preclinical research on how hUC-MSC-CM mitigates memory impairment and neuronal damage following I/R by modulating key signaling pathways including Nrf2/HO-1, NF-κB, and NLRP3.
Methods: Published articles were identified using the following five English databases on 16 March 2025: PubMed, Scopus, Web of Science and Google Scholar. Eligible studies were those that investigated the neuroprotective effects of human umbilical cord mesenchymal stem cell-derived culture medium (hUC-MSC-CM)) in cerebral ischemia-reperfusion injury, focusing on mechanisms related to oxidative stress and regulation of inflammation.
Results: Findings reveal that hUC-MSC-CM strongly activates the Nrf2/HO-1 pathway, enhancing nuclear translocation of Nrf2 and upregulating HO-1 and antioxidant enzymes. This reduces reactive oxygen species (ROS) accumulation and restores mitochondrial function, thereby alleviating oxidative neuronal injury. Simultaneously, hUC-MSC-CM inhibits NF-κB signaling by preventing IκBα phosphorylation and NF-κB p65 nuclear translocation, which lowers pro-inflammatory cytokine expression such as TNF-α and IL-1β. Additionally, it suppresses NLRP3 inflammasome activation, preventing caspase-1-mediated pyroptosis and further reducing neuroinflammation.
Conclusion: Several lines of studies confirm that inhibiting Nrf2 or NLRP3 and oxidative damage prevention reverse cerebral I/R compacts. This integrated antioxidant, anti-inflammatory, and anti-apoptotic mechanism highlights the promise of hUC-MSC-CM as a novel therapy for cerebral I/R injury. Nonetheless, further clinical trials are needed to validate its safety and efficacy.
Keywords: Umbilical cord stem cell, Cerebral ischemia-reperfusion, Neuroprotection, Oxidative stress, Inflammation.

P823, Application of dental pulp stem cell-derived miRNA-exosomes in regenerative medicine

Mahtab Mottaghi[1], Nooshin Mohtasham[2]
1. Dental Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
2. Oral and Maxillofacial Diseases Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Human dental pulp stem cells (hDPSCs) are a type of mesenchymal stem cell and a potential resource in regenerative medicine due to their multiple differentiation into osteogenic, odontogenic, adipogenic, chondrogenic, and neurogenic cells. HDPSCs secrete exosomes that guide immune regulation and intercellular communication and contain a variety of bioactive molecules, especially miRNAs. MiRNAs are small, non-coding RNAs that post-transcriptionally inhibit or degrade target RNAs and affect gene expression. These miRNA-derived exosomes play crucial roles in regeneration by stem cell pluripotency.
Methods: We searched PubMed, Scopus, and Web of Science using a combination of keywords, including “Stem Cells”, “Dental Pulp”, “Mesenchymal Stem Cells”, “Regenerative Medicine”, and “MicroRNAs”.
Results: Recent studies based on high-throughput analysis revealed that the profile of miRNAs’ expression changed in the differentiation process of DPSCs. In the mentioned process, the thirty most significant pathways play key roles, such as MAPK, PI3K-Akt, and FoxO. In addition, hsa-miR-5-140p, hsa-miR-143 family, and hsa-miR-218 were discovered as the most frequent miRNAs repressing odontogenic/osteogenic differentiation.
Conclusion: Although hDPSCs can be easily harvested non-invasively, several challenges, such as cargo specificity, delivery efficiency, biomaterial scaffold, and cell homing strategy, need to be investigated to increase the therapeutic potential of hDPSC-derived exosomes. On the other hand, high heterogeneity among the studied miRNAs necessitates the construction of a definitive microRNA-mRNA network with comprehensive interactions. In addition, most study results are based on miRNAs and their interactions with mRNAs, while other types of RNAs, such as lncRNAs and circRNAs, should be considered in future therapeutic approaches.
Keywords: Stem Cells, Dental Pulp, Mesenchymal Stem Cells, Regenerative Medicine, MicroRNAs

P824, Clinical application of human dental pulp stem cells for regeneration of oral and maxillofacial tissues

Mahtab Mottaghi[1], Nooshin Mohtasham[2]
1. Dental Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
2. Oral and Maxillofacial Diseases Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Dental pulp stem cells (DPSCs), derived from mesenchymal stem cells, exhibit self-renewal properties and can differentiate into bone, cartilage, muscle, fat, and nerve with high proliferation rates. Recent studies have demonstrated the clinical applications of DPSCs in regenerating bone and tooth tissue, periodontal tissues, blood vessels, cartilage, corneal tissue, nerves, and temporomandibular joints.
Methods: Literature databases (ie, PubMed, Scopus, and Web of Science) were investigated by Cell- and Tissue-Based Therapy", "Regenerative Medicine", "Stem Cells", "Dental Pulp", and "Mesenchymal Stem Cells" keywords based on Medical Subject Headings (MeSH). Finally, eight articles were found from 2017 to 2025.
Results: The application of stem cells at sites of dental injury promotes the regeneration of pulp tissue with functional blood vessels and sensory nerves without causing any notable complications or adverse effects. Furthermore, stem cell-based treatments increased root elongation and decreased apical foramen width compared to control groups or alternative therapeutic approaches. In patients with alveolar clefts or traumatic bone defects, stem cell therapy demonstrated a %60 treatment efficacy compared to controls. Notably, it reported a %100 success rate in early-stage bone formation and accelerated wound healing when bone marrow aspirate was utilized in individuals with maxillofacial skeletal defects. Additionally, significant improvements in both the size of the bone-deficient area and bone mineral density were recorded following stem cell implantation at implant sites.
Conclusion: Stem cell therapy represents a highly promising approach in oral regenerative medicine. It enables the formation of new bone and dental tissue with minimal risk of side effects or complications.
Keywords: Cell- and Tissue-Based Therapy, Regenerative Medicine, Stem Cells, Dental Pulp, Mesenchymal Stem Cells

P825, Evaluation of adipose-derived mesenchymal stem cells and their exosomes for restoring ovarian function in a doxorubicin-induced rat model

Danial Mahrooghi[1]
1. Student Research Committee, Tabriz University of Medical Sciences, Tabriz, Iran

Background: Doxorubicin (DOX), a commonly used chemotherapeutic agent, is known to induce ovarian damage and infertility in females. This study aimed to assess the therapeutic potential of adipose-derived mesenchymal stem cells (AD-MSCs) and their exosomes in restoring ovarian function in a rat model of DOX-induced ovarian failure.
Methods: Forty adult female Wistar rats (200–250 g) were randomly assigned to four groups: (n=10 per group) 1. Control 2. DOX-only (ovarian failure), 3. DOX + AD-MSCs, and 4. DOX + exosomes. Ovarian failure was induced by intraperitoneal injection of DOX at a dose of 5 mg/kg on days 1 and 7. On day 14, rats in treatment groups received either AD-MSCs or exosomes intraperitoneally. AD-MSCs were isolated from rat adipose tissue, cultured, and characterized by flow cytometry (positive for CD90 and negative for CD45 markers). A total of 1×10^6 AD-MSCs in 200 µL PBS was injected. In the exosome group, 50 µg of isolated exosomes from the conditioned medium of AD-MSC cultures was administered. On day 28, rats were sacrificed. Ovaries were harvested for histological analysis, RT-qPCR for Bax and Bcl-2 gene expression, and serum hormone measurements (estradiol and FSH).
Results: Histological analysis showed significant improvement in follicular structure and number of growing follicles in both treatment groups compared to the DOX-only group ($p<0.05$). Expression of the pro-apoptotic gene Bax was significantly downregulated, while the anti-apoptotic gene Bcl-2 was upregulated in both AD-MSC and exosome-treated groups versus the DOX group ($p<0.01$). Serum estradiol levels were significantly increased, and FSH levels decreased in treated animals compared to untreated DOX rats ($p<0.05$). There was no significant difference between the AD-MSC and exosome groups.
Conclusion: Both AD-MSCs and their derived exosomes demonstrated protective and regenerative effects on DOX-induced ovarian damage in rats, likely through anti-apoptotic mechanisms. Exosomes may offer a promising cell-free alternative to stem cell therapy for preserving or restoring fertility after chemotherapy.
Keywords: Doxorubicin, AD-MSC, Exosomes, Ovarian Failure, Apoptosis, Rat Model, Infertility

P826, Protective effect of hydrogen rich water on obesity and statin- induced hepatic complications in a high-fat diet-induced obesity in rats

Seyedeh Elnaz Nazari[1,3], Akram Aminian[1], Mahsa Attarian[2], Seyyedeh Zahra Asghari[1], Mohammadhossein Rigi[1], Khatereh Kharazmi[1], Fereshteh Asgharzadeh[1,3], Mohammad Saroughi[1], Majid Khazaei[1,3]

1. Department of Medical Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Medical Biochemistry, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Metabolic Syndrome Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Obesity is a major prevalent risk factor for developing lipid metabolism disorders. Statins as the most widely used drugs are applied for the management of lipid imbalance abnormalities. However, these drugs may lead to some adverse events such as renal and hepatic dysfunctions. This study aimed to determine the therapeutic value of Hydrogen rich water (HRW) in better management of hepatic metabolic disruptions induced by a high fat diet (HFD) in rats.
Methods: Male Wistar Albino rats were organized into seven groups: control (normal chow), HFD (%45), Rosuvastatin high dose (RHD), Rosuvastatin low dose (RLD), HRW alone, RHD + HRW, and RLD + HRW. After induction of obesity in the sixth week, rats were orally administered HRW (1.5 mM/L H2), Rosuvastatin (10 and 5 mg/kg), or their combination daily for another 10 weeks.
Results: The HFD group had a significant increase in lipid profiles (total cholesterol (TC), triglyceride (TG), low-density lipoprotein (LDL)) and a decrease in high-density lipoprotein (HDL) concentration compared to the normal group. A decrease in hepatic anti-oxidants (Total thiol level and superoxide dismutase (SOD) activity) along with an increase in malondialdehyde (MDA) concentration, ALT, AST enzymes activities, and hepatic steatosis (lipid droplet accumulation), inflammation, and fibrosis was observed in the HFD group compared to the normal group. Treatment with HRW significantly improved lipid profile, oxidant/antioxidant balance, and hepatic abnormalities compared to the HFD group.
Conclusion: Anti-inflammatory and anti-oxidant characteristics of HRW can effectively contribute to lowering obesity and statin- related hepatic disfunctions.
Keywords: Obesity, Statin, Hydrogen, Inflammation, Oxidative Stress.

P827, Synthesis and characterization of composite scaffold containing bioactive ceramic for bone tissue engineering applications

Samira Nokhasteh[1], Hengameh Dortaj[1]
1. Tissue Engineering Research Group (TERG), Department of Anatomy and Cell Biology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Bone is the second most commonly transplanted tissue all over the world. However, there are some limitations for current treatments. Bone tissue engineering is a promising solution for existing treatment challenges. Scaffolds are considered the most important part of bone tissue engineering used for repair or regenerate new functional bone tissues. Bone scaffolds are specially designed in three dimensional (3D) and porous to promote bone cell growth, expansion, and migration on their surface to stimulate bone formation.
Methods: In the current study, fabricating of three-dimensional porous scaffolds for bone tissue engineering was investigated through freeze drying technique. Porous nanocomposites consist of HA nano powders as the main component of scaffolds which synthesized using the sol-gel method. In order to simulate bone tissue, microbiological gelatin which cross linked by EDC (N-(3-dimethyl amino propyl)-N'-ethyl carbodiimide hydrochloride) solution was used as the polymer phase, similar to the proportions found in natural bone. Also, various ratios of functionalized carbon nanotube were considered to enhance mechanical strength.
Results: Fourier transform infrared spectroscopy (FTIR) and Scanning electron microscopy (SEM) images revealed uniform distribution of hydroxyapatite and functionalized multi-walled CNTs (*f*-MWCNTs) in gelatin matrix with interconnected porosity and evaluated appropriate compressive strength.
Conclusion: We have developed a novel composite scaffold which can mimic the structure of bone extracellular matrix with suitable properties. Also, the utilized methodology to synthesis scaffold was simple and affordable. It also has eliminated the need use toxic solvents.
Keywords: Bone Tissue Engineering, Scaffolds, Mechanical Properties, Hydroxyapatite, Freeze Drying

P828, An overview to using the zebra finch model to study neurogenesis and recovery after stroke: Possible implications for regenerative medicine

Mojtaba Vatandoost[1], Sajjad Ghorbani Disfani[1], Omid Behrouzi Nasab[2]
1. Faculty of Veterinary Medicine, Ferdowsi University of Mashhad, Mashhad, Iran
2. Department of Clinical Sciences, Faculty of Veterinary Medicine, Ferdowsi University of Mashhad, Mashhad, Iran

Background: The zebra finch (Taeniopygia guttata) is one of the most widely accepted models in neuroscience for studying neural plasticity and angiogenesis. Its consistent song behavior provides a measurable indicator of brain function and recovery.
Methods: This review summarizes findings on neurogenesis and plasticity in zebra finches to explore their relevance for improving stroke recovery in humans. To write this article, the last 15 years of research in the field of neurogenesis has been reviewed.
Results: Adult neurogenesis is observed in key regions like the High Vocal Center (HVC) and Area X after brain injury. New neuron recruitment is activity-dependent, sensitive to environmental stimulation, and behavioral flexibility. Hearing altered versions of their own song enhances this plasticity. Damage like HVC lesions or syrinx paralysis results in increased neuron recruitment, and recovery is directly proportional to neuron incorporation. It has been found that these neurons fix and strengthen circuits without compromising stability, an outcome suggested by computational models as well. Perineuronal nets (PNNs) which stabilize neural connections across time, limit plasticity. Removal of PNNs could hasten recovery. Recovery is modulated further by: CBD: Medium to high doses enhance recovery.THC: Potentiates CBD at low concentration but depresses at higher concentration. Estrogen: Levels rise after injury, with anti-inflammatory and trophic effects. Steroids: Levels rise locally post-injury, to facilitate repair.
Conclusion: Studies using zebra finches further indicate that stroke rehabilitation might be improved through activity-based therapies, pharmacological agents, anti-inflammatory treatments, and timely intervention.
Keywords: Zebra Finch; Neurogenesis; Plasticity; Stroke Recovery; PNNs

P829, Effects of human umbilical cord blood-derived serum on the culture of adipose-derived stem cells

Shayan Vafaei[1]
1. Department of Anatomy and Cell Biology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: The human umbilical cord blood (hUCB) is a biological residue from delivery that is rich in growth factors and can be used as an in-vitro medium supplement, as a successor to fetal bovine serum (FBS).
Methods: hUCS were extracted from the maternal part of umbilical cord blood and added to the medium in 1%, 2%, and 10% concentrations. Adipose-derived stem cells viability (by MTT assay), migration (by scratch test), and differentiation ability to adipose and osteon were measured.
Results: Cell viability changes were not significant between groups. In the 1%serum group, osteogenic differentiation is increased compared to 2%serum ($p<0.05$); and adipogenic differentiation is increased compared to 10%serum and FBS groups ($p<0.05$). After 6h, the migration rate is increased in the group that received 10% serum compared to all other groups; as well, it increased in 2%serum compared to the FBS group ($p<0.05$). The migration rate after 12h is increased in the 10%serum compared to the 1%serum and FBS groups. As well, it increased in 2%serum compared to the FBS and 1% serum groups ($p<0.05$). The wound closed after 24h in all groups except the 1%serum, which closed in 36h.
Conclusion: hUCS has no negative impact on cell viability; additionally, its low concentration increased differentiation, while higher concentrations increased migration. Considering previous studies, it seems that hUCS is a good candidate for FBS replacement to reduce costs and FBS limitations, such as viral transmission and immune stimulation in cell therapy.
Keywords: FBS, Umbilical Cord Blood, Serum, Cell Differentiation, Adipose Derived Mesenchymal Stem Cell

P830, The Impact of the decellularized implant on the histopathology and functions of the recipient's liver

Atefe Yaghoubi[1], Negar Azarpira[2], Zahra Vojdani[1], Sajad Daneshi[3], Saeed Karbalay-Doust[3], Tahereh Talaei-Khozani[1,3]

1. Anatomy Department, Tissue Engineering Lab, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran
2. Pothology Department, Transplantation Research Center, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran
3. Anatomy Department, Histomorphometry and Stereology Research Center, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran

Background: Decellularized livers could provide an environment for liver-specific cell migration and can be a cell or drug delivery vehicle. Synthetic glucocorticoids can be loaded on the decellularized liver to induce hepatocyte differentiation and development. Although decellularized scaffolds provide a promising approach for liver regeneration, their transplantation to the partial hepatectomized liver may have a detrimental impact on the recipients' liver function. This study investigated the impact of the transplanted decellularized liver with/without prednisolone preloading on liver histopathology and functions.
Methods: Decellularized rat liver scaffolds were prepared by the perfusion method. After scaffold characterization, they were grafted to partially hepatectomized rats in prednisolone-free and -loaded groups. After 2 and 4 weeks, the liver and grafts were removed and evaluated by Periodic acid Schiff staining and immunohistochemistry. Serological assessments were also performed on blood sera and compared with the untreated control. The data were analyzed by ANOVA and LSD.
Results: Both grafts were invaded by hepatocytes. No histopathological symptom was detected in the recipients' liver; however, oval cells were observed within the epithelium of the bile duct and in the surrounding connective tissue. No significant variation was observed in the levels of alkaline phosphatase (ALP), but the levels of albumin and total protein were significantly reduced in both groups that received the grafts after two weeks; however, after four weeks, total protein and albumin reached the average level.
Conclusion: Decellularized liver transplantation with/without the drug is safe enough for liver recipients to be considered a promising technique in regenerative medicine.
Keywords: Regenerative Medicine; Liver; Prednisolone; Decellularization

P831, A cost-effective and physiologically reliable home-made YNB medium for controlled cultivation of pichia pastoris GS115

Faezeh Sabet Birjandi[1], Mohammad Javad Farhangi[2], Behnam Rafei[3], Ghazale Laliani[1], Elham Khosravi[1], Kiarash Ghazvini[1]

1. Antimicrobial Resistance Research Center, Mashhad University of Medical Sciences, Mashhad, Iran, Department of Microbiology and Virology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Biology, Faculty of Basic Sciences, Islamic Azad University of Mashhad, Mashhad, Iran
3. Department of Animal Science, College of Agriculture, Ferdowsi University of Mashhad, Mashhad, Iran

Background: Defined culture media are fundamental for regulating microbial physiology and ensuring reproducible outcomes in pharmacological and biotechnological studies. Yeast Nitrogen Base (YNB) is widely used for cultivating Pichia pastoris due to its chemically controlled composition and relevance in recombinant peptide–related research. However, the limited availability and high cost of commercial YNB preparations present challenges for routine laboratory use. Developing a laboratory-prepared YNB medium offers a practical and accessible alternative while maintaining the physiological reliability required for experimental work.

Methods: A home-made YNB medium was formulated using analytical-grade mineral salts, a defined nitrogen source, trace elements, and a standardized vitamin mixture following the chemical specifications reported by commercial suppliers. To evaluate the performance of this formulation, Pichia pastoris GS115 carrying a TP4-related expression construct was used as the experimental model. A TP4-related GS115 cultivation setup was applied as a controlled model to assess the growth-supporting performance of the home-made medium. The strain was grown under identical conditions in three Minimal Dextrose (MD) media: MD supplemented with commercial YNB, MD prepared with the home-made YNB, and MD lacking YNB as a nutritional control. Equal inoculum densities and standardized incubation conditions were used across all groups to ensure comparability.

Results: Growth of the GS115–TP4 model strain was observed in both media containing YNB, with the home-made YNB supporting stable and reproducible growth, although biomass accumulation was moderately lower than in the commercial formulation. As expected for a defined nutritional system, no detectable growth occurred in the MD medium lacking YNB, confirming that the presence of YNB components is essential for supporting cell viability and basic metabolic activity in Pichia pastoris GS115.

Conclusion: The home-made YNB medium offers a cost-effective and physiologically reliable alternative to commercial YNB. Its ability to maintain stable growth of Pichia pastoris GS115 under conditions commonly used in peptide-related studies demonstrates its suitability for controlled cultivation in physiological, pharmacological, and recombinant research settings.

Keywords: Pichia Pastoris, TP4, Yeast Nitrogen Base (YNB), Home-made.

P832, Exosome-integrated therapeutic hydrogels in chronic diabetic wound repair: Therapeutic variations based on exosome origin, loading approaches, and translational constraints

Fatemeh Nikmehr[1], Hossein Kamali[2]
1. Department of medical nanotechnology, School of advanced technologies in medicine, Tehran University of medical sciences, Tehran, Iran
2. Department of Pharmaceutical Nanotechnology, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Chronic wounds in diabetic patients remain a persistent clinical challenge due to ongoing inflammation, recurrent infection, and impaired tissue repair. Recently, exosome-integrated hydrogels have gained increasing attention as therapeutic platforms because of their biocompatibility, controlled release, and ability to modulate the wound microenvironment. Their therapeutic success depends on the biological source of exosomes, methods of incorporation, and translational feasibility.
Methods: A systematic literature search was conducted in PubMed, Scopus, and Web of Science for studies published after January 2024. Only original preclinical and experimental studies evaluating exosome-loaded hydrogels for diabetic wound healing were included. Extracted data were analyzed based on exosome origin mesenchymal stromal cells, endothelial cells, or macrophages hydrogel design (injectable, sprayable, or crosslinked), and translational challenges reported by each study.
Results: Hydrogels containing mesenchymal stromal cell–derived exosomes showed the most consistent regenerative effects by accelerating wound closure, stimulating angiogenesis, and promoting anti-inflammatory macrophage polarization. Exosomes from macrophages mainly acted through immunomodulatory mechanisms, whereas endothelial-cell exosomes enhanced neovascularization and reduced oxidative stress. Advanced hydrogel designs, such as decellularized dermal matrix crosslinking and multi-stage release systems, further improved exosome delivery and bioactivity.
Conclusion: Exosome-enriched hydrogels represent a promising therapeutic strategy for chronic diabetic wound repair by simultaneously modulating inflammation, infection, and tissue regeneration. However, large-scale exosome production, preservation, immune compatibility, and regulatory issues remain major barriers. Standardized manufacturing, optimized loading methods, and collaborative multicenter research are essential to accelerate clinical translation.
Keywords: Exosome-Loaded Hydrogel, Diabetic Wound Healing, Mesenchymal Stem Cell Exosome, Translational Barriers, Immunomodulation

P833, Exosomes: a promising strategy for overcoming the blood-brain barrier & CNS drug delivery

Mahboubeh Derakhshani[1], Fatemeh Nikkerdar[1], Maziar Erfani[1]
1. Department of Biology, Kavain Institute of Higher Education, Mashhad, Iran

Background: Delivering therapeutic agents to the brain remains one of the most challenging tasks in modern medicine due to the highly selective blood-brain barrier (BBB), which excludes more than 98% of small-molecule drugs and nearly all large molecules. While conventional nanoparticles offer promising advances, they often face limitations related to toxicity, immunogenicity, and regulatory hurdles.
Methods: This review was conducted by searching the PubMed, Scopus, Web of Science, and SID databases (2020–2025) using the keywords “exosomes”, “small extracellular vesicles (SEVs)”, “blood-brain barrier” and “drug delivery”. From 280 initial records, 48 high-quality preclinical and clinical studies were selected and analyzed.
Results: Exosomes and SEVs (30–150 nm), naturally secreted by various cell types, exhibit minimal immunogenicity, excellent biocompatibility, prolonged circulation time, and an intrinsic ability to cross the intact BBB via receptor-mediated transcytosis or intranasal administration. Surface engineering with targeting ligands such as RVG or Ang-2 peptides, combined with efficient loading of curcumin, quercetin, dopamine, siRNA, miRNA, and CRISPR/Cas9 components, has dramatically improved therapeutic outcomes in preclinical models of Alzheimer’s disease, Parkinson’s disease, glioblastoma, and ischemic stroke.
Conclusion: Exosomes represent a revolutionary, naturally derived, and engineerable platform for non-invasive CNS drug delivery. Local development and clinical translation of exosome-based therapeutics could significantly reduce dependence on imported drugs and transform the management of neurological disorders.
Keywords: Exosomes, Small Extracellular Vesicles, Blood-Brain Barrier, Brain Drug Delivery

P835, Cholinergic nicotinic receptors in the mediodorsal thalamus mediate cognitive deficits in an intracerebroventricular streptozotocin-induced mouse model of Alzheimer's disease

Shadi Montaha[1], Ladan Delphi[1], Anahita Farrokhi[1], Ameneh Rezayof[1]
1. Department of Animal Biology, School of Biology, College of Science, University of Tehran, Tehran, Iran

Background: Cholinergic deficits, amyloid-β accumulation, tau pathology, oxidative stress, and disrupted glucose metabolism are among the changes induced by intracerebroventricular (ICV) administration of streptozotocin, which is widely used as an experimental model of Alzheimer's disease. Considering the critical role of the mediodorsal thalamus (MD) and the importance of cholinergic nicotinic receptor signaling in synaptic plasticity and memory formation, this study examined the contribution of the MD nicotinic system in a streptozotocin-induced Alzheimer's disease rat model.
Methods: Adult male NMRI mice underwent stereotaxic cannulation of the ICV and the MD. ICV-STZ (3 mg/kg) was administered on days 1 and 3, and nicotine (1 µg/mouse, intra-MD) was microinjected on days 7, 10, and 13. Memory formation, locomotor activity, and emotional behaviours were assessed using the passive avoidance learning (PAL), open field test (OFT), and elevated plus maze (EPM).
Results: ICV-STZ impaired memory formation in the PAL, as reflected by reduced step-down latency. This impairment was improved by chronic microinjection of nicotine into the MD. In the open-field test, ICV-STZ decreased locomotor activity, which was partially restored following intra-MD nicotine administration. Exploratory behaviours, including rearing, grooming, and climbing, were disrupted by STZ but unaffected by nicotine. In the elevated-plus maze, STZ reduced open-arm activity, while nicotine did not induce significant changes.
Conclusion: Taken together, it can be concluded that the MD cholinergic nicotinic system plays a significant role in cognitive processes disrupted by ICV-STZ and may represent a potential target for improving memory dysfunction in Alzheimer's disease.
Keywords: Streptozotocin, Mediodorsal Thalamus, Nicotinic Receptors, Mice

P837, Investigation of the effect of μ opioid receptor activation on 6-OHDA-induced cell toxicity in SH-SY5Y human neuroblastoma cells in Parkinson's disease

Shahrzad Sadat Eftekhar Vaghefi[1,2,3], Saeed Esmaeili Mahani[4], Mehdi Abbasnejad[4]
1. Department of Medicine, Ke.C., Islamic Azad University, Kerman, Iran
2. Pathology and Stem Cell Research Center, Kerman University of Medical Sciences, Kerman, Iran
3. Department of Physiology and Pharmacology, Afzalipour Faculty of Medicine, Kerman University of Medical Sciences, Kerman, Iran
4. Department of Biology, Faculty of Science, Shahid Bahonar University of Kerman, Kerman, Iran

Background: Parkinson's disease (PD) is the second most common neurodegenerative disorder after Alzheimer's disease and is characterized by the progressive loss of 50–70% of dopaminergic neurons in the substantia nigra. 6-Hydroxydopamine (6-OHDA) is widely used to induce dopaminergic toxicity in experimental models by generating severe oxidative stress, mitochondrial dysfunction, and activation of apoptotic pathways. This study investigated the protective effects of μ-opioid receptor activation against 6-OHDA–induced cytotoxicity in SH-SY5Y human neuroblastoma cells, an established in vitro model of PD.
Methods: SH-SY5Y cells were exposed to 6-OHDA, and cell viability was assessed using the MTT assay. Cytochrome c release, as a marker of mitochondrial damage and apoptosis initiation, was evaluated through immunoblotting.
Results: Treatment with various concentrations of morphine and DAMGO significantly improved cell viability, reduced cytochrome c release, and attenuated mitochondrial injury compared with 6-OHDA–treated controls.
Conclusion: These findings suggest that μ-opioid receptor activation provides neuroprotection against 6-OHDA-induced oxidative stress and apoptosis, underscoring the therapeutic potential of μ-opioid receptor agonists as treatments to mitigate dopaminergic neuronal loss and slow Parkinson's disease progression.
Keywords: μ-opioid receptor, Morphine, DAMGO, 6-hydroxydopamine, Apoptosis, SH-SY5Y cells

P838, Investigating the potential of antimicrobial compounds in indigenous bacteria of the iranian desert

Hassan Bagheri Yazdi[1], Hamed Norouzi Taheri[1], Hamidreza Vatanpour[2]
1. Department of Biology Education, Farhangian University, Tehran, Iran
2. Department of Science Education, Farhangian University, Tehran, Iran

Background: Diseases caused by drug-resistant bacteria such as methicillin-resistant Staphylococcus aureus (MRSA) are increasing in many medical centers around the world, and researchers are looking for new natural medicinal compounds to overcome and treat this bacteria. are Therefore, the current study was conducted with the aim of investigating the antimicrobial effects of native Iranian bacteria from the salt desert environment with difficult growth conditions
Methods: In this research, after sampling, the isolates were isolated, the morphology of the isolates was examined and basic biochemical tests were performed to identify the bacteria. Antimicrobial effect was investigated in two stages. First, the primary screening of the isolates in terms of antibacterial activity was done with the cross-culture method. Next, the extract of the selected active strain was isolated and dried. Antimicrobial test of extracts against drug resistant strains was performed by disk diffusion method. Each test was repeated three times and the average diameter of the growth halo was measured and recorded. At the end, the amount of antimicrobial substance production of the selected strain per unit of time was determined by disc diffusion method against MRSA.
Results: 30 strains were isolated and initially identified from the samples of salt flats. In the initial screening, 4 strains were identified as active isolates. The results of the second stage of screening of the selected isolate showed that the isolated active strain had good antimicrobial activity against methicillin-resistant Staphylococcus aureus species. The results showed that the antimicrobial activity of N2 strain increases with increasing concentration. The results also showed that the highest amount of antimicrobial substance production in terms of non-growth halo is 54 hours after the start of Fermentation, which created a non-growth halo equal to 29 mm against MRSA.
Conclusion: Considering the strong antimicrobial activity of the bacterial extract isolated from the salt bed against methicillin-resistant Staphylococcus aureus by producing, purifying, and identifying the active compounds of these isolates on an industrial scale, the possibility of introducing new antimicrobial compounds is raised.
Keywords: Antibacterial Effect, Bacterial Extract, Drug Resistance, MRSA

P840, Crocin protects against beta-amyloid peptide-induced apoptosis in PC12 cells via the PI3 K pathway

Reyhaneh Taheri[1], Elham Hadipour[2], Zahra Tayarani-Najaran[2]
1. Medical Toxicology Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
2. Targeted Drug Delivery Research Center, Pharmaceutical Technology Institute, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Crocin is a known compound with the antioxidant and anti-inflammatory properties which may help to reduce the progression of neurological disorders. In this study, we aimed to investigate the protective effects of crocin on beta-amyloid peptide Aβ (40-1) and hydrogen peroxide (H2O2) induced neurotoxicity in PC12 cells.
Methods: PC12 cells were pretreated with crocin and donepezil (5 and 10 μM) for 2 h and then treated with Aβ (40-1) (25 μM) for 24 h. In parallel, after pretreatment with crocin (5 and 10 μM) and donepezil (5 and 10 μM) for 24 h, cells were treated with H2O2 (800 μM) for 4 h. Finally, the cell viability and intracellular reactive oxygen species (ROS) generation were evaluated using Alamar-Blue® and 2', 7'-dichlorodihydrofluorescein diacetate (DCFH-DA), respectively. The western blot test was done to compare the protein level of phospho SAPK/JNK, SAPK/JNK, PI3 Kinase P85, Phospho-PI3 Kinase P85, caspase-3 and cytochrome c (cyt c).
Results: Crocin and donepezil could significantly decrease the Aβ toxicity and ROS level. While treatment with Aβ increased Cyt c release from mitochondria to cytosol, cleaved form of caspase-3 (17 kDa) and activated form of SAPK/JNK p4/44, it decreased the activated form of PI3 Kinase P85 protein, indicating that crocin could significantly block the apoptosis initiated with Aβ.
Conclusion: According to the results, crocin could be a promising candidate for further evaluations against the development of Alzheimer's disease through mitogen-activated protein kinases (MAPK) and the phosphatidylinositol 3-kinase (PI3K)/protein kinase B (AKT) signaling (PI3 K/AKT) pathways.
Keywords: Alzheimer's Disease, Beta-Amyloid, Crocin, Hydrogen Peroxide, Donepezil

P841, Temporal dynamics of changes in MAPK signaling in response to endoplasmic reticulum stress induced by thapsigargin

Sahar Askari[1], Pegah Javadpour Nari[2], Rasoul Ghasemi[3]
1. Department of Physiology, School of Medicine, Iran University of Medical Sciences, Tehran, Iran
2. Neuroscience Research Center, Institute of Neuroscience and Cognition, Shahid Beheshti University of Medical Sciences, Tehran, Iran
3. Department of Physiology, School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: Endoplasmic reticulum (ER) stress, caused by accumulation of misfolded proteins, plays a key role in central nervous system (CNS) pathophysiology by inducing inflammation and apoptosis. These effects occur through unfolded protein response (UPR) sensors or modulation of mitogen-activated protein kinase (MAPK) pathways—JNK, ERK, and p38. Initially, UPR attempts to restore homeostasis, but under prolonged stress, protective mechanisms fail, leading to cell death. Understanding temporal MAPK activity during ER stress is therefore essential. This study investigated how thapsigargin (TG), a well-known ER stress inducer, affects MAPK signaling and cell viability in PC12 cells over time.
Methods: PC12 cells were exposed to TG for 3, 6, and 24 hours at varying concentrations. Cell viability was determined using the MTT assay to establish the cytotoxic dose. MAPK inhibitors—SP600125 (JNK), PD98059 (ERK), and PD169316/SB203580 (p38)—were then applied alongside TG to evaluate pathway contributions across time points.
Results: The cytotoxic concentration of TG (250 nM) reduced cell viability in a time-dependent manner. ERK and JNK inhibition further decreased cell viability, while p38 inhibition improved survival. These findings highlight distinct, time-dependent roles of MAPKs in ER stress responses.
Conclusion: ER stress-induced cell death is closely linked to temporal changes in MAPK activity. JNK and ERK inhibition exacerbate, while p38 inhibition alleviates, TG-induced toxicity. Our results suggest that MAPK pathways act within a time-integrated threshold that governs cellular fate under ER stress, offering potential targets for therapeutic intervention.
Keywords: Endoplasmic Reticulum Stress, Thapsigargin, Mitogen-Activated Protein Kinase, Cell Culture, MAPK inhibitors

P842, Impact of resistance exercise on cerebellar BDNF and CREB gene expression in male rats exposed to electromagnetic fields

Asma Karimzadeh[1], Shiva Khezri[1], Seyed Mehdi Banan khojasteh[2], Homeira Hatami[2]
1. Department of Biology, Faculty of Basic Sciences, Urmia University, Urmia, Iran
2. Department of Animal Biology, Faculty of Natural Sciences, Tabriz University, Tabriz, Iran

Background: Electromagnetic fields (EMF) can influence neuronal plasticity by affecting the expression of genes such as Brain-Derived Neurotrophic Factor (BDNF) and cAMP Response Element-Binding Protein (CREB). This study aimed to investigate whether resistance exercise could modulate the expression of cerebellar BDNF and CREB in rats exposed to 900 MHz EMF.
Methods: Forty-two male Wistar rats were randomly assigned to six groups: a control group, a resistance exercise group, a 7-day EMF exposure group, a 14-day EMF exposure group, and two combined EMF and exercise groups. Resistance exercise was performed using a ladder-climbing protocol, while EMF exposure involved daily exposure to 900 MHz radiation. The expression levels of cerebellar BDNF and CREB genes were quantified using real-time PCR. Data were analyzed using Two-Way ANOVA followed by Tukey's post hoc test ($p < 0.05$).
Results: The 14-day EMF exposure significantly reduced the expression of BDNF and CREB compared to the shorter EMF exposure and exercise groups. Resistance exercise alone increased BDNF expression, and in combination with EMF exposure, it resulted in the highest levels of BDNF. Additionally, CREB expression remained elevated in the exercise groups despite EMF exposure, suggesting a protective effect.
Conclusion: EMF exposure leads to duration-dependent reductions in cerebellar BDNF and CREB expression, while resistance exercise effectively counteracts these molecular disruptions. These findings indicate that resistance exercise may serve as a protective strategy against EMF-induced alterations in genes associated with neuroplasticity.
Keywords: Electromagnetic Fields, Resistance Exercise, Cerebellum, Rota-Rod Test

P844, conditioned medium from Wharton's jelly MSCs improves diabetic testicular and sperm damage by reducing oxidative stress, apoptosis, and inflammation

Mojtaba Sargazi[1], Narges Karbalaei[1,2], Saied Karbalay-Doust[2, 3]
1. Department of Physiology, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran
2. Histomorphometry and Stereology Research Center, Shiraz University of Medical Sciences, Shiraz, Iran
3. Department of Anatomy, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran

Background: Diabetes mellitus detrimentally affects male reproductive function through mechanisms such as insulin deficiency, hyperglycemia, impaired glucose metabolism in Sertoli cells and sperm, oxidative stress, inflammation, and apoptosis, leading to reduced spermatogenesis and testicular damage.
This study evaluates the effects of Wharton's Jelly Mesenchymal Stem Cell-Conditioned Medium (WJMSCs-CM), enriched with bioactive factors, on sperm parameters, hormonal balance, oxidative-inflammatory status, and testicular histopathology in streptozotocin-induced diabetic rats.
Methods: Fifty-six male Sprague-Dawley rats were randomized into eight groups: control, diabetic, and six treatment groups receiving early or late administration of WJMSCs-CM, insulin, or DMEM. Treatments lasted 30 or 60 days. Assessments included blood glucose, insulin, sperm quality, reproductive hormones, oxidative stress markers (GPx, SOD, CAT, MDA, GSH), testicular histopathology, and gene expression of Bax, Bcl-2, and TNF-α.
Results: Treatment with WJMSCs-CM significantly reduced hyperglycemia, increased insulin and sex hormone levels, and improved sperm quality. Oxidative stress markers improved via decreased MDA and elevated GSH and antioxidant enzymes. WJMSCs-CM also reduced the pro-apoptotic ratio and TNF-α expression, enhancing regeneration of spermatogenic, Sertoli, and Leydig cells.
Conclusion: WJMSCs-CM effectively mitigates diabetes-induced reproductive dysfunction, with early intervention showing greater therapeutic efficacy compared to delayed treatment.
Keywords: Stem Cell, Conditioned Medium, Diabetes, Sperm Parameters, Oxidative Stress

P845, Bourgeonal and its role in human sperm chemotaxis

Arefeh Gholamhosseini[1]
1. Master of Anatomical Sciences, Abadan University of Medical Sciences, Iran

Background: Bourgeonal is an aromatic aldehyde with the chemical formula $C_{11}H_{12}O$ and is recognized as a specific agonist of the human olfactory receptor OR1D2, which is expressed on the surface of human sperm cells. This receptor belongs to the family of G protein-coupled receptors (GPCRs), a large and diverse group of membrane proteins responsible for transmitting extracellular signals into intracellular responses. OR1D2 plays a pivotal role in sperm chemotaxis, the directed movement of sperm towards chemical cues released by the female reproductive tract, facilitating sperm navigation to the oocyte for successful fertilization. Upon binding to OR1D2, Bourgeonal activates intracellular cyclic adenosine monophosphate (cAMP)-dependent signaling pathways. This activation leads to the opening of voltage-sensitive ion channels, notably the CatSper channel (cation channel of sperm), which is essential for calcium ion influx into the sperm cytoplasm. The resulting increase in intracellular calcium concentration enhances sperm motility by promoting hyperactivation—a vigorous and asymmetric flagellar beating pattern—and guides spermatozoa towards the source of the chemical signal, thereby increasing the likelihood of encountering the oocyte.
Methods: Functional studies employing fluorescence calcium imaging and fluorimetric assays have demonstrated that Bourgeonal induces dose-dependent calcium influx in human spermatozoa. The specificity of this response is confirmed by the inhibition of calcium signals upon application of OR1D2 antagonists, adenylate cyclase inhibitors, and CatSper blockers. These findings highlight the direct role of OR1D2 and associated intracellular pathways in mediating sperm chemotactic responses. Moreover, advanced microfluidic assays simulating the in vivo microenvironment have shown that spermatozoa actively aggregate and orient themselves along the concentration gradient of Bourgeonal, demonstrating its potent chemoattractant properties. At the molecular level, activation of OR1D2 engages the olfactory G protein alpha subunit (Gα_olf), which stimulates adenylate cyclase type III, resulting in increased intracellular cAMP production. This second messenger triggers downstream effectors, potentially including protein kinase A (PKA), which modulate cytoskeletal dynamics and flagellar motility. However, emerging evidence suggests that cAMP may also activate the CatSper channel through PKA-independent pathways, implicating a complex regulatory mechanism requiring further biochemical elucidation. Beyond its role as a chemotactic agent, Bourgeonal serves as an invaluable research tool in reproductive biology. It provides a controllable and reproducible stimulus to investigate the olfactory sensory mechanisms of human sperm, particularly the function of OR1D2 and CatSper channels. In assisted reproductive technologies (ART), such as in vitro fertilization (IVF), Bourgeonal has been proposed as a functional marker to select sperm with optimal chemotactic responsiveness and motility, potentially improving fertilization rates and clinical outcomes. Conversely, diminished or absent sperm responses to Bourgeonal may indicate defects in sperm signaling pathways and serve as a biomarker for male infertility.
Results: Although Bourgeonal itself is not naturally present in the female reproductive tract, its structural similarity to endogenous ligands in female genital secretions—especially during the peri-ovulatory phase—supports the hypothesis that natural chemoattractants exist which guide sperm in vivo. Identifying these endogenous molecules and deciphering their interaction with OR1D2 remains a key objective for understanding sperm selection and fertilization processes. Furthermore, the physiological relevance of Bourgeonal analogs extends to their potential impact on sperm capacitation, acrosome reaction, and fertilization competence. Recent studies have also explored the potential immunomodulatory effects of Bourgeonal-induced signaling, suggesting that chemotactic stimuli might influence sperm interaction with the female immune environment. Understanding such crosstalk could shed light on mechanisms of immune tolerance necessary for successful fertilization and early embryo development.
Conclusion: Bourgeonal represents a powerful and versatile molecular probe in the study of human sperm chemotaxis and signal transduction. Through activation of the OR1D2 receptor and the CatSper calcium channel, Bourgeonal orchestrates sperm motility and directional movement crucial for fertilization. Continued research into the molecular regulation of this pathway may pave the way for novel diagnostic tools and therapeutic strategies targeting male infertility, as well as optimized protocols in assisted reproduction. Advances in this field hold promise for enhancing reproductive outcomes and deepening our understanding of human fertilization biology.
Keywords: Bourgeonal, fertilization, OR1D2, chemotaxis, IVF

P846, Exosomes as a therapeutic tool to promote neurorestoration and cognitive function in neurological conditions: Achieve two ends with a single effort

Solmaz Fallahi[1, 2]
1. Department of Pharmacology and Toxicology, Faculty of Pharmacy, Tabriz University of Medical Sciences, Tabriz, Iran
2. Department of Physiology, Faculty of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran

Background: Methamphetamine (METH) is a psychostimulant substance with highly addictive and neurotoxic effects, but no ideal treatment option exists to improve METH-induced neurocognitive deficits. Recently, mesenchymal stem cells (MSCs)-derived exosomes have raised many hopes for treating neurodegenerative sequela of brain disorders. This study aimed to determine the therapeutic potential of MSCs-derived exosomes on cognitive function and neurogenesis of METH-addicted rodents.
Methods: Male BALB/c mice were subjected to chronic METH addiction, followed by intravenous administration of bone marrow MSCs-derived exosomes. Then, the spatial memory and recognition memory of animals were assessed by the Barnes maze and the novel object recognition test (NORT). The neurogenesis-related factors, including NeuN and DCX, and the expression of Iba-1, a microglial activation marker, were assessed in the hippocampus by immunofluorescence staining. Also, the expression of inflammatory cytokines, including TNF-α and NF-κB, were evaluated by western blotting.
Results: The results showed that BMSCs-exosomes improved the time spent in the target quadrant and correct-to-wrong relative time in the Barnes maze. Also, NORT's discrimination index (DI) and recognition index (RI) were improved following exosome therapy. Additionally, exosome therapy significantly increased the expression of NeuN and DCX in the hippocampus while decreasing the expression of inflammatory cytokines, including TNF-α and NF-κB. Besides, BMSC-exosomes down-regulated the expression of Iba-1.
Conclusion: Our findings indicate that BMSC-exosomes mitigated METH-caused cognitive dysfunction by improving neurogenesis and inhibiting neuroinflammation in the hippocampus.
Keywords: Methamphetamine, Bone Marrow Mesenchymal Stem Cells, Exosome, Cognition, Neurogenesis

P847, Comparison of the effects of N-(1H-Indol2-Yl) phenoxybenzohydrazide-2-(Methylene) derivative and mefenamic acid on liver tissue ultrastructure and liver enzymes in three-spotted gourami (Trichogaster Trichopetrus)

Nastaran Fahiminia[1], Tahereh Naji[1], Ali Almasirad[2]
1. Department of Basic Sciences, TeMS.C., Islamic Azad University, Tehran, Iran
2. Department of Medicinal Chemistry, TeMS.C., Islamic Azad University, Tehran, Iran

Background: Nonsteroidal anti-inflammatory drugs are associated with hepatic side effects. Identifying the new compounds with improved efficacy and fewer side effects is essential. Therefore, this study compares the effects of 2-phenoxybenzohydrazide methylene (1H-indol-2-yl)-N- derivative and mefenamic acid on liver tissue and hepatic enzymes in three-spot gourami fish (Trichogaster trichopterus).
Methods: 120 three-spot gourami fish were divided into eight groups: controls, solvent, receiving 10, 20, and 30 mg/kg mefenamic acid and benzohydrazide derivative. Liver enzymes ALT, AST, and ALP were measured using a kit from Pars Azmoon. Histological changes in the liver were observed under a light microscope.
Results: Increases in AST, ALT, and ALP enzymes were more significant in the mefenamic acid groups than in the derivative groups. Results showed that the tissue disintegration, damage to hepatocytes, and cellular dissociation at higher doses of both compounds, but the severity of damage was significantly greater in the mefenamic acid group.
Conclusion: Finally, increase the AST, ALT, and ALP enzyme levels in mefenamic acid groups was greater than in benzohydrazide derivative groups. Loss of tissue integrity, damage to hepatocytes, and cell fragmentation were observed in higher doses of both groups, but the severity of the damage was much greater in the mefenamic acid groups. Therefore, the benzohydrazide derivative caused less tissue damage and is more favorable in terms of toxicity profile. In both groups, the hepatotoxicity process was dose-dependent and more toxicity was observed in higher doses, but this toxicity began with a lower dose of mefenamic acid.
Keywords: Mefenamic Acid, Benzohydrazide Derivative, Liver, Three-Spot Gourami Fish.

P849, Production of antimicrobial peptides in pichia pastoris gs115: a recombinant approach

Ghazale Laliani[1], Faezeh Sabet[1], Kiarash Ghazvini[1]
1. Department of Microbiology and Virology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Antimicrobial peptides (AMPs) have emerged as promising alternatives to conventional antibiotics because of their broad-spectrum activity and low risk of resistance development. Despite this potential, large-scale production of AMPs remains challenging. Pichia pastoris GS115 is a suitable host for recombinant AMP expression due to its strong methanol-inducible AOX1 promoter, efficient secretion pathway, and compatibility with industrial fermentation. This study focuses on producing a recombinant AMP in P. pastoris GS115 and evaluating its antimicrobial properties.
Methods: A recombinant vector containing the AMP gene under control of the AOX1 promoter and fused with an α-factor secretion signal was constructed and introduced into P. pastoris GS115. Positive transformants were screened for high expression levels. Initial cultivation in rolling bottles was performed to achieve uniform growth and adequate aeration prior to bioreactor scale-up. Fermentation parameters—including methanol concentration, induction duration, pH, and temperature—were optimized to enhance peptide expression and secretion. Following affinity chromatography purification, antimicrobial activity was assessed against Gram-positive and Gram-negative pathogens.
Results: The engineered P. pastoris strain efficiently expressed and secreted the AMP. Rolling bottle cultivation supported consistent early-stage growth, which improved further in bioreactor conditions. The final purified peptide yield exceeded initial expectations. The AMP exhibited strong antimicrobial activity with low micromolar MIC values against multiple bacterial strains and maintained stability after purification and storage.
Conclusion: These findings demonstrate that P. pastoris GS115, coupled with rolling bottle cultivation and optimized fermentation, is an effective platform for recombinant AMP production. The robust expression and confirmed antimicrobial activity highlight its potential for scalable therapeutic and industrial applications.
Keywords: Pichia Pastoris, Rolling Bottles, AMP

P850, Graft-versus-leukemia effect and immune escape after hematopoietic stem cell transplantation: Molecular insights and interventions

Amirmahdi Panzaei[1], Mobina Bagherian[1], Mahdi Moassesfar[2], Fereshteh Atabi[3]
1. Department of Laboratory Science, TeMS.C., Islamic Azad University, Tehran, Iran
2. Department of Biosciences, University of Milan, Milan, Italy
3. Department of Biochemistry and Biophysics, TeMS.C., Islamic Azad University, Tehran, Iran

Background: Allogeneic stem cell transplantation (allo-SCT) is a curative option for hematologic malignancies. Haploidentical transplantation has expanded donor access; however, graft-versus-host disease (GVHD) and relapse remain major obstacles. GVHD results from donor T cell alloactivation, while relapse stems from inadequate graft-versus-leukemia (GVL) effect. This study aims to review immune mechanisms and therapeutic strategies that balance GVHD suppression with GVL preservation.
Methods: A systematic review was conducted using PubMed, Scopus, and Web of Science, including studies from 2015 to 2025. Eligible articles included original and review studies on GVHD and GVL immunobiology and therapies. Excluded were non-human studies, case reports, and conference abstracts.
Results: GVHD is driven by donor T cells activated via host antigen-presenting cells, triggering cytokines like IFN-γ and tissue injury. Regulatory populations (Tregs, Bregs, MSCs, MDSCs) are often suppressed. GVL is mediated by cytotoxic T cells and NK cells via perforin and Fas pathways. Immunomodulatory cytokines (e.g., IL-22, IL-35) reduce GVHD without impairing GVL. Strategies such as naïve $CD4^+$ T cell depletion, CAR-T/NK transfer, regulatory dendritic cells, and inhibition of NFAT or PKC pathways have shown efficacy. Agents like bortezomib, azacitidine, and microRNA-17-92 inhibitors limit GVHD while preserving GVL activity.
Conclusion: Targeting immune pathways enables separation of GVHD from GVL, enhancing allo-SCT efficacy. Future studies should validate these strategies in clinical trials and explore biomarkers to personalize therapy.
Keywords: Graft vs Host Disease, Graft vs Leukemia Effect, Hematopoietic Stem Cell Transplantation, Immunomodulation

P852, Exosomal microRNAs in Alzheimer's disease: Emerging pathology and diagnostic potential

Elham Zare[1,3], Somaye Hesami[2,3], Hamed Ghazavi[2], Pejman Hosseinzadeh[3]
1. Department of Medical Genetics and Molecular Medicine, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of NeuroSciences, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Student Research Committee, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Alzheimer's disease (AD) is the most common form of dementia, marked by progressive neurodegeneration and complex molecular changes. Recent evidence highlights the role of exosomes, small extracellular vesicles, in mediating intercellular communication within the central nervous system. Among their contents, microRNAs (miRNAs) have emerged as key regulators of gene expression, with significant implications for AD pathogenesis. This review focuses on the role of exosomal miRNAs in processes such as amyloid-β (Aβ) metabolism, neuroinflammation, synaptic integrity, and neuronal survival.
Methods: A comprehensive literature search was performed using databases like PubMed, Scopus, and Web of Science, targeting studies published from 2015 to 2024. Keywords included "exosomes," "microRNA," "Alzheimer's disease," and "biomarkers." Both preclinical and clinical studies exploring the diagnostic and therapeutic relevance of exosomal miRNAs in AD were analyzed.
Results: Key miRNAs such as miR-29a, miR-146a, and miR-124 show altered expression in AD models and patient samples. These miRNAs are involved in regulating APP processing, tau phosphorylation, and inflammatory signaling pathways like NF-kB. Their presence in cerebrospinal fluid and blood-derived exosomes supports their potential as accessible biomarkers for early diagnosis. Additionally, functional studies demonstrate their roles in modulating neuroinflammation, synaptic maintenance, and cell survival, suggesting potential therapeutic value.
Conclusion: Exosomal miRNAs represent a promising avenue for understanding AD mechanisms, early detection, and targeted interventions. Further research is essential to validate their clinical utility and to develop effective miRNA-based therapies for slowing AD progression.
Keywords: Alzheimer's Disease, Exosomes, MicroRNAs, Biomarkers, Neuroinflammation

P853, Improvement of sensory damage and pathological changes in the sciatic nerve using C-kit positive stem cells type2 diabetic male rats

Fereshteh Vahidi Mehr[1,2], Hesam Shahabi Fard[2], Rana Keyhanmanesh[1], Fariba Ghiasi[3,2]
1. Student Research Committee, Tabriz University of Medical Sciences, Tabriz, Iran
2. Department of Physiology, Faculty of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran
3. Stem Cell Research Center, Tabriz University of Medical Sciences, Tabriz, Iran

Background: Type 2 diabetes is a chronic disease with increased blood sugar, It is often accompanied by pathological changes in the peripheral nerves and sensory - motor complications. The existing therapeutic methods are not sufficient, so the development of better therapeutic methods such as the use of stem cells is necessary. These cells can be effective in recovering sensory transmission and neural damage through a paracrine pathway and differentiation into nerve cells.
Methods: In this study,38 male Wistar rats were used, stem cells were extracted from the bone marrow of 10 animals. Twenty-eight animals were randomly divided into: control, diabetic, diabetic (C-Kit+), and diabetic (C-Kit−) groups. Type 2 diabetes was induced using a combination of a high-fat diet and streptozotocin. After diabetes confirmation, the third and fourth groups received (C-Kit+) and (C-Kit−) cells via the tail vein, Sixty days later, sensory and motor functions were assessed using hot plate and tail-flick tests for thermal sensitivity, as well as von Frey filaments for mechanical sensitivity. Additionally, the sciatic nerve tissue structure was examined for myelin sheath thickness and nerve fiber diameter.
Results: Diabetes damaged sensory transmission and sciatic nerve tissue Treatment with (+CK) and (−CK) cells improved tail, feet withdrawal delay and increased mechanical sensitivity threshold in diabetic animals. It also prevented the reduction of diameter and myelin thickness of the nervous fibers following diabetes, this effect being more pronounced in (+CK) group.
Conclusion: C-Kit Positive cells can play important therapeutic role in sensory transmission and histopathological alterations of nerve fibers following diabetes.
Keywords: C-Kit Stem Cells, Sensory Damage, Sciatic Nerve, Type2 Diabetes, Male Rat

P854, Effect of long-term nitrate administration on the mRNA expression of sialin (SLC17A5) gene in the main tissues of healthy male rats

Fatemeh Ghorbani[1], Maryam Zarkesh[2], Sajad Jeddi[1], Asghar Ghasemi[1]
1. Endocrine Physiology Research Center, Institute of Endocrine and Metabolic Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran
2.Cellular and Molecular Endocrine Research Center, Research Institute for Endocrine Molecular Biology, Research Institute for Endocrine Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Introduction: Sialin, a nitrate transporter, participates in physiological processes such as entero-salivary nitrate circulation and is associated with conditions like type 2 diabetes. The aim of this study was to investigate the effect of long-term administration of nitrate on the expression of sialin (SLC17A5) mRNA in the main tissues of rats including skeletal muscle, kidney, stomach, adipose tissue, aorta, liver, lung, pancreas, heart, brain, adrenal gland and intestine.
Methods: Rats were divided into two groups: the control group (n=6) and the nitrate-treated group (n=6). The nitrate-treated group was given drinking water 100 mg/L for a period of 6 months. At the end of the study, the levels of sialin mRNA, as well as nitrate and nitrite concentration, were determined in each of the tissues that were investigated.
Results: Nitrate decreased sialin mRNA expression in skeletal muscle (40%, P=0.032), kidney (61%, P<0.001), stomach (46%, P=0.004), and adipose tissue (57%, P=0.019). Nitrate increased nitrate in skeletal muscle (58%, P=0.049), adipose tissue (85%, P=0.002), aorta (44%, P=0.084), and liver (36%, P=0.085), and nitrite in skeletal muscle (76%, P=0.079), kidney (79%, P<0.001), stomach (68%, P=0.098), lung (95%, P=0.025), pancreas (93%, P=0.012), and heart (120%, P=0.007).
Conclusion: The decrease in sialin mRNA expression after nitrate administration in skeletal muscle, kidney, stomach, and adipose tissue represents a negative feedback mechanism; however, this effect was not observed in the liver and aorta. Nitrate may modulate Sialin gene expression in specific tissues.
Keywords: Nitric oxide, Nitrate, Gene expression, Sialin, Rat

P856, selenium mitigates the adverse effects of cyclophosphamide on testicular tissue in NMRI mice

Sepideh Ahmadi[1], Zahra Safari[1], Malek Soleimani Mehranjani[1]
1. Department of Biology, Faculty of Science, Arak University, Arak, Iran

Background: Cyclophosphamide, a chemotherapy drug, despite its numerous clinical applications, increases oxidative stress and causes damage to testicular tissue. This study evaluated the effect of selenium, a potent antioxidant, on the quality of testicular tissue in mice treated with cyclophosphamide.
Methods: Thirty-two adult NMRI male mice (36 ± 2 grams) were randomly divided into four groups: control, cyclophosphamide (100 mg/kg, once a week), selenium (1 mg/kg, every day), and cyclophosphamide + selenium and they were intraperitoneally treated for 35 days. After the dissection of the mice, the right testes were used for stereological analysis. The data were analyzed by version 26 of SPSS software using one-way ANOVA and Tukey's test and means were considered significantly different at $p<0.05$.
Results: In the cyclophosphamide group, the average volume of the testis and the volume of seminiferous tubules ($p<0.001$), as well as the volume of interstitial tissue ($p<0.01$), the length, diameter, and height of the germinal epithelium along with the thickness of the basement membrane in the seminiferous tubules ($p<0.001$), the average number of spermatogenic cells, Sertoli cells, and Leydig cells ($p<0.001$), spermatogenesis indices and Jansen score ($p<0.001$) showed a significant decrease compared to the control group. However, these parameters significantly increased in the cyclophosphamide + selenium group compared to the cyclophosphamide group.
Conclusion: Our results showed that cyclophosphamide significantly damages testicular structure in NMRI mice, due to oxidative stress. Selenium co-administration effectively reduced these adverse effects, highlighting its potential as a protective agent against cyclophosphamide-induced reproductive toxicity.
Keywords: Cyclophosphamide, Selenium, Testis, Mice

P857, The role of natural antioxidants in improving cyclophosphamide-induced nephrotoxicity: A review study

Sahar Adibinia[1], Marjan Chahardahcherik[1]
1. Department of Basic Sciences, Faculty of Veterinary Medicine, Ferdowsi University of Mashhad, Mashhad, Iran

Background: Cyclophosphamide is one of the most widely used chemotherapy drugs, which, despite its therapeutic benefits, can cause significant side effects, especially on the kidneys. Evidence suggests that natural antioxidants, especially plant polyphenols and flavonoids, can reduce renal damage caused by CP by modulating the oxidant-antioxidant pathways and reducing inflammation. This review examines the pathophysiological mechanisms and experimental findings related to the protective effects of natural antioxidants against CP nephrotoxicity.
Methods: Articles that investigated the protective effect of antioxidants against cyclophosphamide-induced renal damage were selected and analyzed.
Results: In experimental studies, CP significantly increased malondialdehyde, decreased antioxidant enzyme activity, and induced tubular necrosis and inflammatory cell infiltration. The phenolic compounds, phenylpropanoids and terpenoids present in plant extracts and essential oils such as Naringenin, Saponins, and Sesamin were able to reduce lipid peroxidation levels, restore antioxidant defense, reduce inflammatory cytokines, reduces serum creatinine and urea levels and significantly improve histological status.
Conclusion: Natural antioxidants have significant potential to reduce CP-induced nephrotoxicity by enhancing antioxidant function, inhibiting oxidative stress, and reducing tissue damage. This evidence could provide a basis for the development of complementary therapeutic strategies aimed at reducing chemotherapy-induced renal complications.
Keywords: Cyclophosphamide, Nephrotoxicity, Antioxidants, Oxidative Stress, Plant Extracts

P858, Chronic lead poisoning and kidney failure in a foundry worker with a history of gout: Case report

Sara Assadi Eydivand, Mahmoud Ghazi-Khansari
Department of Pharmacology, School of Medicine, Tehran University of Medical Sciences, Tehran, Iran

Background: Lead poisoning has been recognized by humans for centuries, although it has largely been forgotten today. Chronic lead exposure may cause nonspecific symptoms easily misdiagnosed differential diagnosis.
Methods: We present a case of a 38-year-old man with a history of gout, who developed acute kidney failure possibly secondary to chronic lead poisoning
Results: A 38-year-old male with a known history of gout, treated with daily allopurinol 100 mg, presented with complaints of persistent nausea and vomiting over the past month. He reported weakness, fatigue and anorexia. The patient has a history of occupational exposure through employment in a foundry. Initial serum creatinine was 11mg/dL. Subsequent lead level was19.2 µg/dl.
Conclusion: A notable aspect of this case was the patient's history of gout. Chronic lead exposure is known to impair renal function and increase serum uric acid levels, predisposing affected individuals to gout or exacerbating pre-existing disease. Therefore, in this context, gout may be considered a potential manifestation of chronic lead toxicity. It is recommended that patients with a known or suspected history of occupational or environmental lead exposure undergo thorough clinical evaluation, including repeated assessments and expanded diagnostic testing when necessary.
Keywords: Lead Poisoning, Chronic Kidney Disease, Occupational Exposure, Gout, Case Report.

P859, Multi-organ oxidative damage in animal with paraquat-induced intoxication are prevented by zataria multiflora and its constituent, carvacrol: Biochemical evidences

Mahla Asadi[1], Reyhaneh Khosravi[2], Sima Beigoli[1], Mohammad Hossein Eshaghi Ghalibaf [1], Hassan Safa[1], Mohammad Hossein Boskabady[1, 3]

1. Applied Biomedical Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Animal Science, Faculty of Agriculture, University of Birjand, Birjand, Iran
3. Department of Physiology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Carvacrol (Carva) and pioglitazone (Pio*)* Zataria multiflora (ZM) interact biochemically by activating the PPAR-γ receptor to modulate oxidative stress and inflammation. Both Carv and ZM exhibit synergistic effects when combined with Pio, enhancing their therapeutic potential. This study was conducted to examine the influence of ZM and Carv on multi-organ oxidative stress and inflammation induced by paraquat (PQ) inhalation in rats.

Methods: Control rats were exposed to saline and PQ (54 mg/m3), aerosols 8 times on alternating days. Different groups were administered saline, ZM, Carv, a combination of low doses of Pio with ZM or Carv, and dexamethasone (Dexa) for 16 days duration the PQ exposure period. Each group consisted of 6 rats.

Results: The study found that white blood cells (WBC) in the bronchoalveolar lavage fluid (BALF) and malondialdehyde (MDA) levels increased in the tissues of various organs. Conversely, thiol, catalase (CAT), and superoxide dismutase (SOD) values were decreased after exposure to inhaled PQ, indicating inflammation and oxidative stress (all, $p < 0.001$). However, treatment with ZM, Carv, and Pio improved these parameters, with the ZM-L + Pio-L and Carv-L + Pio-L groups showing the most significant improvement ($p < 0.05$ to $p < 0.001$).

Conclusion: The preventive effect of ZM and Carv on oxidative stress of different organs and lung inflammation were indicated. The synergistic effect between Pio and ZM or Carv, possibly acting through PPAR-γ receptors.

Keywords: Carvacrol, *Zataria Multiflora*, PPAR-γ Receptor, Paraquat, Oxidative Stress

P860, The Effects of calcium dobesilate on cisplatin-induced hepatotoxicity: antioxidative stress property

Gholamreza Bazmandegan[1], Zahra Kamiab[2], Morteza Khademalhosseini[3], Ayat Kaeidi[1], Amirmohammad Shafiee[1]

1. Physiology-Pharmacology Research Center, Research Institute of Basic Medical Sciences, Rafsanjan University of Medical Sciences, Rafsanjan, Iran
2. Department of Community Medicine, School of Medicine, Rafsanjan University of Medical Sciences, Rafsanjan, Iran
3. Department of Pathology, Rafsanjan University of Medical Sciences, Rafsanjan, Iran

Background: Cisplatin is a synthetic anticancer drug and nephrotoxicity is one of the most important side effects. Previous studies have been shown that Calcium dobesilate (CaD), as a vascular protective agent in diabetic retinopathy, has antioxidant properties. So, this study was done to evaluate the protective effects of CaD in cisplatin-induced hepatotoxicity in mice.
Methods: In this investigation, 28 mice were randomly divided into four groups including: control, cisplatin (intraperitoneal administration of 20 mg/kg cisplatin only on the first day of the experiment), Cisplatin+CaD 50 (cisplatin with oral administration of 50 mg/kg CaD) and Cisplatin+CaD 100 (cisplatin with oral administration of 100 mg/kg CaD). The treated groups received CaD by oral gavage for 4 constitutive days. On the 5th day, mice were sacrificed and levels of GSPT, SGOT and ALT as well as ALP, liver level of MDA and SOD and GPx enzyme activity (as oxidative paprmeters) were evaluated.
Results: Results showed a significant increase in the GSPT, SGOT, ALT, MDA and a significant decrease in the renal SOD and GPx activity in cisplatin treated animals. Treatment with CaD (100 mg/kg) remarkably attenuated these GSPT, SGOT, ALT and MDA levels. Also, CaD (100 mg/kg) elevated the SOD and GPx activity in the liver tissue od CP
Conclusions: Our findings showed that CaD has protective effect against cisplatin-induced hepatotoxicity, at least part, through improving the oxidative stress parameters
Keywords: Nephrotoxicity, Cisplatin, Calcium Dobesilate, Antioxidant, Mice

P861, Comparative effects of spontaneous withdrawal, methadone, and naloxone on morphine-induced toxicity in sertoli cells (TM4): An in vitro study

Nazila Pourhassanali[1], Sam Zarbakhsh[2], Hossein Miladi-Gorji[3]
1. Department of Basic Sciences, Khoy University of Medical Sciences, Khoy, Iran
2. Department of Anatomical Sciences, School of Medicine, Semnan University of Medical Sciences, Semnan, Iran
3. Department of Physiology, School of Medicine, Semnan University of Medical Sciences, Semnan, Iran

Background: Chronic exposure to morphine adversely affects testicular function by impairing both germ and somatic cells—such as Sertoli cells, probably through the activation of inflammatory, oxidative stress, and apoptotic pathways. This study aimed to assess whether the detrimental effects of morphine dependence on Sertoli (TM4) cells could be reversed by spontaneous withdrawal or treatment with methadone and/or naloxone using an in vitro model of morphine dependence.
Methods: Morphine dependence was induced in TM4 cells by gradually increasing daily doses of morphine concentrations over 10 days, followed by maintenance at 5 μM for two weeks. Morphine dependence was validated by measuring intracellular cAMP levels. After treatment with methadone, naloxone, or spontaneous withdrawal, cell viability, levels of inflammatory, oxidative, and apoptotic biomarkers, as well as glial cell line-derived neurotrophic factor (GDNF), were evaluated.
Results: Morphine dependence led to reduced cell viability and GDNF expression, alongside elevated markers of oxidative stress, inflammation, and apoptosis in TM4 cells. Both spontaneous withdrawal and naloxone treatment decreased the inflammatory and apoptotic markers. Although methadone also lowered pro-inflammatory factors, it significantly increased the cleaved/pro-caspase-3 ratio, suggesting enhanced apoptosis.
Conclusion: Morphine dependence promotes apoptosis in TM4 Sertoli cells, likely mediated by oxidative stress and inflammation. Spontaneous withdrawal and naloxone appear to have more favorable outcomes than methadone in reversing these effects, though longer treatment durations may be necessary.
Keywords: Sertoli cell line (TM4), Morphine dependence, Naloxone, Methadone, GDNF

P862, From venom gland to application: A unique, thermostable hyaluronidase from mesobuthus crucittii with dual-substrate specificity

Fatemeh Salabi[1], Masoumeh Baradaran[2], Hedieh Jafari[1], Seyed Mahdi Kazemi[3]
1. Razi Vaccine and Serum Research Institute, Agricultural Research, Education and Extension Organization (AREEO), Ahvaz, Iran
2. Toxicology Research Center, Medical Basic Sciences Research Institute, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
3. Zagros Herpetological Institute, Qom, Iran

Background: Scorpion venom is a rich source of bioactive molecules with significant therapeutic potential. Within this repertoire, hyaluronidase enzymes are of particular pharmaceutical interest for their role in tissue permeability.
Methods: This study investigates the venom gland transcriptome of the Iranian scorpion Mesobuthus crucittii, with a focus on characterizing a venom hyaluronidase (Hyal). RNA sequencing and de novo assembly produced a high-quality transcriptome. In silico analysis, including molecular docking studies, was performed on the identified hyaluronidase transcript. In vitro turbidimetric assays were conducted to assess enzymatic activity.
Results: The transcriptome revealed a complex arsenal dominated by ion channel toxins, metalloproteinases, and phospholipases. Annotation identified a full-length hyaluronidase transcript with unique structural features, including a distinctive cysteine framework predicted to form six disulfide bonds. The in vitro assays demonstrated that the enzyme possesses robust hyaluronic acid-degrading activity and a slow chondroitin sulfate-degrading capability—a rare dual-substrate activity. Molecular docking studies provided a structural rationale for this activity, showing a preferential binding affinity for hyaluronic acid tetrasaccharides. The enzyme also exhibited exceptional thermal stability.
Conclusion: The combination of a novel disulfide-bonded architecture, dual hydrolytic activity, and thermal stability highlights the significant biotechnological promise of this scorpion venom hyaluronidase. Our findings advance the understanding of venom composition and evolution while identifying a prime candidate for applications in drug delivery and antivenom development.
Keywords: Scorpion Venom, Hyaluronidase, Mesobuthus Crucittii, Transcriptomics

P863, Effect of cyanocobalamin (vitamin B12) on paraquat-induced brain injury in mice

Marzieh Jafari Fakhrabad[1], Mohamad Moshiri[2,3], Fatemeh Ariakia[4], Vahid Reza Askari[5,6,7,] Zahra Salmasi[8,9], Leila Etemad[4,10]

1. Department of Toxicology, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran
2. Medical Toxicology Research Center, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Clinical Toxicology, Imam Reza Hospital, Mashhad University of Medical Sciences, Mashhad, Iran
4. Pharmaceutical Research Center, Pharmaceutical Technology Institute, Mashhad University of Medical Sciences, Mashhad, Iran
5. Applied Biomedical Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
6. Department of Pharmaceutical Sciences in Persian Medicine, School of Persian and Complementary Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
7. Department of Persian Medicine, School of Persian and Complementary Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
8. Nanotechnology Research Center, Pharmaceutical Technology Institute, Mashhad University of Medical Sciences, Mashhad, Iran
9. Department of Pharmaceutical Nanotechnology, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran
10. Department of Pharmaceutical and Food Control, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran

Background: The goal of this study was to evaluate the neuroprotective effects of vit B12 on paraquat induced neurotoxicity.
Methods: Thirty-six male mice were randomly divided into six groups. Three groups were treated intraperitoneally with paraquat (10 mg/kg) twice a week (with a 3-day interval) for 3 weeks. Normal saline, vit B12 (1 mg /kg), or vit C (50 mg/kg) was injected 30 min before paraquat administration. Other groups only received normal saline (control), vit B12, or vit C in the same protocol. Motor performance and coordination were assayed by challenging beam traversal, pole, open field, and rotarod tests. The hippocampus and serum samples were isolated to evaluate the oxidative stress (GSH and ROS), apoptosis (caspase 3), and inflammatory markers (TNF-α and IL-1β).
Results: Administration of paraquat leads to induction of motor deficits, which were improved by treatment with vit B12. In addition, vit B12 could prevent oxidative damage, apoptosis, and inflammation caused by paraquat.
Conclusion: It seems that vit B12 could be a novel therapeutic agent in the management of paraquat induced-neurotoxicity.
Keywords: Apoptosis, Inflammation, Neurotoxicity, Paraquat, Vitamin B12

P864, Study of clinical symptom and hematological parameters in patients with scorpion envenomation hospitalized in Khuzestan, Iran

Hedieh Jafari[1], Fatemeh Salabi[1]
1. Razi Vaccine and Serum Research Institute, Agricultural Research, Education and Extension Organization (AREEO), Ahvaz, Iran

Background: Scorpion stings are a significant public health issue in tropical and subtropical regions, including Iran, and can cause mortality, particularly among infants and the elderly. Given Iran's climate, numerous scorpion envenomation cases are reported annually. This study evaluated the clinical manifestations and hematological parameters of patients hospitalized for scorpion stings in Khuzestan province.
Methods: A retrospective analysis was conducted on the medical records of 500 scorpion sting patients admitted to hospitals in several Khuzestan cities from 2017 to 2022. Data on age, gender, clinical symptoms (both local and systemic), and hematological parameters were collected and analyzed using SPSS software.
Results: Analysis revealed that local symptoms were predominantly pain (62.1%), redness (29.3%), and swelling (15.3%). The most frequent systemic manifestations included tachycardia (87.4%), tachypnea (67.4%), and hypotension (49.8%). Signs of renal failure were the most common systemic complication (34.9%). Statistical analysis indicated significant abnormalities in White Blood Cell (WBC) count, Prothrombin Time (PT), Partial Thromboplastin Time (PTT), and International Normalized Ratio (INR) ($P< 0.05$) .Based on the clinical severity grading patients (24.4%, 68.1%, and7.5%) were classified in the grades I, II, and III, respectively.
Conclusion: The study concludes that coagulation parameters (PT, PTT, INR) are useful predictors of envenomation severity. Hematuria was occurred in the majority of the patients. These findings could contribute to the efficient management of scorpionism in emergency health services.

Keywords: Scorpion envenomation, Hematological parameter, Clinical symptom

P865, The effects of androctonus crassicoda scorpion venom on liver and kidney histopathology and blood sugar levels in diabetic rats

Fateme Jafari[1], AmirMohamad Amiri[2], Mohamad Nemati[3], Noushin Ghadiri[4], Mona Sharififard[5]
1. Student research Committee, Ahvaz Jundishapure University of Medical Sciences, Ahvaz, Iran
2. Department of Immunology, School of Medicine, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
3. Department of Venomous Animals and Anti-venom Production, Razi Vaccine and Serum Research Institute, Agricultural Research, Education and Extension Organization (AREEO), Ahvaz, Iran
4. Department of Immunology, School of Medicine, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
5. Department of Vector Biology and Control of Disease, School of public health, Ahvaz Jundishapure University of Medical Sciences, Ahvaz, Iran

Background: In this study, Type 2 diabetes (T2D) is a complex metabolic disorder characterized by relative insulin deficiency, leading to chronic hyperglycemia. Lifestyle factors such as sedentary behavior, and dietary habits contribute to the increasing incidence of type 2 diabetes. The potential therapeutic applications of scorpion venom have gained attention in recent years, particularly in the context of diabetes management. Certain components of scorpion venom may impact metabolic processes and offer novel approaches to treating type 2diabetes.
Methods: Further, for conducting this study Diabetes was defined as any blood sugar level over 250 mg/dl in male Wistar rats induced by a single dose of streptozotocin intraperitoneally. For the purpose of analyzing the effect of A. crassicoda scorpion venom, this venom was injected with two lethal doses of 25% and 50% three times to 2 randomized selected diabetic rat groups over a two-week period. The levels of blood glucose were measured every two days and histopathological changes in the liver and kidney were assessed using H&E staining.A. crassicoda scorpion venom reduced blood sugar gradually over a two week period and the degenerated liver and kidney cells were repaired after the venom injection in comparison with diabetic rats that had not been injected with venom.
Results: This study indicates that the effect of A. crassicoda scorpion venom on diabetes is positive and reduces diabetes symptoms.
Conclusion: Scorpion venom from A. crassicauda causes hypoglycemia in diabetic rats and combats hyperinsulinemia caused by type 2 diabetes. scorpion venom could be an effective drug discovery target against diabetes.
Keywords: Diabetes, Androctonus Crassicoda, Scorpion Venom, Venom Therapy.

P866, Borneol ameliorates acrylamide-induced oxidative stress and inflammation in the hippocampus of rats

Rana Hassanloo[1], Masoumeh Asle-Rousta[2]
1. Department of Genetics, Za.C., Islamic Azad University, Zanjan, Iran
2. Department of Physiology, Za.C., Islamic Azad University, Zanjan, Iran

Background: Acrylamide is a toxin that forms when free asparagine reacts with reducing sugars during high-temperature cooking and food processing. It can cross the blood-brain barrier (BBB), leading to oxidative stress and neuroinflammation. Borneol, a natural bicyclic monoterpene, crosses the BBB and reaches the brain. Research has demonstrated the neuroprotective effects of borneol in animal models of Parkinson's disease, epilepsy, and ischemia, mainly due to its ability to inhibit oxidative stress and neuroinflammation. Here, we investigated the effects of L-borneol on oxidative stress and neuroinflammation in the hippocampus of adult male rats exposed to acrylamide.
Methods: The rats were divided into four groups: Control, Borneol, Acrylamide, and Acrylamide-Borneol. For 21 consecutive days, acrylamide (25 mg/kg) and L-borneol (50 mg/kg) were administered orally. After this period, the hippocampi were collected for molecular and biochemical analysis.
Results: Our findings showed that malondialdehyde levels were lower in the Acrylamide-Borneol group compared to the Acrylamide group ($p < 0.01$). In contrast, glutathione content and superoxide dismutase activity were higher in the Acrylamide-Borneol group ($p < 0.05$ and $p < 0.01$, respectively). Additionally, the mRNA expression of pro-inflammatory cytokines, including tumor necrosis factor-α, interleukin (IL)-1β, and IL-6, was lower in the Acrylamide-Borneol group than in the Acrylamide group ($p < 0.05$, $p < 0.001$, and $p < 0.001$, respectively).
Conclusion: Borneol reduced hippocampal oxidative stress and neuroinflammation in rats exposed to acrylamide. Therefore, borneol may serve as a promising option for mitigating acrylamide-induced neurotoxicity.
Keywords: Bicyclic Monoterpenes; Acrylamide; Oxidative Stress; Tumor Necrosis Factors; Hippocampus

P867, Extra-label therapeutic applications and safety of fluralaner in cats

Zar Hallajian[1], Mobin Mamoudi Lamouki[2], Rokhsana Rasooli[1]
1. Department of Veterinary Pharmacology, Faculty of Veterinary Medicine, University of Tehran, Iran
2. Faculty of Veterinary Medicine, University of Tehran, Iran

Background: Fluralaner, a long-acting isoxazoline, is approved only for flea and tick control in cats. Multiple clinical reports exist regarding the successful extra-label use of fluralaner for various dermal parasitic infestations. Evaluating the effectiveness and safety of these uses is warranted due to recent reports of possible neurological adverse effects linked to isoxazoline products.
Results: Records indicate at least 40 cats treated with Fluralaner for extra-label use against multiple parasitic diseases. These included Ototodectes cynotis (16 cats: 100% eradication by day 28), Demodicosis (Demodex cati and D. gatoi; clinical cure and parasitological resolution in 13 cats), Lynxacarus radovskyi infestation (10 cats), and Sarcoptes scabiei infestation (10 cats, including one FIV+ cat). Furthermore, field studies reported mild, transient adverse effects in patients, such as hypoactivity, vomiting, and drowsiness. Fluralaner remained safe and effective in cats with co-morbidities (e.g., diabetes or FIV). Despite FDA warnings regarding rare neurological events like tremors, ataxia, and seizures associated with the isoxazoline class, substantial evidence supporting fluralaner safety.
Conclusion: These results confirm fluralaner is an effective treatment option against several dermal parasitic infections in cats, well tolerated even in animals with complicated clinical conditions. Given the use of fluralaner in veterinary medicine, further studies are needed to assess its potential in human dermatology.
Keywords: Fluralaner, Cat, Isoxazoline, Extra-Label Use, Human Potential.

P868, Study of liver enzyme activity and oxidative stress biomarkers in individuals exposed to air pollutants

Bahman Azadbakht[1], Fereshteh Dadfar[1]
1. Department of Biology, Payame Noor University, Tehran, Iran

Background: Given the importance and undeniable effects of air pollution on human health and the environment, especially in the last decade when its effects are clearly visible, the aim of the present study was to investigate the activity of liver enzymes and oxidative stress factors in individuals exposed to air pollutants in Tehran.
Methods: In this experimental study, 30 individuals living in Tehran were randomly selected as the experimental group and 30 individuals living in Kohdasht as the control group. To investigate the activity of alanine transaminase, aspartate aminotransferase, and alkaline phosphatase enzymes, enzymatic or colorimetric methods were used using a laboratory kit. To evaluate oxidative stress biomarkers including malondialdehyde, total antioxidant capacity and glutathione, Benzie and Strain, TBARS and Beutler methods were used. Data were analyzed using SPSS software and t-test statistical method.
Results: The results of the study showed that the group exposed to air pollutants (residents of Tehran) had higher liver enzyme activity than the non-exposed group (residents of Kohdasht), but this difference was not significant. Evaluation of oxidative stress biomarkers also showed that the level of malondialdehyde in the two experimental groups did not differ significantly. Total antioxidant capacity and glutathione in the group of Tehran residents exposed to air pollution showed a significant decrease compared to residents of Kohdasht.
Conclusion: The results of this study indicated the negative impact of air pollutants on the levels of liver enzymes and oxidative stress biomarkers, which can lead to the development of chronic diseases and functional disorders in the liver.
Keywords: Respiratory Pollutants, Liver Enzymes, Oxidative Stress

P869, Protective effect of coenzyme Q10 against acetaminophen-induced nephrotoxicity

Mohammadreza Rahmani[1], Jalal Hassanshahi[2]
1. Physiology-Pharmacology Research Center, Research Institute of Basic Medical Sciences, Rafsanjan University of Medical Sciences, Rafsanjan, Iran
2. Department of Physiology and Pharmacology, School of Medicine, Rafsanjan University of Medical Sciences, Rafsanjan, Iran

Background: Acetaminophen overdose causes kidney injury via oxidative stress and apoptosis induction. Coenzyme Q10 (CoQ10) has several effects such as antioxidant, anti-inflammation, and anti-apoptotic properties. This study aimed to determine the protective effect of CoQ10 on acetaminophen-induced kidney injury in rats.
Methods: In this study, 40 male Wistar rats were randomly divided into five groups (n=8) including control, CoQ10 10 mg/kg, acetaminophen, acetaminophen + CoQ10 5 mg/kg, and acetaminophen + CoQ10 10 mg/kg. Animals initially received a single dose of acetaminophen (700 mg/kg), then CoQ10 treatment was given as two i.p. injections at 1 and 12 h following acetaminophen administration. Then, animals were sacrificed, and malondialdehyde (MDA) concentration, glutathione peroxidase (GPx), and superoxide dismutase (SOD) activity levels were measured in the kidney tissue. The western blotting analysis was used to determine the Bax, Bcl-2, and cleaved caspase-3 protein expression levels in the kidney tissue.
Results: CoQ10 (10 mg/kg) significantly increased the GPx and SOD activities and also reduced the MDA concentration in the acetaminophen + CoQ10 10 mg/kg group versus the acetaminophen group ($P<0.05$). Also, CoQ10 significantly decreased the cleaved caspase-3, Bax proteins expression level in the acetaminophen + CoQ10 10 mg/kg group versus the acetaminophen group ($P<0.05$).
Conclusion: This study showed that CoQ10 can ameliorate acetaminophen-induced acute renal injury at least via suppressing oxidative stress and apoptosis parameters.
Keywords: Acetaminophen, Oxidative Stress, Apoptosis, CoQ10, Antioxidant

P870, Synthesis, Characterization, and Cytotoxicity Evaluation of Liposomal Nanoparticles Containing Adenosine Triphosphate for the Treatment of Aluminum Phosphide Poisoning

Farkhondeh Rzazzaghi- Firozjaei[1], Hamidreza Mohammadi[2], Javad Akhtari[3], Amineh Sadat Zahiry Pour[1]
1. Department of Addiction Studies, School of Medical, Kashan University of Medical Sciences, Kashan, Iran
2. Department of Toxicology and Pharmacology, Faculty of Pharmacy, Mazandaran University of Medical Sciences, Sari, Iran
3. Department of Medical Nanotechnology, Faculty of Medicine, Mazandaran University of Medical Sciences, Sari, Iran

Background: Aluminum phosphide (ALP) is widely used to preserve grains but is highly toxic due to phosphine gas release, which disrupts mitochondrial function by inhibiting CYTc oxidase. This causes reduced ATP production, cellular acidosis, and cell death. This study explores using ATP-loaded liposomal nanoparticles as a novel antidote to prevent and treat ALP poisoning.
Methods: To prepare ATP-loaded nanoliposomes, lipids including HSPC, cholesterol, mPEG2000-DSPE, and DOTAP were combined in specific molar ratios and mixed in a designated tube. ATP was then incorporated into the mixture. The average size of the nanoliposomes was determined using a zeta sizer device, while ATP encapsulation efficiency was measured via HPLC. The cytotoxicity of the synthesized nanoparticles was evaluated on the HFF2 cell line.
Results: The synthesized nanoliposomes had an average particle size of 134.8 nm, a zeta potential of -13.3 mV, and an ATP encapsulation efficiency of approximately 40%. Cytotoxicity tests indicated that the nanoparticles exhibited no toxic effects on the HFF2 cell line.
Conclusion: The findings suggest that the prepared nanoparticles possess optimal size and zeta potential and are non-toxic to cells. These characteristics make them a promising candidate for use as an antidote to mitigate the effects of aluminum phosphide poisoning.
Keywords: Liposome, Aluminum phosphide, ATP, Cytotoxicity

P871, Edaravone exerts protective effects against ethanol-induced gastric ulcer in rats through the suppression of pro-inflammatory cytokines

Parizad Rezaye[1,2], Elham Karimi-Sales[1,2], Soleyman Bafadam[3], Khalil Hajiasgharzadeh[1], Mohammad Reza Alipour[1,2], Reza Rahbarghazi[1]

1. Stem Cell Research Center, Tabriz University of Medical Sciences, Tabriz, Iran
2. Department of Physiology, Faculty of Medicine, Tabriz University of Medical Sciences, Tabriz, Iran
3. Salmas School of Nursing, Urmia University of Medical Sciences, Urmia, Iran

Background: Gastric ulcer is a common, painful gastrointestinal disease worldwide. Current treatments have side effects and high recurrence rates; therefore, developing safe and more effective therapies is crucial. Edaravone is a neuroprotective agent with antioxidant and anti-inflammatory effects. This study, for the first time, evaluated the potential impact of edaravone on ethanol-induced gastric ulcer in rats.

Methods: Male Wistar rats were randomly divided into four groups: control, ulcer, ulcer+edaravone, and ulcer+omeprazole. Groups 1 and 2 received 0.5% carboxymethylcellulose (vehicle), while groups 3 and 4 received omeprazole (20 mg/kg) or edaravone (20 mg/kg) by gavage for 2 weeks. Gastric ulcer was induced by a single oral dose of absolute ethanol (5 ml/kg) on the 14th day, and one hour after the final gavage of either carboxymethylcellulose, omeprazole, or edaravone. Finally, the pH and volume of the supernatant from the gastric contents were measured, and ELISA kits were used to evaluate gastric levels of tumor necrosis factor alpha (TNF-α) and interleukin-1 beta (IL-1β).

Results: Ethanol administration significantly elevated IL-1β and TNF-α protein levels in the ulcer group compared to the control. Conversely, pre-treatment with both omeprazole and edaravone significantly suppressed these Ethanol-induced inflammatory responses Additionally, omeprazole and edaravone significantly increased gastric pH and decreased gastric juice volume compared to the untreated ulcer group.

Conclusion: It appears that edaravone can exert a gastroprotective effect similar to omeprazole, as evidenced by its ability to reduce gastric inflammation, decrease gastric juice volume, and regulate gastric acid secretion.

Keywords: Edaravone, Gastric ulcer, Inflammation

P872, Histopathological evaluation of taranjabin's protective role in cisplatin-induced acute kidney injury in rats

Mohammad Hossein Rigi[1], Mohammad Taghi Khoshniat[1], Abolfazl Khajavi Rad[1,2], Sara Hoseinian[1,2], Seyyedeh Zahra Asghari[1], Fatemeh Salami[1], Vahideh Ghorani Sirjani[1], Ahmad Reza Aminian[1]
1. Department of Physiology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Applied biomedical Research Center, Basic Sciences Research Institute, Mashhad University of Medical Sciences, and Mashhad, Iran

Background: Kidney diseases are one of the most important causes of death in the world. These diseases can be classified into two main groups: acute kidney injury (AKI) and chronic kidney disease. Cisplatin is one of the most widely used chemotherapy drugs and causes acute intrarenal injury by damaging the kidney epithelium and causing hemodynamic changes. The pharmacological properties of Taranjabin include antioxidant, anti-inflammatory, and diuretic effects. The present study investigated the impact of the hydroalcoholic extract of Taranjabin on cisplatin-induced nephrotoxicity.
Methods: 40 male Wistar rats were randomly divided into five groups: 1) control, 2) cisplatin (7 mg/kg), 3) vitamin E (100 mg/kg) + cisplatin, 4) Taranjabin (200 mg/kg) + cisplatin, 5) Taranjabin (400 mg/kg) + cisplatin. The study was 11 days, and on day 4, cisplatin was injected intraperitoneally. Administration of normal saline, hydroalcoholic extract of Taranjabin, and vitamin E was started on day 1 and continued until the end of the study.
Results: The study demonstrated significantly higher tissue damage rates in the cisplatin group versus controls. However, vitamin E (100 mg/kg) and Taranjabin (200 and 400 mg/kg) markedly reduced tissue damage compared to cisplatin, indicating their nephroprotective potential. Notably, Taranjabin 400 mg/kg showed superior efficacy to both Taranjabin 200 mg/kg and vitamin E, while Taranjabin 200 mg/kg also outperformed vitamin E (all $p < 0.001$).
Conclusion: The study suggests that Taranjabin extract may serve as a promising therapeutic agent for cisplatin-induced AKI, demonstrating efficacy comparable to the established antioxidant vitamin E. These findings underscore its potential clinical applicability in AKI management.
Keywords: Taranjabin, Acute Kidney Injury, Cisplatin, Nephrotoxicity

P874, Gestational acid folic treatment attenuates metabolic and cognitive dysfunctions induced by lithium exposure in rat offspring

Sana Shariatmadar[1], Samaneh Kakhki[2], Farimah Beheshti[3,4]
1. Student Research Committee, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
2. Department of Clinical Biochemisrry, School of Medicine, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
3. Neuroscience Research Center, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
4. Departments of Physiology, School of Medicine, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran

Background: The present study aimed to analyze both neurobehavioral and biochemical results of neonates born of mothers exposed to different doses of lithium and groups that received a high dose of lithium with folic acid.
Methods: Male and female rats were mated in separate cages, and pregnant rats were divided into eight first group as 1) vehicle; 2) propylthiouracil (PTU)-induced hypothyroidism, 3-4) received two different doses of lithium carbonate (15, and 30 mg/kg) and 5-7) the highest doses of lithium (30 mg/kg) plus three different doses of folic acid (5, 10, and 15 mg/kg), and 8) received just folic acid (15 mg/kg). All treatments were dissolved in drinking water and continued until delivery followed by returning to a regular diet without treatment.
Results: Lithium (30 mg/kg) disrupts both behavioral and biochemical markers, including TSH, T3, and T4 as measuring indicators to assess thyroid function, IL-10 and TNF-α as anti-inflammatory and inflammatory agents, respectively, malondialdehyde (MDA) as oxidative stress marker, alongside SOD, and Catalase activity as anti-oxidant indicators. Besides, folic acid, almost at the highest dose (15 mg/kg), attenuated memory impairment and anxiety-like behavior caused by lithium. Moreover, the groups treated with folic acid alone in comparison with vehicle demonstrated the higher level of anti-oxidant and anti-inflammatory indicators.
Conclusion: According to results, prenatal exposure to a high dose of lithium (30mg/kg) leads to fetal neurodevelopmental disorder and growth restriction through various mechanisms more likely attributed to hypothyroidism which means it should be either prohibited or prescribed cautiously during pregnancy.
Keywords: Lithium; Propylthiouracil; Pregnancy; Oxidative stress; Inflammation.

P875, Investigating the role of edaravone in protectingtm4 sertoli cells against CoCl2-induced hypoxic injury: A possible therapeutic approach

Amir Reza Saberi[1,2], Faezeh Abolhasani[1,2], Shadi Mohammadpour-Asl[3], Dr. Naseh abdollahzade[3,4], Dr. Shiva Roshan-Milani[4,5]

1. Student Research Committee, Urmia University of Medical Sciences, Urmia, Iran
2. School of Pharmacy, Urmia University of Medical Sciences, Urmia, Iran
3. Department of Physiology, School of Medicine, Urmia University of Medical Sciences, Urmia, Iran
4. Neurophysiology Research Center, Cellular and Molecular Medicine Research Institute, Urmia University of Medical Sciences, Urmia, Iran
5. Cellular and Molecular Research Center, Cellular and Molecular Medicine Research Institute, Urmia University of Medical Sciences, Urmia, Iran

Background: Mammalian spermatogenesis happens in the seminiferous tubules of the testes and is supported by a blood and oxygen supply. Some pathological conditions such as testicular torsion and varicocoele can lead to reduced blood flow, oxygen, and nutrient supply, adversely affecting normal male reproductive function. Edaravone, a free radical scavenger, is a medication widely used to treat stroke. Recent studies have reported a significant therapeutic effect of Edaravone against testicular torsion/detorsion damage. However, there is little information available regarding its effects on testicular somatic cells, particularly isolated Sertoli cells. This study, therefore, aimed to investigate the effect of Edaravone on cell viability in cobalt chloride (CoCl2)-induced Sertoli cell hypoxia to gain insight into its potential protective mechanisms. Understanding how Edaravone influences Sertoli cell viability under hypoxic conditions could provide valuable information for developing therapeutic strategies aimed at preserving male fertility in pathological situations characterized by impaired blood flow.

Methods: The mouse Sertoli cells (TM4) were cultured in DMEM-F12 medium. The TM4 cells were incubated with 100 µL of the medium on a 96-well cultured plate. The cells investigated in four main groups: control, CoCl2 (125 µM), Edaravone (1000 µM) and a pretreatment group, where cells were exposed to the treatment containing medium for 24-hours. In the pretreatment group, cells were incubated with Edaravone 1 hour before CoCl2, while the control group was incubated only with free medium. Their effects on TM4 cell viability was then investigated using MTT assay.

Results: Cell viability decreased in cells exposed to CoCl2, while exposure to Edaravone showed opposite effects. Pretreatment with Edaravone before CoCl2 recovered CoCl2-induced anti-proliferative effects. The cellular viability of control cells was 100±0.7%, which significantly increased to 129± 2%, in cells exposed 1000 µM Edaravone ($P<0.01$). The cellular viability in cells exposed to CoCl2 reduced to 59±2%, however, pretreatment with Edaravone recovered it to approximately control levels.

Conclusion: Edaravone reduces the toxicity and cell death effects of hypoxia on Sertoli cells. Inhibition of spontaneously or pathologically-induced Sertoli cell death by Edaravone, suggesting a probable clinical importance and therapeutic effects of Edaravone on infertility caused by testicular impaired blood flow. However, further research is needed to elucidate this therapeutic effect and the underlying mechanisms of protection.

Keywords: Sertoli Cell, TM4, Hypoxia, Edaravone, Cell Viability, Cobalt Chloride

P876, A review of wildlife-inspired biomimetic drug delivery systems: innovations from octopus salivary glands to snake skin

Seyyed AmirSohrab Tabatabaie Hosseini[1], Sajjad Ghorbani Disfani[1], Bizhan Malaekeh-Nikouei[2]
1. Department of Clinical Science, Faculty of Veterinary Medicine, Ferdowsi University of Mashhad, Iran
2. Department of Pharmaceutics, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Biomimetic drug delivery systems open a new avenue in pharmaceutical research by drawing inspiration from nature's time-tested strategies. By mimicking mechanisms found in wildlife and other natural systems, biomimicry offers innovative and potentially more effective solutions to these long-standing challenges.
Methods: This brief review highlights key advances in biomimetic drug delivery, focusing on two 1. Luo's octopus-inspired patch (2023) - enhanced drug absorption in dogs and proved safe in humans. 2. Bae's snake-fang microneedles (2019) - delivered vaccines painlessly in mice. Sources were limited to 5 high-impact papers from Nature and Science journals (2019-2023).
Results: Luo et al. (2023) developed a patch inspired by octopus suckers. The patch stretches the buccal mucosa to enhance peptide absorption. In dogs, this suction patch achieved bioavailability up to two orders of magnitude higher than those of the commercial tablet. Last, a first-in-human study involving 40 healthy participants confirmed the dosage form's acceptability. Bae et al. (2019) created a microneedle patch inspired by snake fangs. This patch delivers drugs in under 15 seconds with gentle pressure, eliminating pumping systems. Tested with ovalbumin and influenza virus, it induced robust immune responses in rodents, offering a painless alternative to injections.
Conclusion: Biomimetic drug delivery systems show promise in enhancing efficacy, reducing discomfort, and improving patient adherence. Examples like octopus-inspired patches and snake fang–based injectors highlight innovative, needle-free approaches. However, challenges such as production complexity, cost, and biocompatibility must be resolved for clinical use.
Keywords: Biomimetic Drug Delivery, Nature-Inspired Patches, Needle-Free Vaccination, Bioinspired Microneedles

P877, Therapeutic potential of ATP-loaded liposomal nanoparticles against aluminum phosphide-induced cardiotoxicity

Amineh Sadat Zahiry Pour[1], Hamidreza Mohammadi[2], Javad Akhtari[3], Farkhondeh Rzazzaghi- Firozjaei[1]
1. Department of Addiction Studies, School of Medical, Kashan University of Medical Sciences, Kashan, Iran
2. Department of Toxicology and Pharmacology, Faculty of Pharmacy, Mazandaran University of Medical Sciences, Sari, Iran
3. Department of Medical Nanotechnology, Faculty of Medicine, Mazandaran University of Medical Sciences, Sari, Iran

Background: Aluminum phosphide (AlP) poisoning is a life-threatening condition with high mortality, primarily due to systemic toxicity from phosphine gas. Phosphine inhibits mitochondrial cytochrome oxidase, disrupting the electron transport chain and leading to excessive production of reactive oxygen species (ROS), lipid peroxidation, impaired ATP synthesis, cellular acidosis, and necrosis. Cardiac tissue is especially vulnerable to mitochondrial dysfunction, resulting in myocardial energy depletion and cardiac failure. Current treatments are mainly supportive and do not reverse mitochondrial damage. This study aimed to evaluate the therapeutic potential of adenosine triphosphate (ATP)-loaded liposomal nanoparticles in restoring myocardial bioenergetics and improving survival in a mouse model of AlP poisoning.
Methods: The oral LD50 of AlP in adult male mice was determined as 18.22 mg/kg. ATP-loaded liposomal nanoparticles were administered intravenously at doses of 64, 96, and 128 mg/kg. Control groups received standard treatments, including sodium bicarbonate (2 mEq/kg, IP) and magnesium sulfate (200 mg/kg, IP). Cardiac ATP levels were quantified using high-performance liquid chromatography (HPLC), and nanoparticle hemolytic activity was assessed to evaluate biocompatibility.
Results: ATP-loaded nanoparticles significantly reduced mortality at the LD50 dose of AlP, achieving 100% survival at the optimal dose. Treated animals showed markedly higher cardiac ATP levels than controls. Hemolysis was minimal (0.2%), confirming safety.
Conclusion: ATP-loaded liposomal nanoparticles effectively restore cardiac ATP levels, reduce AlP-induced cardiotoxicity, and improve survival. This strategy offers a promising energy-based therapeutic approach for managing acute aluminum phosphide poisoning.
Keywords: Aluminum Phosphide, ATP, Liposome, Cardiotoxicity

P878, Protective role of selenium nanoparticles against radiation-induced protein oxidation in rat testicular tissue

Milad Faraji[1], Siamak Asri Rezaei[2], Aliasghar Tehrani[3]
1. Department of Basic Sciences, School of Veterinary Medicine, Shiraz University, Shiraz, Iran
2. Department of Clinical Pathology and Internal Medicine, Faculty of Veterinary Medicine, Urmia University, Urmia, Iran
3. Department of Pathobiology, Faculty of Veterinary Medicine, Urmia University, Urmia, Iran

Background: The increasing application of gamma radiation in medical settings necessitates strategies to mitigate its adverse effects, particularly oxidative damage to reproductive tissues. This study evaluated the protective effects of selenium supplementation— administered as sodium selenite or selenium nanoparticles—against gamma irradiation-induced oxidative stress in testicular tissue.
Methods: Fifty-four male Wistar rats were randomly assigned to three groups: control, sodium selenite, and selenium nanoparticles. Each treatment group received intraperitoneal injections of selenium (0.1 mg/kg, based on elemental selenium) for 14 consecutive days. Rats were exposed to gamma radiation (2 and 8 Gy, weekly) for 20 minutes over two weeks. Testicular tissues were harvested for biochemical analyses, including glutathione peroxidase (GPx), superoxide dismutase (SOD), catalase (CAT), total antioxidant capacity (TAC), malondialdehyde (MDA), and advanced oxidation protein products (AOPP), as well as histopathological assessment.
Results: Results showed significant oxidative alterations in the control group following irradiation, with elevated MDA and AOPP levels and reduced antioxidant enzyme activities. Both selenium treatments attenuated these effects, with selenium nanoparticles demonstrating superior efficacy. Specifically, GPx and SOD activities were better preserved, MDA and AOPP levels were significantly lower, and TAC was maintained, particularly at the higher 8 Gy dose ($p < 0.05$). Histological evaluations confirmed reduced tissue damage in selenium-treated groups, most notably in the nanoparticle group.
Conclusion: In conclusion, selenium nanoparticles offered enhanced protection against gamma radiation-induced oxidative stress in testicular tissue compared to sodium selenite. These findings support their potential as a preventive approach for mitigating male infertility associated with therapeutic or occupational radiation exposure.
Keywords: Selenium Nanoparticles, Oxidative Stress, Testicular Damage, Radiotherapy, Experimental Pharmacology

P879, Comparative effects of curcumin, nanocurcumin, and A PPAR agonist on paraquat-induced oxidative stress and systemic inflammation in a rat model

Mahboobeh Ghasemzadeh Rahbardar[1], Mohammad Hossein Boskabady[2,3], Mohammad Ehsan Taghavizadeh Yazdi[2], Sima Beigoli[2], Hamideh Amin[3]
1. Clinical Research Development Unit, Shahid Hasheminejad Hospital, Mashhad University of Medical Sciences, Mashhad, Iran
2. Applied Biomedical Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Physiology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: This study assessed the modulatory impacts of curcumin, nanocurcumin, and pioglitazone—an agonist of peroxisome proliferator-activated receptor gamma (PPARγ)—on systemic inflammation and oxidative stress triggered by paraquat (PQ) inhalation.
Methods: Wistar rats randomly assigned to nine experimental groups. Control animals received saline, while the remaining groups were exposed to PQ aerosols (54 mg/m³, eight times on alternating days). In PQ-treated groups, interventions included saline alone (PQ group), curcumin at 30 mg/kg (Cu), two doses of nanocurcumin—2 mg/kg (NC-L) and 8 mg/kg (NC-H), pioglitazone at 5 mg/kg (Pio), combinations of Pio with low-dose curcumin (Pio + Cu-L) or low-dose nanocurcumin (Pio + NC-L), and dexamethasone at 0.03 mg/kg (Dexa). Treatments continued for 16 days, concurrent with PQ exposure. Biological endpoints included total and differential white blood cell (WBC) counts, and malondialdehyde (MDA), superoxide dismutase (SOD), catalase (CAT), thiol groups, interleukin-10 (IL-10), and tumor necrosis factor-alpha (TNF-α).
Results: PQ inhalation elevated blood levels of total and differential WBCs, MDA, IL-10, and TNF-α, alongside reductions in CAT, SOD, and thiol concentrations. Administration of NC-L, NC-H, Pio, Pio+Cu, Pio+NC-L, and Dexa alleviated PQ-induced perturbations to varying extents. Co-treatment with Pio+Cu and NC-L yielded more pronounced restoration across multiple parameters compared to each agent administered individually.
Conclusion: Cu, NC, and Pio alleviated PQ-induced systemic inflammation and oxidative stress, with co-treatment (Pio+Cu or Pio+NC) yielding greater improvements, likely via PPARγ-mediated mechanisms enhancing the therapeutic effects of Cu.
Keywords: Curcumin, Inflammation, Oxidative stress, Paraquat, Pioglitazone

P880, Adverse effects of alcohol consumption, tobacco smoking, and air pollution on asthma

Syyedeh Zahra Ghasemi[1], Sima Beigoli[2], Amirali Reihani[3], Mohammad Hossein Boskabady[2,4]
1. Cutaneous Leishmaniasis Research Center, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Applied Biomedical Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
3. Student Research Committee, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
4. Department of Physiology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Alcohol consumption, tobacco smoking, and air pollution are significant contributors to the development and severity of asthma, each through distinct mechanisms. Understanding these factors is crucial for effective management and prevention strategies. The purpose of this review article is to elucidate the harmful effects of alcohol consumption, cigarette smoking, and air pollution specifically on asthma.
Methods: Various databases such as Medline, PubMed, Scopus, and Google Scholar, were searched to gather the required articles.
Results: The relationship between smoking and exposure to environmental tobacco smoke has been conclusively proven with lung diseases such as asthma. Also, metabolites resulting from acute and chronic alcohol consumption lead to lung and airway hypersensitivity to allergens. In addition to the two mentioned factors, exposure to air pollutants such as suspended particles, carbon dioxide, carbon monoxide, and sulfur caused by the activity of industrial units, traffic, and natural accidents increases the possibility of lung diseases. There seems to be an association between alcohol consumption, tobacco smoking, and air pollution and the risk of asthma in adults and children's.
Conclusion: Understanding the interplay between these environmental triggers and asthma pathogenesis is crucial for effective management and prevention strategies. This article delves into the detrimental impacts of alcohol, tobacco, and air pollution on asthma, exploring the mechanisms involved.
Keywords: Alcohol, Smoking, Air pollution, Respiratory disorders, Asthma

P881, Essential management of stingray envenomation: A systematic review

Sajjad Ghorbani Disfani[1], Shaghayegh Rahmani[2]
1. Doctoral student of Veterinary Medicine, Faculty of Veterinary Medicine, Ferdowsi University of Mashhad, Iran
2. Department of Emergency Medicine, MMS.C, Islamic Azad University, Mashhad, Iran

Background: Stingray stings are common marine injuries causing severe pain and tissue damage. While rarely fatal, improper management leads to prolonged suffering and preventable complications. This review summarizes evidence-based practices for frontline clinicians.
Methods: We analyzed 12 studies (2010-2025) focusing on practical stingray treatment protocols. Selection prioritized clinically relevant findings from emergency medicine and toxicology literature.
Results: Key Findings: 1) Immediate Care: Hot water immersion (40-45°C) effectively relieves pain by denaturing thermolabile toxins (success rate: 82-90%), 2) Wound Management: Vigorous irrigation reduces infection risk; retained spines occur in 15-20% of cases,3) Medications: Ciprofloxacin covers 95% of marine pathogens; NSAIDs suffice for pain control in 70% of patients,4) Follow-up: Most symptoms resolve within 48 hours with proper initial care .Recommendations:1) Establish "sting stations" with thermometers and basins at beaches,2) Implement a 3-step protocol: Hot water soak (30-90 minutes) , Thorough wound exploration and Targeted antibiotics when indicated, 3) Provide discharge instructions highlighting warning signs
Conclusion: Effective stingray management requires neither complex technology nor specialized training. Simple, timely interventions following these evidence-based guidelines can prevent nearly all serious complications. This standardized approach is particularly valuable for coastal clinics with limited resources.
Keywords: Stingray Envenomation, Thermal Therapy, Marine Trauma, Coastal Emergency Medicine, Venom Denaturation

P882, The study of bee venom on histomorphometry, immunohistochemistry and some blood parameters indiuces arthritis from enrofloxacin in rat cartilage

Haydeh Keyhan[1], Hassam Morovvati[2], Mohammad Kazem Koohi[1]
1. Department of Comparative BioSciences) DCBs, Faculty of Veterinary Medicine, University of Tehran, Tehran, Iran
2. Department of Basic Science, Faculty of Veterinary Medicine, University of Tehran. Tehran, Iran

Background: Bee venom therapy is a thousands-year-old treatment that has been used as a traditional medicine for the treatment of various diseases. Rheumatoid arthritis (RA) is a common and debilitating disease that causes chronic inflammation of the synovial membrane and joint destruction. The present study investigated the histological and immunological effects of bee venom (BV) and melittin in the knee joint of arthritic rats.
Methods: Arthritis model was induced by intraperitoneal injection of enrofloxacin in rats for 2 weeks. Then, the therapeutic effect of BV at single doses of 0.5, 1 and 1.5 mg/kg were injected intra-articularly. All groups were sampled on the 30th day. Histological studies were performed with H&E, PAS and Trichrom mason. Hematology tests and serum IL-6 and TNF-α levels were measured, and tissue expression of TNF-α was determined by immunohistochemistry
Results: Statistically significant changes including increased thickness in articular cartilage, decreased number of lacunae, decreased levels of IL-6, TNF-α in blood and tissue expression of TNF-α were shown in BV dose (1 mg/kg). Other doses did not show significant changes in most of the tests examined.
Conclusion: The present study highlighted the potential of intra-articular BV therapy in preventing the development of arthritis symptoms in the knee. However, further studies are needed to comment on the safety of the venom. Also, administration of BV through the regulation of various mechanisms such as anti-inflammatory effects may have promising results in the control and treatment of arthritis
Keywords: Bee Venom, Enrofloxacin, Arthritis

P883, The relationship between metformin use and the incidence of various types of anemia

Morteza Garmei[1], Fatemeh Shams[1,2]
1. Department of Hematology and Blood Banking, Mashhad University of Medical Sciences, Mashhad, Iran
2. Cancer molecular pathology research center, Mashhad University of medical sciences, Mashhad, Iran

Background: Various studies have shown that certain medical conditions and the use of specific drugs can contribute to the onset of anemia. Among these drugs is metformin, a medication widely prescribed for diabetes, one of the most prevalent diseases globally. The main function of metformin as the first-line drug for the treatment of diabetes is to reduce hyperglycemia; it acts by reducing the intestinal absorption of glucose and hepatic glucose production (through AMPK stimulation), as well as increasing insulin sensitivity.
Methods: This study aims to provide a comprehensive perspective by analyzing and comparing the findings of various studies on the relationship between metformin use and the emergence of different types of anemia.
Results: The relationship between metformin use and the occurrence of various types of anemia and the mechanisms of its effect are different. The results of studies on the association between metformin and iron deficiency anemia are somewhat contradictory. Most studies show a direct relationship between metformin use and the occurrence of megaloblastic and hemolytic anemias, but on the other hand, metformin use may improve Fanconi anemia, anemia of chronic disease, and sickle cell anemia.
Conclusion: Metformin has been an important drug in the treatment of diabetes for many years. It is also used to treat other disorders such as polycystic ovary syndrome and some cancers. The relationship between this drug and types of anemia has been investigated, and of course, more studies are definitely needed in this field.
Keywords: Anemia, Metformin, Diabetes

P885, Synergistic toxicity and bioaccumulation of PFAS and microplastics: A multi-omics perspective

Shirin Imanpour[1], Sadegh Mohades[1], Jamshid Tabeshpour[1]
1. Department of Pharmacology and Toxicology, Islamic Azad University, Damghan, Iran

Background: Per- and polyfluoroalkyl substances (PFAS) and microplastics (MPs) are widespread environmental contaminants known for their persistence and toxicity. While their individual effects have been extensively studied, limited research explores their synergistic interactions and combined bioaccumulation mechanisms. Recent findings suggest that MPs act as vectors for PFAS, increasing their environmental mobility, bioavailability, and toxicity. Furthermore, both contaminants have been implicated in gut microbiome disruption, neurotoxicity, and metabolic alterations, with potential long-term health consequences. Summarize current knowledge on the combined toxicity of PFAS and MPs, and Explore the role of multi-omics approaches in understanding their biological effects. In addition, to Identify knowledge gaps and propose future research directions.
Methods: A systematic literature review was conducted using PubMed, Web of Science, and Scopus, focusing on studies published in the last five years. Keywords included “PFAS and microplastics,” “synergistic toxicity,” “multi-omics,” “remediation techniques,” and “climate change impact.” Studies were selected based on relevance, experimental rigor, and contribution to understanding PFAS-MP interactions at molecular and ecological levels.
Results: Evidence suggests that MPs enhance PFAS bioavailability, leading to greater bioaccumulation in aquatic and terrestrial organisms. Multi-omics analyses reveal significant changes in gene expression, metabolic pathways, and immune responses following PFAS-MP exposure. Additionally, climate change accelerates PFAS leaching from MPs, altering their toxicity profiles. Emerging remediation methods, including nanomaterial-based adsorbents, bioengineered bacteria, and advanced oxidation processes, show promise for dual-contaminant removal.
Conclusions: PFAS and MPs exhibit synergistic toxicity, exacerbating their individual environmental and health risks. A multi-omics approach provides critical insights into their biological impact, while climate change further complicates their fate. Future research should focus on longitudinal human exposure studies, personalized risk assessments, and the development of scalable remediation strategies to mitigate their combined effects.
Keywords: Microplastics, PFAS, Multi-Omics, Synergistic Toxicity, Environmental Remediation

P886, Air pollution and bone mineral density in osteoporosis

Seyed Mohammad Mohammadi[1], Heidar Maleki[2], Mohammad Lotfi[3], Naser Kamyari[4], Gholamreza Goudarzi[2,5], Fatemeh Shojaei Moghaddam[3], Jasem Salehi[3], Seyed Amin Hossaini Motlagh[6], Khadijeh Kanani[7], Sheyda Ghasemi[3], Esmat Radmanesh[8,9]

1. Department of Orthopedics, School of Medicine, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
2. Air Pollution and Respiratory Diseases Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
3. Student Research Committee, Abadan University of Medical Sciences, Abadan, Iran
4. Department of Public Health, School of Health, Abadan University of Medical Sciences, Abadan, Iran
5. Department of Environmental Health, School of Health, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran
6. Department of Environmental Health Engineering, School of Health, Yasuj University of Medical Sciences, Yasuj, Iran
7. Clinical Research Development Unit, Taleghani Educational Hospital, Abadan University of Medical Sciences, Abadan, Iran
8. Research Center for Environmental Contaminants (RCEC), Abadan University of Medical Sciences, Abadan, Iran
9. Department of Physiology, School of Medicine, Abadan University of Medical Sciences, Abadan, Iran

Background: Research indicates a connection between osteoporosis and inflammation from outdoor air pollutants. However, further extensive studies are required due to the limited number of existing studies and the variability observed across them.This study investigates the relationship between air pollution and bone density in patients with osteoporosis in Abadan.
Methods: Individuals referring to the Bone Densitometry Department of Abadan Nuclear Medicine Center, including healthy individuals and those with osteopenia and osteoporosis, were included in this study from January 31, 2022 to May 21, 2023. Demographic information and information about BMD related to the lumbar spine and femur of the individuals were obtained.
Results: BMD values in different parts of the femur and lumbar spine (L1-L4) were significant in all three groups, and the osteoporosis group had the lowest mean. In patients with osteoporosis, there was an inverse correlation between PM and BMD, but it was not statistically significant.
Conclusion: This study provided evidence that there was no significant relationship between the mean concentration of air pollution and BMD in the femur and lumbar spine of patients with osteoporosis.
Keywords: Osteoporosis, Bone, Air pollution

P887, Learning and memory improving effects of vitamin C in lead exposed immature rats

Sajjad Mollaei[1], Farimah Beheshti[2,3], Farzaneh Vafaee[4], Mahmoud Hosseini[5,6]
1. Department of Physiology, School of Medicine, Mashhad University of Medial Sciences, Mashhad, Iran
2. Neuroscience Research Center, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
3. Department of Physiology, School of Medicine, Torbat Heydariyeh University of Medical Sciences, Torbat Heydariyeh, Iran
4. Neuroscience Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
5. Applied Biomedical Research Center, Basic Sciences Research Institute, Mashhad University of Medical Sciences, Mashhad, Iran
6. Psychiatry and Behavioral Sciences Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: There have been numerous reports on the neuroprotective effects of Vitamin C (Vit C). We have investigated the effects of Vit C on memory and oxidative stress in the lead-exposed juvenile rats in the present study.
Methods: The juvenile rats were separated into 3 groups (N = 15): 1- Control, 2- Lead (drinking water contaminated with lead for 8 weeks), 3- Lead + Vit C. Morris water maze (MWM), and Passive avoidance (PA) test were conducted to assess memory. After the behavioral tests, animals were sacrificed, and tissues were collected for evaluating Thiol content and malondialdehyde as markers for oxidative stress.
Results: The Lead group exhibited significantly higher latency to find the platform, as well as traveled distance. In addition, spent less time in the target area (Q1) compared to the Control. The Lead + Vit C group spent more time in Q1 compared to the Lead group. There was no traveling speed difference between groups. In PA, lead significantly reduced latency compared to control, while Vit C increased the latency. Total thiol content in the brain was lowered by Lead, and MDA was considerably higher when compared to Control. Treatment with Vit C enhances thiol and lowers MDA.
Conclusion: Our results suggest that treatment with Vit C can induce protective effects against Lead-exposure neural damage in juvenile rats, and these effects might be due to the anti-oxidative properties in the brain.
Keywords: Learning, Memory, Vitamin C, Ascorbic acid

P888, Investigation of the amount of heavy metals lead and cadmium in dry fruit and vegetable waste and meat from sheep fed with it

Leili Houshyari[1], Gholamali Jelodar[1]
1. Department of Basic Sciences, Veterinary Faculty, Shiraz University, Shiraz, Iran

Background: Due to the progress of industries and the improper use of chemical and livestock fertilizers in agricultural lands, contamination of crop products with heavy metals has become of great concern for human health. The present study aims to investigate the residue of lead and cadmium in dry fruit and vegetable waste and the meat of lambs fed with this type of waste.
Methods: To conduct this research, 2000 kg of dry fruit and vegetable waste was collected and ground from 65 active recycling bins in Shiraz city during the warm seasons, and four samples from four different points were used to evaluate the concentration of heavy metals. To investigate the concentration of these heavy metals in the meat of lambs fed with dry waste, 24 male Turkish Qashqai lambs at the age of 120 days were used in a completely randomized design with 4 groups of 6 animals for 45 days. The experimental groups included: 1) Fattening diet. 2) A diet containing 30% of the fattening diet with 70% of fruit and vegetable waste silage. 3) A diet containing 50% of the fattening diet with 50% of fruit and vegetable waste. 4) A diet containing 30% of the fattening diet with 70% of fruit and vegetable waste. Weighing was done at the beginning and end of the period. At the end of the period, three lambs from each group were slaughtered, and the levels of cadmium and lead in their meat were determined by atomic absorption spectrometry. Data analysis was performed using SPSS software and the ANOVA procedure and Duncan's test comparison at the 5% level.
Results: The concentrations of lead and cadmium in the four samples of dry fruit, vegetable, and meat waste analyzed were lower than the Iranian and WHO-FAO standards. There was no significant difference between the concentrations of lead and cadmium in the tested samples ($P<0.05$).
Conclusion: The results of this study showed that the concentrations of lead and cadmium in the waste of warm-season agricultural products and the meat of lambs feeding on them were lower than the Iranian standard, and there is no concern for animal and human health regarding their consumption, and it can be used as animal feed.
Keywords: Heavy Metals, Cadmium, Lead, Waste, Feeding Lamp Meat

P889, Investigation of Hematological, Serum Biochemical, ALP, Rumen's Ph and Intestinal Tissue Alteration Following Consumption of Fruit and Vegetable Waste in Warm Seasons and its Silage in Fattening Lambs

Lily Hooshyari[1], Gholamali jelodar[2], Mohammadreza Rezvani[3], Hamidreza Moradi[4]
1. Department of basic sciences, veterinary faculty, Shiraz University, Shiraz, Iran
2. Department of basic sciences, veterinary faculty, Shiraz University, Shiraz, Iran
3. Animal sciences of basic sciences, agriculture faculty, Shiraz University, Shiraz, Iran
4. Department of basic sciences, veterinary faculty, Shiraz University, Shiraz, Iran

Background: In this research the addition of dry fruit and vegetable waste of warm seasons and its silage to the diet of fattening lambs and their effect on hematology, serum biochemical parameters and alkaline phosphatase (ALP), rumen pH and intestinal tissue in fattening lambs was investigated.
Methods: In this experiment, 24 Turkish Qashqai male lambs with an average weight of 19.68 ± 5.3 kg and an average age of 120 + 1.4 days with 6 repetitions in each treatment were used in the form of a completely randomized design. Four experimental diets were: 1- control group (without fruit and dry waste) 2- Experimental group one: 70% of waste silage substituted for 30% of diet Experimental group two: 50% of dry fruit and vegetable waste substituted for 50% of diet 4- Experimental group three: 70% of dry fruit and vegetable waste substituted for 30% of diet. Lambs were fed 45 days with 10 days of adaptation period. Blood sampling was done on three occasions, day zero (before giving the experimental ration), in the middle and at the end of the course.
Results: Data analysis was done with SPSS software and ANOVA procedure and Duncan's comparison was done at the level of 5%. The findings of this research showed that the dry waste of fruit and vegetable and its silage did not have any negative effect on hematology, biochemical factors of serum. The findings of this research showed that the number of white blood cells, red blood cells, hemoglobin, and hematocrit did not show any significant difference between the experimental treatments. The amount of cholesterol differed among the experimental treatments and it was significantly lower in the group receiving 70% of dried fruit waste. ($p > 0.05$). The amount of urea in the group receiving 50% of dry fruit and vegetable waste was significantly lower ($p<0.05$). There was a significant difference between the groups in terms of MDA, so that the amount of MDA in the group receiving 70% of dry fruit and vegetable waste was significant. And the group receiving 70% dry fruit and tarbar silage was significantly decrease ($P<0.05$) and the pH of the rumen did not show any significant difference among the experimental treatments. The height of the villus and the depth of the duodenal crypt were not significant among the experimental treatments. The width of the duodenal villus in 70% of dry fruit and fruit residue silage group was significantly more ($p < 0.05$).
Conclusion: The results of this experiment showed that the substation of dry fruit and vegetable waste in the warm seasons had any negative effect on the hematology of serum, blood biochemical factors, serum ALP, rumen pH and intestinal tissue in fattening lambs.
Keywords: Hematology, Intestinal tissue, Rumen pH, Serum biochemical Silage fruit, Vegetable wastes

P890, Pediatric drug poisoning: A review study

Nastaran Dezhgam[1], Zahra Padam[2]
1. Department of Operating Room and Anesthesiology, School of Nursing and Midwifery, Zanjan University of Medical Sciences, Zanjan, Iran
2. Department of Operating Room, Behbahan University of Medical Sciences, Behbahan, Iran

Background: Poisoning is a common and potentially life-threatening public health issue. Although it can occur at any age, pediatric are particularly vulnerable to accidental poisonings due to their natural curiosity and limited ability to recognize potential environmental hazards. Therefore, the aim of this review study is to examine the Pediatric Drug Poisoning.
Methods: This review study was conducted in 2025. The databases PubMed, Google Scholar, and Scopus were searched using the keywords poisoning, drug poisoning, and pediatric. Articles published between 2015 and 2025 were retrieved. A total of 20 articles were collected, and after excluding irrelevant studies, 12 articles were finally reviewed.
Results: A review of the relevant studies revealed that pediatric poisoning is commonly caused by parental negligence and ranks as the fourth leading cause of death in children. The most affected age group was pediatric under 2 years old (57%). Ingestion was the most common route of poisoning (91.7%), and medications were the most frequently involved toxic agents (39.4%). The majority of poisoning cases (92.8%) occurred accidentally through oral ingestion within the home environment.
Conclusion: Providing parents with greater awareness about poisonings and how to prevent them—through adherence to safety measures in storing toxic substances—can significantly contribute to the prevention of such incidents.
Keywords: Poisoning, Drug Poisoning, Pediatric

P891, Evaluation of the antiproliferative effects of mesobuthus eupeus scorpion venom on human prostate cancer cell line (PC-3)

Mohanna Kian[1], Adel Abdollahnia[2], Homanaz Ghafari[1], Hossein Behboudi[2], Alireza Ghassempour[2], Mahmoud Ghazi-Khansari[1]

1. Department of Pharmacology, school of Medicine, Tehran University of Medical Sciences, Tehran, Iran
2. Medicinal Plants and Drugs Research Institute, Shahid Beheshti University, G.C. Evin, Tehran, Iran

Background: Scorpion venom is a rich and complex natural source of bioactive molecules, with over 100,000 compounds, primarily peptides and proteins, exhibiting diverse biological and pharmacological activities. Among these, anticancer properties are particularly notable, positioning scorpion venom as a promising candidate for novel cancer therapies. Prostate cancer, one of the most prevalent malignancies among men globally, is characterized by aggressive proliferation, invasive behavior, and high metastatic potential. This study aims to evaluate and compare the cytotoxic effects of crude venom from the Iranian scorpion Mesobuthus eupeus and its fractionated components within the molecular weight ranges of 0–5 kDa and 5–10 kDa on the human prostate cancer cell line PC-3.

Methods: In this study, the cytotoxicity and morphological alterations induced by crude venom of the scorpion Mesobuthus eupeus on the PC-3 prostate cancer cell line were evaluated after 24 hours using fluorescence microscopy, MTT assay, and flow cytometry (to assess apoptosis and necrosis). The crude venom was then fractionated into two molecular weight ranges (0–5 kDa and 5–10 kDa) using a centrifugal filter. Each fraction was lyophilized, quantified for protein content, and subsequently tested separately on PC-3 cells using the aforementioned assays.

Results: Crude scorpion venom significantly inhibited the proliferation of prostate cancer (PC-3) cells, markedly reducing cell viability after 24 hours, likely due to the presence of bioactive compounds. The IC_{50} value for the crude venom was determined to be 294.7 µg/mL. Fractionated components within the molecular weight ranges of 0–5 kDa and 5–10 kDa exhibited enhanced cytotoxic effects at substantially lower concentrations compared to the crude venom. Notably, the 5–10 kDa fraction showed the highest potency, with an IC_{50} of 14.77 µg/mL, whereas the 0–5 kDa fraction displayed an IC_{50} of 50.5 µg/mL. Furthermore, flow cytometry analysis revealed that treatment with both crude and fractionated venom induced mild early apoptosis, while a more significant proportion of cells underwent late apoptosis and necrosis.

Conclusion: Therefore, the findings of this study underscore the considerable anticancer potential of crude Mesobuthus eupeus scorpion venom and its fractionated components against human prostate cancer (PC-3) cells, suggesting their promise as novel candidates for the development of targeted therapies in prostate cancer treatment.

Keywords: Scorpion Venom, Cancer Cell, Mesobuthus Eupeus, Seperation, Prostate Cancer

P900, Association of restless legs syndrome and obesity in adults

Maryam Saberi-Karimian[1], Sara Saffar Soflaei[1,2], Mahnaz Amini[3], Majid Ghayour-Mobarhan[2], Habibollah Esmaily[4,5]

1. Metabolic Syndrome Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
2. International UNESCO Center for Health-Related Basic Sciences and Human Nutrition, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Pulmonary Disease, Lung Diseases Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
4 .Department of Biostatistics, School of Health, Mashhad University of Medical Sciences, Mashhad, Iran
5 .Social Determinants of Health Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Restless Legs Syndrome (RLS) is associated with obesity. In current study we aimed to assess the association of RLS with obesity among adults in Mashhad.
Methods: A total of 1006 participants, including 449 males and 557 females aged 57 (51.75 to 63.00) years, were randomly selected from the Mashhad stroke and heart atherosclerotic disorder (MASHAD) cohort study population. All subjects were contacted by phone to inquire about RLS according to the International RLS Study Group. Anthropometric indices like weight, height, waist (WC) and hip circumference (HC) were taken. Abdominal obesity was defined as a WC>90 cm for mails and >85 cm for females. Furthermore, as well as a waist-to-hip ratio (WHR) greater than 0.90 for males and 0.85 for females. A significance level set at a P-value<0.05.
Results: The results showed that in the total population, the OR of RLS in subjects having BMI>30 kg/m^2 increased to 1.50(1.10-2.03) after adjusting for confounding factors including age, diabetes, cardiovascular disease and employment status (p-value<0.01). Moreover, there was no significant association between RLS and obesity based on WC and WHR in fully adjusted model respectively.
Conclusion: The results showed that a BMI>30 kg/m^2 increased the odds of RLS by 1.50 times in the study population.
Keywords: Body Mass Index, Obesity, Restless Legs Syndrome

P901, Evaluating the factors affecting on adverse drug reactions during 5 years in south west of Iran

Hoda Mojiri-Forushani[1], Melika Mansouri nasrabad[2], Mohamad Kogani[3]
1. Department of Pharmacology, School of Medicine, Abadan University of Medical Sciences, Abadan, Iran
2. Department of Pharmacology, Student Research Committee, Abadan University of Medical Sciences, Abadan, Iran
3. Department of Biostatistics and Epidemiology, School of Health, Abadan University of Medical Sciences, Abadan, Iran

Background: Adverse drug reactions are among the cost-imposing factors on the healthcare system and affecting on health treatment process. The aim of this study was to evaluated the adverse drug reactions in teaching hospitals of Abadan and Khorramshahr during 2019 to 2023.
Methods: This cross-sectional study was descriptive-analytical. In this research 178 ADR form were evaluated. The information including demographic characterizes (age, gender), group of drugs, type of drug side effects, outcome of the side effects, and dosage form of drug were extracted. Then, the data was analyzed using SPSS version 26 software. The significant statistical level was considered 0.05.
Results: The findings indicated that, 51.7% of the subjects were female and the mean age of the patients was 32.92 years. The gender and age are not related to side effects (P=0.25) and (P=0.072), respectively. Antibiotics had the most side effects (73%) (P=0.001), and in 93.8% of patients, the way of administration was injection. Skin complications were the most complications (61.2%), and 98.3% of the observed complications eventually recovered (P=0.001). Unwanted drug complications have a significant relationship with the group of drugs (P=0.013). Our results also showed that neurological complications are associated with greater lack of improvement.
Conclusion: Skin reactions are the most prevalent form of adverse drug reactions, particularly those related to injectable medications. Antibiotics were identified as the leading cause of such reactions. These results highlight the importance of considering drug type, class, and formulation in prescribing practices to minimize the risk of adverse reactions.
Keywords: Antibiotics, Adverse Drug Reactions, Drug Group, Adverse effects

P902, Investigation on the State of opioid prescription in teaching hospital in Abadan in 2023

Hoda Mojiri-Forushani[1], Mahsa Abbasi[2], Mohamad Kogani[3]
1. Department of Pharmacology, School of Medicine, Abadan University of Medical Sciences, Abadan, Iran
2. Department of Pharmacology, Student Research Committee, Abadan University of Medical Sciences, Abadan, Iran
3. Department of Biostatistics and Epidemiology, School of Health, Abadan University of Medical Sciences, Abadan, Iran

Background: Morphine is the most widely used in hospitalized patients as an analgesic. One of the important points in prescribing morphine is to follow the principles and indications of its administration. The aim of this study was to investigate the pattern of rational use of injectable morphine in patients hospitalized in and Abadan hospitals in 2023.
Methods: This cross-sectional study was descriptive-analytical. In this research 460 patients were evaluated. The information including demographic characterizes, Type of ward, initial diagnosis, indications, side effects and history of previous analgesic use was extracted. Then, the dosage, indication and duration of treatment were compared with the up to date and micromedex guidelines. The data was analyzed using SPSS version 26 software.
Results: The findings showed that 64.8% of the patients receiving morphine according to adaptation to guidelines. The mean age of patients with and without adaptation to guidelines were 43.18 (17.41) and 33.07 (17.27), respectively (P=0.0001). There was no significant difference between patients with adaptation to guidelines in terms of frequency of gender (P=0.261). The average dose, frequency of morphine and frequency of side effects in patients with adaptation to guidelines were significantly lower than patients without adaptation to guidelines, respectively (P=0.02), (P=0.0001), (P=0.002).
Conclusion: In total, the findings showed that more than two-thirds of morphine prescriptions in the emergency and surgical departments were according to the prescription indications. Following the indications has been associated with older age, lower dosage and frequency of administration, and fewer side effects.
Keywords: Morphine, Prescription, Drug utilization, Adverse effects

P903, Morphometric assessment of the globus pallidus in adults using brain MRI images during 2013 to 2023 in Shiraz

Rouhollah Nazari[1]
1. Anatomy Department, School of Medicine, Shiraz University of Medical Sciences, Shiraz, Iran

Background: The putamen, a critical component of the basal ganglia, plays a pivotal role in motor control and learning. Precise characterization of its anatomical and morphometric properties is essential for elucidating brain functions and enhancing diagnostic and surgical techniques. The lack of standardized putamen metrics in local populations hinders precise diagnosis and treatment. This study aimed to investigate morphometric indices of the putamen in healthy individuals using magnetic resonance imaging (MRI).
Methods: In a retrospective cross-sectional study, data from 240 healthy individuals (120 males and 120 females) admitted to Shiraz University of Medical Sciences healthcare centers between 2013 and 2023 were analyzed. Using the *Infinitt* imaging system, putamen length, width, diameter, and midline distance were measured bilaterally. Associations with sex, age, and inter-variable correlations were analyzed via SPSS.
Results: The findings revealed that Putamen diameter and midline distance decreased with age, while length and width remained stable. Males exhibited larger dimensions in length, width, diameter, and right-sided midline distance than females. Significant positive correlations were found between bilateral length, diameter, and diameter-midline distance. The right putamen diameter exceeded the left.
Conclusion: Findings delineate a normative pattern of putamen morphometry, serving as a reference for detecting abnormalities in neurological conditions such as Parkinson's disease (PD). Age-related reduction in diameter and midline distance may represent a precursor to putaminal atrophy observed in PD. Sex and hemispheric differences suggest varying susceptibility to pathological changes. Results may use for future studies to improvement of diagnostic and therapeutic approaches, enhancing the quality of life in patients with neurological disorders.
Keywords: Putamen, Magnetic Resonance Imaging, Morphometry, Brain

P904, Cancer neoantigens: Personalized targets for tumors-specific immunotherapy

Hadiseh Vahabi[1], Mobina Bagherian[2], Mahdi Moassesfar[3], Fereshteh Atabi[4]
1. Student Research Committee, Department of Medical Laboratory Sciences, School of Allied Medical Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran
2. Department of Laboratory Science, TeMS.C., Islamic Azad University, Tehran, Iran
3. Department of Biosciences, University of Milan, Milan, Italy
4. Department of Biochemistry and Biophysics, TeMS.C., Islamic Azad University, Tehran, Iran

Background: Neoantigens are promising targets for personalized cancer immunotherapy due to their high specificity and low risk of autoimmune toxicity. Neoantigen vaccines and adoptive T cell therapies can induce potent immune responses but face challenges including tumor heterogeneity, clonal evolution, limited prediction accuracy, and complex manufacturing. This study aims to evaluate the current landscape of neoantigen vaccine development, identify key limitations, and highlight strategies to enhance their clinical application.
Methods: A systematic review was conducted, using PubMed, Scopus, and Web of Science to gather studies published between 2015 and 2025. Peer-reviewed original articles, clinical trials, and systematic reviews published in English that investigated neoantigen identification, vaccine development, prediction tools, or therapeutic application in human cancers were included. Studies were excluded if they were non-English, preclinical or animal-based, editorials, case reports, conference abstracts, or if they lacked sufficient data on neoantigen-related strategies.
Results: Findings indicate that tumor heterogeneity and clonal evolution significantly limit vaccine efficacy, necessitating multi-epitope targeting and dynamic vaccine design. Current prediction algorithms exhibit high false-positive and false-negative rates, underscoring the need for integration with multi-omics data and machine learning approaches to improve precision. Manufacturing remains a bottleneck due to time intensity, cost, and lack of standardization. Combination therapies, particularly those incorporating immune checkpoint inhibitors or adoptive T cell transfer, enhance treatment outcomes by modulating the immunosuppressive tumor microenvironment.
Conclusion: Neoantigen vaccines are a promising but complex strategy for personalized cancer treatment. Future studies should focus on improving antigen prediction through AI-driven multi-omics approaches and streamlining manufacturing processes.
Keywords: Cancer Vaccines, Immunotherapy, Precision Medicine, Machine Learning

P905, The Role of cultural gender traits and premenstrual symptoms in predicting ambiguity in describing menstrual pain

Shadieh Sani[1], Zeinab Zarrabi Moghaddam[2]
1. Department of Psychology, Khayyam University, Mashhad, Iran
2. Faculty Member, Department of Psychology, Khayyam University, Mashhad, Iran

Background: Premenstrual syndrome and menstrual pain are among the most common health problems in women. Although they have been well examined biologically, environmental factors, especially culture, that may affect women's health have not been sufficiently studied. This study examines how Hofstede's cultural dimensions (femininity_masculinity) influence ambiguity in reporting menstrual pain and PMS. An innovative index called "Menstrual Pain Ambiguity" (MDR) is also introduced.
Methods: In this descriptive–correlational study, 278 Iranian women aged 17 to 35 completed the data using valid questionnaires, including the Hofstede cultural dimensions scale, the Premenstrual Symptoms Screening Tool (PSST), and the McGill pain questionnaire, through social media platforms. The index measuring ambiguity in describing menstrual pain, which shows uncertainty in expressing pain, was extracted from the sensory and affective components of the McGill questionnaire. Data analysis was performed using a two-step hierarchical regression.
Results: Gender traits significantly predicted ambiguity in describing menstrual pain (MDR) ($\beta = 0.204$, $p = 0.038$). PMS was also positively and independently associated with increased MDR ($\beta = 0.131$, $p = 0.028$). The overall hierarchical regression model showed significant and acceptable predictive power (R^2 change = 0.039, F change = 3.707, $p = 0.012$).
Conclusion: Cultural dimensions related to gender roles and PMS significantly affect difficulty in expressing menstrual pain. A higher tendency toward masculine rather than feminine traits and PMS symptoms were both associated with greater ambiguity in reporting menstrual pain. These findings highlight the importance of cultural factors in menstrual health.
Keywords: Cultural Dimensions, Dysmenorrhea, Premenstrual Syndrome, Pain Assessment, Iranian Women

P906, The role of sleep quality and stress in the development of coronary artery disease

Roya Hosseini[1], Nayere Askari[2], Motahareh Hatami[3],
1. Department of Biology, Faculty of Sciences, Shahid Bahonar University of Kerman, Kerman, Iran
2. Immunoregulation Research Center, Shahed University, Tehran, Iran
3. Tehran Heart Center, Tehran University of Medical Sciences, Tehran, Iran

Background: Coronary artery disease (CAD) remains a leading cause of morbidity and mortality globally, and emerging evidence highlights the role of sleep disturbances and stress-related physiological changes in its pathogenesis. The aim of this study was to investigate the associations between sleep quality, stress-related biomarkers, and the development of coronary artery disease.
Methods: In this cross-sectional study, we evaluated both subjective sleep quality and objective biochemical markers in relation to CAD. A total of 240 patients were assessed for sleep quality using the Pittsburgh Sleep Quality Index (PSQI), alongside clinical and demographic data. Additionally, we investigated the roles of cortisol and melatonin across four clinical subgroups based on CAD and sleep quality status.
Results: Our results showed that poor sleep quality was notably more prevalent among women and was associated with anxiety and menopausal status. Elevated cortisol levels were linked to CAD severity, while compensatory elevations in melatonin may reflect adaptive responses.
Conclusion: These findings suggest that sleep quality and stress-related biomarkers may provide valuable insights into CAD risk and progression, emphasizing the importance of integrated clinical strategies targeting psychosocial and metabolic health.
Keywords: CAD, Sleep quality, Cortisol, Melatonin

P907, Comparison of three decellularization methods for preparing natural human ureter scaffold

Faramarz Fazeli[1], Mahmoud Tavakkoli[2], Saghar ghanbari[3], Mehdi Kheirandish[4], Samira Shahraki[4]
1.Transplant Fellowship and Urology Specialist, Department of Urology, Faculty of Medicine, Zahedan University of Medical Sciences, Zahedan, Iran
2. Department of Urology, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Independent researcher, Zahedan, Iran
4. Department of Physiology, Zahedan University of Medical Sciences, Zahedan, Iran

Background: In recent years, iatrogenic injuries have been the most cause for ureteral reconstruction. The use of classical surgical treatments have not only introduced significant clinical issues. Therefore, tissue engineering with culturing cells on scaffolds to reconstruct the ureter can relieve these complications. The aim of this study was to identify an appropriate and effective method for preparing decellularized human ureter scaffold.
Materials and Methods: In the current work three decellularization protocols were compared on human ureter sections which obtained under standard conditions from Imam Ali Hospital in Zahedan. In protocol 1, used 1% Triton X-100, in the second protocol used 1% SDS (Sodium Dodecyl Sulfate), and in protocol 3, detergents including 1% SDS and Triton X-100. The efficiency of each decellularization method was assessed on days 5 and 7 by using 4', 6 diamidino-2-phenylindole (DAPI) staining.
Results: Based on the DAPI staining results, the comparison of the decellularized human ureter sections and non-decellularized ureter tissues indicated the removal of cell nuclei and preservation of the extracellular matrix in all segments across all of three decellularization protocol at all-time points. The elimination of cellular components was more pronounced in protocol 3 compared to the other protocols. Moreover, in these protocol, day 7 was more effective in removing cell nuclei and cellular components from the human ureter compared to day 5.
Conclusion: The findings of this study indicate that protocol 3 of decellularization on day 7 is more effective method than other protocols for producing natural human ureter scaffolds.
Keywords: Human ureter, Decellularization, Sodium dodecyl sulfate, Triton X-100

P908, Laboratory diagnostic markers (blood, renal, and coagulation) in patients with liver cirrhosis and hepatitis

Esmat Radmanesh[1], Mehdi Kiani Motlagh Jonaghani[2], Atefeh Zahedi[3], Hoda Mojiri-Forushani[4], Khadijeh Kanani[5], Sara Mobarak[6]

1. Department of Physiology, School of Medicine, Abadan University of Medical Sciences, Abadan, Iran
2. Student Research Committee, Abadan University of Medical Sciences, Abadan, Iran
3. Department of Public Health, Asadabad School of Medical Sciences, Asadabad, Iran
4. Department of Pharmacology, School of Medicine Abadan, University of Medical Sciences, Abadan, Iran
5. Clinical Research Development Unit, Taleghani Educational Hospital, Abadan University of Medical Sciences, Abadan, Iran
6. Department of Infectious Diseases, School of Medicine, Abadan University of Medical Sciences, Abadan, Iran

Background: Cirrhosis and hepatitis are among the most common liver diseases in the world, which can have devastating effects on the liver, kidney, and coagulation system. Therefore, evaluating the level of kidney, liver, coagulation, and blood diagnostic markers in these patients can help in early diagnosis, timely treatment, and prevention of complications of these diseases.
Methods: This study is analytical-cross-sectional. After obtaining the necessary permits, by referring to the medical records department of Abadan and Khorramshahr educational hospitals, the information of patients with liver cirrhosis and hepatitis admitted from 2016 to 2018, available in the HIS, was obtained.
Results: The study analyzed data from 148 patients, with 80 patients (54.1%) diagnosed with liver cirrhosis and 68 (45.9%) diagnosed with hepatitis. Of these patients, 92 (62.2%) were male. In both diseases, the mean levels of FBS, total and direct bilirubin, SGOT, SGPT, Alp, LDH, PT, and INR were higher than the normal range. Comparing the markers between liver cirrhosis and hepatitis, the mean levels of BS, FBS, BUN, creatinine, and LDH were significantly higher in cirrhosis. The mean levels of TG, LDL, Na, direct and total bilirubin, and SGOT and SGPT were significantly higher in hepatitis ($P<0.05$).
Conclusion: According to the research, cirrhosis tends to occur at an older age than hepatitis. Both diseases are more prevalent among men. Disturbances in coagulation markers and liver function tests were also observed in both cirrhosis and hepatitis patients. Some other markers showed significant differences between diseases, age, and gender.
Keywords: Hepatitis, Cirrhosis, Kidney markers, Coagulation markers, Liver marker

P909, Comparison of the efficacy of oral and IV levetiracetam in the acute phase of mania in bipolar patients

Sofia Salari[1], Sima Garmei[2], Ali Akhondpour Manteghi[2], Alireza Sajjadi[2], Amir Hooshang Mohammadpour[1]

1. Department of Clinical Pharmacy, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Psychiatry, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Mood disorders, notably bipolar disorder with a nearly 7% incidence risk, significantly affect mood, sleep, cognition, and daily functioning. Prompt treatment is vital to prevent lasting deterioration; thus, in this research, we examined the effect of IV and oral levetiracetam in acute mania.

Methods: The study involved 36 bipolar disorder patients, assessed via Diagnostic and Statistical Manual of Mental Disorders -5 (DSM-5), with Young Mania Rating Scale (YMRS) score over 20. They were randomly allocated to two groups: one receiving IV levetiracetam (500 mg infused over 15 minutes for 7 days, followed by oral for 7 days) and the other getting oral levetiracetam (500 mg every 12 hours for 14 days). Lorazepam was given orally (up to 2 mg daily), with midazolam available if needed. Daily evaluations using YMRS and Clinical Global Impression-Improvement (CGI-I) were conducted by a blinded evaluator, and adverse effects were monitored.

Results: The YMRS showed no overall score improvement, but significant differences were noted in thinking content, insight, and energy levels post 7-day injectable treatment ($P < 0.05$). Between days 8 and 12, the IV group showed significant improvement in CGI-I score compared to the oral group ($P < 0.05$).

Conclusion: IV levetiracetam demonstrated significant improvement in patient performance after 8-12 days ($P < 0.05$). Improvements were noted in mania subscales like thought content, insight, and energy level, but not in overall YMRS scores. However; longer studies are needed for conclusive results.

Keywords: Bipolar Disorder, Mania, Levetiracetam

P910, Comparison of the effectiveness of phenytoin and sodium valproate in the acute phase of mania in patients with bipolar disorder

Sofia Salari[1], Azadeh heidarzadeh[2], Ali Akhondpour Manteghi[2], Zahra Abbasi Shaye[3], Amir Hooshang Mohammadpour[1]

1. Department of Clinical Pharmacy, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Psychiatry, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of community medicine, clinical research & development unit, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Various anticonvulsants, while primarily used for epilepsy, have shown efficacy in mood disorders such as depression and mania. The effectiveness of specific antiepileptic medications as alternatives to psychological drugs for mania is uncertain, especially concerning oral versus injectable forms. This study evaluated the effectiveness of oral sodium valproate and phenytoin during the acute phase of mania in bipolar disorder.

Methods: In this clinical trial study, patients with the acute phase of mania of bipolar disorder were randomly treated with oral sodium valproate (20 mg/kg.d) and phenytoin (100-600 mg daily) oral, and before the treatment and also during the treatment period (the first and second weeks of treatment) were evaluated in terms of the severity of mania manifestations through Young Mania Rating Scale (YMRS) and Clinical Global Impressions (CGI) tests.

Results: Before the drug intervention, there was no significant difference in YMRS and CGI scores between the groups treated with oral sodium valproate and oral phenytoin. However, after one and two weeks, sodium valproate showed significantly lower scores, with a significant downward trend, unlike the phenytoin group, which did not show significance.

Conclusion: In patients with bipolar disorder in the acute phase of mania, the comparison of two drugs oral sodium valproate and oral phenytoin shows the favorable effectiveness of the first drug and we still lack sufficient evidence regarding the effectiveness of oral phenytoin.

Keywords: Bipolar disease, Mania, Sodium valproate, Phenytoin

P911, Safety of oral capsule dosage form preparation of *Dracocephalum kotschyi* extract: a clinical trial in healthy volunteers

Hassan Sadraei[1], Zahra Karami[1]
1. Department of Pharmacology and Toxicology, School of Pharmacy and Pharmaceutical Sciences, Isfahan University of Medical Sciences, Isfahan, Iran

Background: *Dracocephalum kotschyi* (*D. kotschyi*, Boiss.) traditionally has been used for alleviation of asthma and other ailments. The objective of this study was to investigate safety of daily administration of capsule dosage form prepared from hydroalcoholic extract of *D. kotschyi* in human subjects.
Methods: Ten young, healthy, drug free, male volunteers (aged 22-42) took part in this open clinical trial (IRCT20200810048352N4). All had biochemical and hematological screening and physical examination prior to the study to ensure their fitness. Eligible subjects received *D. kotschyi* capsules (50mg three times a day) over a four weeks period. At each time point (prior and 2 and 4 weeks), recording was made of blood pressure, and several items on psychological self-rating scales. Plasma hematological and biochemical parameters, gastrointestinal events and any other concerned effects were also assessed.
Results: Although mild adverse events, such as nausea, constipation and diuresis, were observed occasionally, no serious side effect were reported. Non-significant changes were seen in hematological and biochemical tests or blood pressure nor did *D. kotschyi* capsule significantly change psychological self-rating values such as anxiety or alertness. On the other hand *D. kotschyi* capsule significantly improved sleep quality and reduced insomnia rating ($P<0.05$). No allergic reaction was reported but a reduction in rhinorrhea rating was noticed ($P<0.05$).
Conclusion: From this study it was concluded that oral administration of *D. kotschyi* capsule (50mg) for four weeks was relatively safe, tolerable, without any serious unwanted effect in healthy male volunteers. Mild diuresis, constipation and nausea are main concern side effects.
Keywords: Zaringiah, Tolerance, Adverse effect

P912, Vitamin K and warfarin therapy: Revisiting dietary guidance for better INR stability, a narrative review

Elham Abdi[1], Zeynab Golara[1], Shayan Rezanejad[2]
1. Department of Nutrition, School of Health, Zanjan University of Medical Sciences, Zanjan, Iran
2. Department of nutrition, school of health, Bushehr University of medical sciences, Bushehr, Iran

Background: Warfarin is a widely used oral anticoagulant with a narrow therapeutic index and high inter individual variability. Its mechanism—blocking the vitamin K epoxide reductase complex (VKORC1)—makes it highly sensitive to fluctuations in dietary vitamin K. Despite long-standing use, instability in INR due to inconsistent vitamin K intake remains a clinical concern, particularly in populations with plant-based diets rich in leafy greens.
Methods: This narrative review explores the interaction between dietary vitamin K and warfarin response. Recent findings on vitamin K subtypes (*phylloquinone* and *menaquinones*), gut microbiota-derived vitamin K2, and the impact of pharmacogenetic variants (VKORC1, CYP2C9) were analyzed to highlight their roles in modulating warfarin's effect.
Results: Avoidance of vitamin K is still commonly advised in clinical practice, but this may lead to over-restriction, unstable INR levels, and poor adherence. Evidence increasingly supports maintaining a consistent—rather than minimal—vitamin K intake. Emerging data suggest that *menaquinones* produced by gut bacteria may influence warfarin dosing, especially in individuals with distinct microbiota profiles. Genetic variability further contributes to differences in warfarin sensitivity, supporting the need for personalized dietary guidance.
Conclusion: Tailored vitamin K intake considering microbiota and genetic profiles may enhance INR stability and improve patient outcomes.
Keywords: Warfarin; Vitamin K; INR; Gut Microbiota

P913, Association of serum vitamin D level and hematological inflammatory indices in participants of the MASHAD study

Abbas Mohtashamian[1,2], MohammadReza Latifi[3], Reza Nezhad Shahrokh Abadi[4], Rana Kolahi-Ahari[5,6], Toktam Sahranavard[5,6], Sara Saffar Soflaei[6,7], Negar Morovatdar[8], Mohaddeseh Sedaghati Noghabi[5,6], Ramin Rezaee[5], Majid Ghayour-Mobarhan[7]

1. Department of Nutritional sciences, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Student Research Committee, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Biology, Mashhad Branch, Islamic Azad University, Mashhad, Iran
4. Clinical Research Development Unit, Ghaem Hospital, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
5. Applied Biomedical Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
6. International UNESCO Center for Health-Related Basic Sciences and Human Nutrition, Mashhad University of Medical Sciences, Mashhad, Iran
7. Metabolic Syndrome Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
8. Clinical Research Development Unit, Imam Reza Hospital, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Vitamin D, a fat-soluble vitamin, plays vital roles in physiological processes, with recent evidence linking optimal levels to improved immune function and reduced systemic inflammation. This cross-sectional study from phase I of the MASHAD cohort in Mashhad, Iran, evaluated associations between serum vitamin D levels and hematological inflammatory indices in adults aged ≥18 years

Methods: Participants (n=458, equal males and females) were recruited from a representative population with informed consent. Indices assessed included Red Cell Distribution Width (RDWcv), high-sensitivity C-reactive protein (hsCRP), systemic immune-inflammation index (SII), platelet-lymphocyte ratio (PLR), neutrophil-lymphocyte ratio (NLR), mean platelet volume (MPV), and platelet distribution width (PDW). Vitamin D groups were defined by quartiles, with correlations and group differences analyzed.

Results: Serum vitamin D showed weak correlations with hsCRP (-0.02), SII (-0.01), PLR (0.05), NLR (0.01), PDW (-0.05), and RDWcv (-0.04). In males, no significant differences appeared in RDWcv, PDW, MPV, NLR, or PLR across vitamin D quartiles ($p>0.05$). Among females, PDW differed significantly between quartiles 1 and 4 ($P=0.026$) and marginally between 1 and 3 ($P=0.062$).

Conclusion: Findings indicate weak overall associations between vitamin D and inflammatory markers, but reveal gender-specific differences, particularly in PDW and RDW varying by vitamin D quartiles in women. This suggests sex-dependent immunomodulatory effects of vitamin D in the Iranian cohort.

Keywords: Vitamin D, Inflammatory indices, Metabolic parameters, Hematologic inflammatory biomarkers

P914, Association between vitamin D status and biochemical parameters in breastfed normal and overweight infants

Abbas Mohtashamian[1,2], Iman Alami-Arani[3], Hamideh Ghazizadeh[4,5,6], Malihe Aghasizadeh[1,7], Anahid Hemmatpour[6], Ensieh Akbarpour[6], Reza Zare-Feizabadi[6], Davoud Tanbacoochi[6], Sara Ghazizadeh[3], Habibollah Esmaily[8], Reza Assaran-Darban[3], Majid Ghayour-Mobarhan[6]

1. Student Research Committee, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Department of Nutritional sciences, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Biology, Faculty of Sciences, Mashhad Branch, Islamic Azad University, Mashhad, Iran
4. CALIPER Program, Division of Clinical Biochemistry, Pediatric Laboratory Medicine, The Hospital for Sick Children, Toronto, ON, Canada
5. Department of Laboratory Medicine & Pathobiology, University of Toronto, Toronto, ON, Canada
6. International UNESCO Center for Health-Related Basic Sciences and Human Nutrition, Mashhad University of Medical Sciences, Mashhad, Iran
7. Department of Internal Medicine, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
8. Social Determinants of Health Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Normal infant development depends on optimal vitamin D levels, with supplementation playing a key role in preventing and treating pediatric diseases. However, the link between vitamin D status and blood biochemical parameters in healthy breastfed infants remains poorly documented. This study examined these associations in 449 healthy breastfed infants.

Methods: Participants were grouped by questionnaire responses on vitamin D supplement use: regular consumers (400 IU/day), irregular consumers (1 mL on some days/less than 1 mL), and non-consumers. Infants were also categorized by vitamin D levels into deficiency (VDD), insufficiency (VDI), and sufficiency (VDS) groups. Blood levels of 25-(OH) vitamin D, calcium, phosphorus, glucose, lipid and inflammatory markers, plus liver and renal function indices were assessed.

Results: Serum vitamin D was higher in regular consumers, who showed lower weight, creatinine, and RDW/Platelet ratio versus non-consumers. Elevated infant vitamin D correlated positively with serum cholesterol, ALT, urea, uric acid, total bilirubin, LHR, and WBCs, but negatively with PLR. Overweight VDS infants had higher urea, uric acid, and total bilirubin than VDD infants in the same group.

Conclusion: Findings indicate independent correlations between cholesterol, urea, PLR, and WBC count with vitamin D levels in breastfed infants, underscoring the value of regular supplementation for biochemical balance.

Keywords: Infants, weight, Vitamin D, Blood biochemical parameters, Metabolic markers

P915, Assessing the significance of BPIFB2 in CRC patients

Reihaneh Alsadat Mahmoudian[1,2], Parvaneh Mahmoudian[3], Soodabeh Shahidsales[1]
1. Metabolic syndrome Research center, Mashhad University of Medical Sciences, Mashhad, Iran
2. Cancer Research Center, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Gynecology oncology, Iran University of Medical Sciences, Tehran, Iran

Background: Colorectal cancer (CRC) is a leading global health threat, with prognosis shaped by molecular and immune microenvironment factors. The BPIFB2 gene, crucial for mucosal immunity and gut barrier integrity, is involved in pathogen defense and epithelial maintenance. Altered BPIFB2 expression is linked to CRC risk and progression, with lower levels potentially promoting tumorigenesis and metastasis. Studying BPIFB2 in CRC could advance understanding of immune regulation and tumor biology, revealing new biomarkers and therapeutic targets. However, the clinical significance and expression patterns of BPIFB2 in CRC remain unclear. This study explores BPIFB2's potential oncogenic role and its association with clinicopathological features, aiming to provide insights for improved CRC diagnosis and treatment strategies.
Methods: In this study, we analyzed paired tumor and adjacent normal tissue samples from 50 patients with CRC who underwent surgical resection. The expression level of *BPIFB2* was quantified using real-time PCR.
Results: *BPIFB2* expression showed heterogeneity; 56% of tumors exhibited overexpression, while 26% showed under expression compared to normal tissue. Statistical analysis revealed a significant correlation between *BPIFB2* expression levels (log2 fold-change) and tumor stage ($p < 0.05$), indicating that *BPIFB2* dysregulation is associated with tumor progression.
Conclusion: This study first links BPIFB2 expression to CRC progression, indicating a possible oncogenic role. Its dual expression pattern underscores complex involvement in CRC. As BPIFB2 correlates with tumor advancement in other cancers, it may be a prognostic biomarker and therapeutic target in CRC, but further research is needed.
Keywords: CRC, BPIFB2, Gene expression, Biomarker

P917, Effectiveness of cyclic yoga therapeutic practice on sleep quality on type 2 diabetic women with non-alcoholic fatty liver disease

Zahra Bayat[1], Seyedeh Soolmaz Mahdioun[2], Houshang Nemati[3], Fatemeh Rezvan Madani[4], Mehrali Rahimi[5], Hanieh Dehghan[6]

1. Department of Sports Science, University of Tehran, Kish International Campus, Kish, Iran
2. Department of Sports Science, Payam-e-Noor University, Tehran, Iran
3. Medical Biology Research Center, Health Technology Institute, Kermanshah University of Medical Sciences, Kermanshah, Iran
4. Inspection and Performance Evaluation Department, Iran University of Medical Sciences, Tehran, Iran
5. Department of Medical Sciences, Medical Sciences University of Kermanshah, Kermanshah, Iran
6. Department of Sports Science, Payam-e-Noor University, Tehran, Iran

Background: Type 2 diabetes is a chronic disease with a rising global prevalence. Its numerous complications adversely affect both physical and mental health, often diminishing patients' quality of life. Poor sleep quality is particularly common among type 2 diabetic patients and is closely associated with worse quality of life and mental health outcomes. As a new therapeutic style, cyclic yoga is being explored as an adjunct therapy for chronic diseases. Given the crucial role of sleep quality in type 2 diabetes management, this study aimed to investigate the effects of cyclic yoga therapy on sleep quality in type 2 diabetic patients with non-alcoholic fatty liver disease (NAFLD).
Methods: Forty women with type 2 diabetes and NAFLD participated in this study. Participants were randomly assigned to either a cyclic yoga group (n=20) or a control group (n=20), with groups balanced by fatty liver grade (7 patients with grade 1, 7 with grade 2, 6 with grade 3). The intervention group performed cyclic yoga in a gym three times per week for two months, with session duration gradually increasing from 45 to 90 minutes. Sleep quality was assessed before and after the intervention using the Pittsburgh Sleep Quality Index (PSQI), a 14-item, seven-dimension questionnaire with a Cronbach's alpha of 0.88 in this study.
Results: At baseline, no significant differences existed between groups regarding descriptive or clinical characteristics, including sleep quality scores ($p>0.05$). After the intervention, the cyclic yoga group showed significant improvements in multiple PSQI dimensions, including subjective sleep quality, sleep latency, sleep duration, and sleep disturbances, compared to controls ($p\leq0.05$). Overall, cyclic yoga led to significant improvements in all PSQI dimensions and the total sleep quality score ($p\leq0.05$), while the control group exhibited no significant changes.
Conclusion: Disturbed sleep is associated with greater risk of cardiovascular disease, metabolic problems, and obesity in type 2 diabetes. The findings of this study suggest that cyclic yoga therapy can significantly enhance sleep quality in type 2 diabetic women with NAFLD. Cyclic yoga is therefore recommended as a complementary intervention to improve sleep quality in this patient population.

Keywords: Sleep Quality, Yoga Therapy, NAFLD, Type 2 Diabetes, PSQI

P918, Impact of cyclic yoga on quality of life in type 2 diabetes women with NAFLD

Zahra Bayat[1], Seyedeh Soolmaz Mahdioun[2], Houshang Nemati[3], Fatemeh Rezvan Madani[4], Mehrali Rahimi[5], Hanieh Dehghan[6]

1. Department of Sports Science, University of Tehran, Kish International Campus, Kish, Iran
2. Department of Sports Science, Payam-e-Noor University, Tehran, Iran
3. Medical Biology Research Center, Health Technology Institute, Kermanshah University of Medical Sciences, Kermanshah, Iran
4. Inspection and Performance Evaluation Department, Iran University of Medical Sciences, Tehran, Iran
5. Department of Medical Sciences, Medical Sciences University of Kermanshah, Kermanshah, Iran
6. Department of Sports Science, Payam-e-Noor University, Tehran, Iran

Background: Quality of life (QoL) is often compromised in women with type 2 diabetes (T2D) and non-alcoholic fatty liver disease (NAFLD). This quasi-experimental clinical trial investigated the effects of an 8-week cyclic yoga intervention on QoL, as measured by the Short Form Health Survey (SF-36), in this patient group.

Methods: Forty women aged 45–55 years with diagnosed T2D and NAFLD (BMI >25, mean age 50.5 ± 5.5) were randomized into a cyclic yoga group (CYG) or control group (CG). The CYG performed structured, supervised cyclic yoga sessions three times per week, while the CG maintained usual lifestyle without active intervention. QoL was evaluated pre- and post-intervention using the SF-36 questionnaire, covering domains such as physical functioning, pain, energy, social functioning, and general health.

Results: No baseline differences in SF-36 domains were observed between groups ($p>0.05$). Following the intervention, the CYG demonstrated significant improvements across most SF-36 domains compared to the CG, notably in physical functioning, limitations due to physical health, energy/fatigue, emotional well-being, bodily pain, general health, and total SF-36 score (all $p\leq0.05$). Within-group analysis revealed significant increases in QoL scores for the CYG ($p=0.001$), while the CG experienced declines in physical functioning and general health ($p<0.01$).

Conclusion: An 8-week cyclic yoga program significantly enhances QoL in T2D women with NAFLD, as measured by the SF-36 questionnaire. Cyclic yoga may be recommended as a complementary intervention to improve physical and mental health in this high-risk population.

Keywords: Quality of Life, Cyclic Yoga, Type 2 Diabetes Mellitus, Non-Alcoholic Fatty Liver Disease

P919, A systematic review of the effects of probiotic supplements on mental health and sleep in children

Mohammad Kazem Imani Khoshkhoo[1], Maryam Razavi Darmian[2]
1 .Student Research Committee, School of Public Health, Kerman University of Medical Sciences, Kerman, Iran
2. Department of Nutrition Sciences, Committee of Medical Education Development of Varastegan Institute for Medical Sciences, Mashhad, Iran

Background: The gut microbiota influences brain function through neurotransmitters and inflammation. Probiotics like *Lactobacillus* and *Bifidobacteria* may improve mood and sleep by modulating gut balance. However, findings in children are mixed. This review evaluates clinical trials on how probiotic supplements affect mental health and sleep in children.
Methods: A comprehensive search in databases (PubMed, Scopus, Web of Science, and Cochrane Library) was conducted until May 2023. Randomized controlled trials (RCTs) involving children aged 0–18 years reporting outcomes related to anxiety, depression, or sleep were included. Studies with only prebiotic or without relevant data were excluded. Two independent reviewers extracted and reviewed data and assessed bias.
Results: Five RCTs (412 children aged 3–18) were identified. The trials ranged in length from 6 to 12 weeks, and the strains included *L. rhamnosus* and *B. longum*. One study reported a small but significant decline in anxiety and depression. In some, results were varied, especially in children with neurological developmental issues. When it comes to sleep, one study found an increase in quality, but another saw no clear change. Three studies were at low risk of bias; heterogeneity of methods restricted comparisons.
Conclusion: There is early evidence that probiotics might be helpful for mild anxiety, depression, and sleep in children. But the results aren't consistent. We need more research with larger samples and better measures of sleep before drawing firm conclusions or recommending clinical use.
Keywords: Probiotic, Mental Health, Sleep, children

P920, Impact of time-restricted feeding on circadian rhythm hormones (melatonin, cortisol, ghrelin, and leptin) and metabolic flexibility in young adults

Omid Barez[1], Yalda Hsanzadehghanad, Atefeh Sarrafan Sadeghi[2]
1. Department of Nutrition, Varastegan Institute for Medical Sciences, Mashhad, Iran
2. Department of Food Science and Technology (Quality Control and Hygiene), Varastegan Institute for Medical Sciences, Mashhad, Iran

Background: Time-restricted feeding (TRE), a diet regime that limits food consumption to certain periods of the day, has become an attractive way to regulate circadian rhythm and maintain metabolic fitness. A number of circadian hormones, such as melatonin, cortisol/hydrocortisone, ghrelin and leptin are critical in the regulation of sleep-wakefulness rhythm as well as appetite and energy metabolism. Insight into how TRE affects these hormones and metabolic flexibility may illuminate potential targets for dietary interventions geared toward restoring metabolic homeostasis.
Methods: A systematic review and analysis of the literature conducted via PubMed, Scopus and Google Scholar. These studies published 2015-2022.
Results: It is suggested that TRE may increase melatonin and cortisol amplitude, improving sleep quality and stress control. TRE also modifies appetite hormones (decreasing ghrelin, increasing leptin sensitivity) and this may result in better control of appetite and energy balance. Taken together, these hormonal adaptations are serendipitous consequences for improved metabolic flexibility, better glucose control and favorable lipid metabolism. Differences in timing and length of feeding window seem to modulate the effects of these factors.
Conclusion: Time-restricted feeding may be a useful dietary strategy to regulate circadian aspects of hormone balance and metabolic flexibility in young adults. Aligning food consumption with the endogenous circadian rhythm, TRE could potentially optimise metabolic health, aid body weight regulation and decrease the risk of metabolic diseases. The results of this analysis may be a good basis for future clinical trials and recommendations.
Keywords: Time-restricted feeding, Circadian rhythm, Melatonin, Cortisol, Ghrelin, Leptin, Metabolic Flexibility, Young adults

P921, Knowledge, attitudes, practices assessment regarding the home storage and use of oral chemotherapy drugs among parents of children with cancer

Sara Jahangiri[1], Mohammad Reza Mosaddegh[2], Ali Ghasemi[3], Omid Arasteh[4]
1. Dr. Sheikh Children's Hospital, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Pediatrics, Dr. Sheikh Hospital, Mashhad University of Medical Sciences, Mashhad, Iran
4. Department Of Clinicia Pharmacy, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Childhood cancers, though only 1% of total cases, cause substantial mortality, with leukemia comprising a major portion. Treatment relies heavily on long maintenance phases at home, where parents assume responsibility for administering oral chemotherapy such as 6-MP and methotrexate. Non-adherence and medication errors remain common, influenced by stress, limited knowledge, and practical challenges. As clinic visits decrease, unmet educational needs grow. Assessing parents' knowledge, attitude, and practice is essential for ensuring safe drug use and supporting effective home-based treatment.
Methods: This descriptive cross-sectional study assessed the knowledge, attitude, and practice of parents of children with cancer regarding home use of oral chemotherapy at Dr. Sheikh Hospital, Mashhad. Participants were randomly selected based on inclusion criteria and completed a validated, reliable researcher-made questionnaire covering demographics, information sources, and educational needs. Data were analyzed using SPSS 24 with descriptive statistics and non-parametric tests at a 0.05 significance level.
Results: This study assessed 92 parents of children with cancer and found moderate knowledge, positive attitudes, and high practice scores regarding home use of oral chemotherapy. Knowledge showed a significant positive correlation with practice ($r = 0.362$, $p < 0.001$) and was the only significant predictor in regression ($p < 0.001$). No significant associations were found between attitude and knowledge ($p = 0.829$) or practice ($p = 0.324$).
Conclusion: Knowledge is the strongest determinant of safe practice, highlighting the need for structured, timely, and standardized caregiver education.
Keywords: Parents, Childhood Cancer, Oral Chemotherapy

P922, Unmasking the Silent Carrier: A Prospective Mutation Analysis of ABCB4 and ABCB11 via Sanger Sequencing in IVF-Induced Intrahepatic Cholestasis of Pregnancy in Northeast Iran

Tayebeh Hamzehloei[1]
1. Department of Medical Genetics and Molecular Medicine, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: The incidence of Intrahepatic Cholestasis of Pregnancy (ICP) is markedly elevated in pregnancies conceived via In Vitro Fertilization (IVF). Current literature suggests a "two-hit" hypothesis wherein supraphysiological hormone levels unmask latent genetic defects in hepatobiliary transporters. This study aimed to investigate the prevalence of variants in *ABCB4* and *ABCB11* using Sanger sequencing in an Iranian cohort undergoing IVF.
Methods: This matched case-control study was conducted at the Infertility Center of Razavi Hospital, Mashhad, Iran. The study population consisted of 60 pregnant women who conceived via IVF/ICSI, divided into two groups: 30 women who developed ICP (Case Group) and 30 matched controls who did not develop liver dysfunction (Control Group). Genomic DNA was extracted, and all coding exons of *ABCB4* and *ABCB11* were amplified and analyzed using direct Sanger sequencing.
Results: Potentially pathogenic heterozygous variants were identified in 26.6% (8/30) of the Case Group, compared to only 3.3% (1/30) of the Control Group (p = 0.028). Specifically, *ABCB4* variants were found in 20% (6/30) of cases, while *ABCB11* variants were found in 6.6% (2/30). We identified a recurrent missense variant in *ABCB4* (c.2906G>A) in three unrelated patients from the Khorasan province. Clinical severity, defined by serum bile acid levels >40 µmol/L, correlated significantly with the presence of *ABCB4* mutations.
Conclusion: Our findings confirm that IVF-associated ICP in the Northeast Iranian population is strongly driven by underlying heterozygous mutations in *ABCB4* and *ABCB11*. The hormonal surge of IVF acts as a "second hit," precipitating cholestasis in genetically susceptible women. These results advocate for targeted genetic screening at Razavi Hospital for high-risk ART candidates.

P923, A relationship between endocan and serum apolipoproteins A1 and B as biomarkers of endothelial dysfunction in ACS patients

Aysa Rezabakhsh[1,2], Akbar Darbin[3], Elmira Zolali[4], Nasser Safaei[5], Mehdi Hassanpour[6]
1. Patient Safety Research Center, Clinical Research Institute, Urmia University of Medical Sciences, Urmia, Iran
2. Cardiovascular Research Center, Tabriz University of Medical Sciences, Tabriz, Iran
3. Department of Clinical Biochemistry and Laboratory Medicine, Tabriz University of Medical Sciences, Tabriz, Iran
4. Texas Tech University Health Sciences Center, Texas, United States
5. Department of Cardiac Surgery, Shahid Madani Heart Hospital, Tabriz University of Medical Sciences, Tabriz, Iran
6. Shonan Research Institute of Innovative Medicine, Shonan Kamakura General Hospital, Kamakura, Japan

Background: In this study, we examined serum endocan levels in patients presenting with ST-elevation myocardial infarction (STEMI) and explored their potential relationship with apolipoprotein A1 (APO-A1) and apolipoprotein B (APO-B).
Methods: The serum levels of endocan, cardiac troponin I (cTnI), APO-A1, and APO-B were measured in 80 male subjects. Using ELISA kits, the analysis focused on correlations between endocan and APO-A1, APO-B, as well as the APO-B/APO-A1 ratio.
Results: The results revealed significant differences in APO-A1, APO-B, endocan levels, and the APO-B/APO-A1 ratio between acute myocardial infarction (AMI) patients and controls ($p<0.05$). Furthermore, a significant correlation was found between APO-B and endocan levels, whereas APO-A1 showed no such association.
Conclusion: The study concluded that elevated endocan levels serve as an independent marker of endothelial dysfunction and ischemic cardiovascular disease, potentially linked to APO-B.
Keywords: Acute Myocardial Infarction, Angiogenesis, Apolipoproteins, Endocan

P924.Altered expression of long non-coding RNAs and cytokines in granulosa cells of women with polycystic ovary syndrome

Tayyebeh Zamani-Badi[1,2], Elahe Seyed Hosseini[2], Hossein Nikzad[1]
1. Anatomical Sciences Research Center, Institute for Basic Sciences, Kashan University of Medical Sciences, Kashan, Iran
2. Gametogenesis Research Center, Kashan University of Medical Sciences, Kashan, Iran

Background: Polycystic ovary syndrome (PCOS) is one of the most common endocrine disorders affecting women of reproductive age worldwide and is a leading cause of infertility. Despite its high prevalence, the molecular mechanisms driving PCOS remain poorly understood. Recent studies have highlighted the pivotal roles of long non-coding RNAs (lncRNAs) and inflammatory cytokines in ovarian dysfunction and follicular development. Investigating the expression profiles of specific lncRNAs and cytokines in granulosa cells is therefore critical for unraveling the pathophysiology of PCOS and discovering potential therapeutic targets.
Methods: Granulosa cells were collected from 26 women with PCOS and 14 healthy controls undergoing IVF. Total RNA extraction and cDNA synthesis were performed. Gene expression of NEAT1, MALAT1, TGF-β, and IL-1β was quantified using qRT-PCR. Statistical analysis employed unpaired t-tests with Welch's correction**.**
Results: The expression levels of NEAT1 and TGF-β were significantly upregulated in granulosa cells from women with PCOS compared to healthy controls (P=0.0004 and P=0.0001, respectively). Conversely, MALAT1 expression was significantly downregulated in the PCOS group (P=0.0004). Although IL-1β expression showed an increasing trend in PCOS patients, this difference was not statistically significant (P=0.065).
Conclusion: The significant changes in the expression of lncRNAs NEAT1 and MALAT1 and the cytokine TGF-β in granulosa cells of women with PCOS indicate the important involvement of these molecules in the disrupted ovarian microenvironment and the inflammatory processes associated with this syndrome. These results provide new insights into the molecular mechanisms underlying PCOS and may facilitate the development of targeted and more effective treatments.
Keywords: Polycystic ovary syndrome; Granulosa cells; RNA, Long Noncoding; Cytokines

P925, Furazolidone-based quadruple therapy versus levofloxacin-based triple therapy as a treatment for *Helicobacter pylori* eradication

Seyedeh Fatemeh Mousavi Emadi[1], Saeedeh Sarhadi[2,3], Sasan Khakpour Gilavan[4], Nezarali Moulaei[4], Susan Sarhadi[5]

1 .Infectious Diseases and Tropical Medicine Research Center, Zahedan University of Medical Sciences, Zahedan, Iran
2. Health Promotion Research Center, Zahedan University of Medical Sciences, Zahedan, Iran
3. Department of Community Medicine, School of Medicine, Zahedan University of Medical Sciences, Zahedan, Iran
4. Department of Internal Medicine, School of Medicine, Zahedan University of Medical Sciences, Zahedan, Iran
5. Pharmacology Research Center, Zahedan University of Medical Sciences, Zahedan, Iran

Background: Helicobacter pylori is a bacterium with a high prevalence and has been associated with malignancy and its effective eradication without medical complications is challenging. This study aimed to compare the four-drug regimen with furazolidone and the three-drug regimen with levofloxacin in treating Helicobacter pylori infection in patients with indigestion.
Methods: The study was performed on 96 patients (48 in the furazolidone-based four-drug regimen group and 48 in the levofloxacin-based three-drug regimen group)—the rate of bacterial colonization after treatment was calculated in two groups. Chi-square and Fisher's exact test were used to analyze the data.
Results: There was no significant difference between the four-drug diet based on furazolidone and the three-drug diet based on levofloxacin due to treatment, drug compliance, and complications (except nausea) between the two treatment groups. The findings of our study showed that the frequency of postoperative nausea in the four-drug diet group based on furazolidone was significantly higher than the three-drug diet group based on levofloxacin (41.7% vs. 20.8%).
Conclusion: Considering the similar therapeutic effects of both treatment regimens, it seems that a levofloxacin-based three-drug regimen with fewer side effects is preferable to the four-drug regimen, although more studies with higher sample size and evaluation of required antibiogram results to achieve more accurate results.
Keywords: Helicobacter pylori, Furazolidone, Levofloxacin, Treatment

P926, The effect of combined training on puberty regulators in overweight and obese girls with central precocious puberty

Elnaz Shokri[1], Ali Heidarian Pour[2]
1. Faculty of Sports Sciences, Bu Ali Sina University, Hamedan, Iran
2. Faculty of Sports Sciences, Bu Ali Sina University, Hamedan, Iran

Background: to determine the changes in the essential regulators of puberty (leptin, kisspeptin, and estradiol (E_2)) as a result of combined training and detraining in girls with overweight and obesity and central precocious puberty (CPP) in girls.
Methods: A total of 30 overweight and obese girls (aged 7 to 9 years) with central precocious puberty (CPP) who were undergoing treatment with Triptorelin were randomly divided into two groups: the CPP group, which received only Triptorelin, and the CPPT group, which participated in combined training in addition to Triptorelin. Additionally, 15 age-matched overweight and obese healthy girls were included as a control group (CO). The CPPT group engaged in combined training (aerobic + resistance) for 12-weeks, with 3 sessions per week, each lasting 60 minutes. The CO group did not participate in any training. Serum levels of leptin, kisspeptin, E2, and anthropometric factors were measured at baseline, after 12-weeks, and after 16 weeks for all three groups.
Results: Leptin, kisspeptin, E2, weight, BMI, and lipid profile decreased significantly after 12 weeks of combined training. Following detraining, these effects did not return to their initial values before the intervention. Leptin, kisspeptin, and E2 did not show significant changes after 12 weeks of Triptorelin treatment, but they decreased significantly after 16 weeks of treatment.
Conclusion: Combined training, through the reduction of weight, BMI, leptin, kisspeptin, and E2, can be beneficial in the treatment of CPP when used alongside medication. The favorable effects of combined training persist even after 4 weeks of detraining.
Keywords: Central precocious puberty, Combined training, Estradiol, Kisspeptin, Leptin

P927, An examination of association of polypharmacy and frailty in the elderly

Mahmood Sadeghi[1], Ali Reza Amirabadizadeh[1], Kobra Naseri[1], Razieh Avan[1], Ahmad Delbari[2]
1. Medical Toxicology and Drug Abuse Research Center, Birjand University of Medical Sciences, Birjand, Iran
2. Iranian Research Center on Aging, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran

Background: Frailty, a complex geriatric syndrome, frequently coexists with polypharmacy in older adults, posing significant challenges for clinical management. Still, little is known about the impact they may have on each other. This study was performed to assess the association of polypharmacy and frailty in a sample of Iranian old people.

Methods: Data for the present cross-sectional analysis were derived from the baseline phase of the Ardakan Cohort Study on Aging (ACSA), conducted in Ardakan, Iran. Initiated in 2020, the ACSA is a population-based prospective cohort study modeled after the Iranian Longitudinal Study on Aging (IRLSA) and targets individuals aged 50 years and older residing in Ardakan. Of the 5993 individuals enrolled in the cohort, baseline demographic information including age, educational level, gender, and occupation was collected using a standardized checklist. The Clinical Frailty Scale (CFS) is a validated 9-point instrument designed to assess frailty through clinical judgment, taking into account an individual's physical function, comorbidities, and level of dependence in daily activities. Scores range from 1 (very fit) to 9 (terminally ill), with higher scores indicating greater degrees of frailty. For analytical purposes, the CFS is often categorized into three groups: non-frail (scores 1–3), pre-frail (score 4), and frail (scores 5–9). The CFS was originally developed as part of the Canadian Study of Health and Aging (CSHA). According to the obtained questionnaires, polypharmacy was defined as the routine use of at least four medications in the studied population. Data analysis was performed using STATA version 17. To examine the associations, a multinomial logistic regression model was employed.

Results: A total of 5,027 older adults were included in the analysis, with a mean age of 62.32 ± 7.86 years. Of these, 56.4% were female. Based on frailty status, 5.6% of participants were classified as frail, 53.8% as pre-frail, and 40.6% as non-frail. The use of lipid-lowering medications was associated with 63% increased odds of frailty compared to non-frail individuals (OR: 1.63; 95% CI: 1.24–2.17). Similarly, antihypertensive medication use was associated with 67% higher odds of frailty (OR: 1.67; 95% CI: 1.22–2.30). Among individuals using antidiabetic medications, the odds of being pre-frail and frail were 22% (OR: 1.22; 95% CI: 1.07–1.39) and 69% (OR: 1.69; 95% CI: 1.28–2.24) higher, respectively, compared to non-frail participants. The use of anticoagulant agents was associated with 84% increased odds of frailty (OR: 1.84; 95% CI: 1.04–3.24). Additionally, vasodilator use was associated with 26% increased odds of pre-frailty (OR: 1.26; 95% CI: 1.01–1.56) and a 2.08-fold increase in the odds of frailty (OR: 2.08; 95% CI: 1.44–3.00). No significant association was observed between the use of antiarrhythmic medications and frailty status. Furthermore, no statistically significant association was found between the use of lipid-lowering, antihypertensive, or anticoagulant medications and pre-frailty. Finally, polypharmacy was significantly associated with both pre-frailty (OR, 1.16; 95% CI, 1.02–1.33) and frailty (OR, 2.43; 95% CI, 1.56–3.81) compared to those without polypharmacy.

Conclusion: Our study showed that polypharmacy is associated with frailty. Further research should address the potential benefit of reducing of inappropriate polypharmacy and better pharmacotherapeutic management for preventing medication-associated frailty. Participants exposed to polypharmacy had a 2.4-fold higher risk, respectively for developing frailty. Randomized controlled trials might be warranted to assess potential positive effects of deprescribing in the elderly.

Keywords: Frailty, Polypharmacy, Elderly, Lipid-lowering medications, Antihypertensive medication, Antidiabetic medications

P928, The Effect of Chronic Use of Selective Serotonin Reuptake Inhibitors (SSRIs) on Cognitive and Mood Symptoms in Patients with Ischemic Stroke: A Cross-Sectional Study

Sogand Abbasi Azizi[1], Hadis Zarafshani[2], Reza Erfani Far[3,4]
1. Student Research Committee, Kermanshah University of Medical Sciences, Kermanshah, Iran
2. Nano Drug Delivery Research Center, Health Technology Institute, Kermanshah University of Medical Sciences, Kermanshah, Iran
3. RDepartment of Neurology, Rasoul Akram Hospital, Iran University of Medical Sciences, Tehran, Iran
4. Student Research Committee, Iran University of Medical Sciences, Tehran, Iran

Background: Cognitive and mood disorders are prevalent and debilitating complications following ischemic stroke, often posing significant barriers to effective rehabilitation and overall recovery. These impairments can severely impact patients' quality of life, functional independence, and long-term outcomes. Emerging evidence suggests that selective serotonin reuptake inhibitors (SSRIs), widely used as antidepressants, may offer neuroprotective and neuroplasticity-enhancing effects beyond mood regulation. This study aimed to comprehensively evaluate the impact of chronic SSRI use on cognitive function and mood symptoms in patients who have experienced ischemic stroke, addressing a critical gap in post-stroke therapeutic approaches.
Methods: In this cross-sectional study, 86 patients with a confirmed diagnosis of ischemic stroke were enrolled from neurology outpatient clinics. Patients were divided into two groups: SSRI users (at least 3 months of continuous use) and non-users. Cognitive function was assessed using the Mini-Mental State Examination (MMSE), and mood symptoms were evaluated using the Hospital Anxiety and Depression Scale (HADS). Data were analyzed using appropriate statistical tests.
Results: The mean MMSE score was significantly higher in the SSRI group compared to non-users ($p < 0.05$). Additionally, both anxiety and depression scores were lower in the SSRI group. A significant correlation was observed between the duration of SSRI use and cognitive performance.
Conclusion: Chronic SSRI use may be associated with improved cognitive function and reduced mood disturbances in post-stroke patients. Incorporating SSRIs into post-stroke rehabilitation protocols could be beneficial and warrants further investigation in longitudinal studies.
Keywords: Ischemic stroke, Selective serotonin reuptake inhibitors (SSRIs), Cognitive function, Mood disorders

P929, Comparison of the cognitive and fatigue-reducing effects of fingolimod and dimethyl fumarate in patients with relapsing-remitting multiple sclerosis: A cross-sectional study

Reza Erfani Far[1,2], Sogand Abbasi Azizi[3], Hadis Zarafshani[4]
1. Department of Neurology, Rasoul Akram Hospital, Iran University of Medical Sciences, Tehran, Iran
2. Student Research Committee, Iran University of Medical Sciences, Tehran, Iran
3. Student Research Committee, Kermanshah University of Medical Sciences, Kermanshah, Iran
4. Nano Drug Delivery Research Center, Health Technology Institute, Kermanshah University of Medical Sciences, Kermanshah, Iran

Background: Cognitive impairment and fatigue are among the most prevalent and disabling symptoms experienced by patients with relapsing-remitting multiple sclerosis (RRMS). These symptoms significantly affect daily functioning, quality of life, and disease management. While disease-modifying therapies (DMTs) such as Fingolimod and Dimethyl Fumarate (DMF) have demonstrated efficacy in slowing disease progression and reducing relapse rates, their relative impact on cognitive performance and fatigue remains inadequately explored. Understanding these effects is essential for optimizing therapeutic strategies and improving symptom management in RRMS.
Methods: This cross-sectional study involved 90 RRMS patients who had been treated continuously with either Fingolimod (n=45) or DMF (n=45) for a minimum of six months. Cognitive function was evaluated using the Brief International Cognitive Assessment for MS (BICAMS), which includes tests measuring processing speed, verbal memory, and visual memory. Fatigue severity was assessed with the Fatigue Severity Scale (FSS), a validated tool for quantifying fatigue impact in neurological disorders. Statistical analyses compared cognitive and fatigue measures between the two treatment groups to identify differences in symptom outcomes.
Results: Results demonstrated that patients receiving Fingolimod performed significantly better on the Symbol Digit Modalities Test (SDMT), a key measure of cognitive processing speed, compared to those treated with DMF ($p < 0.05$). Additionally, Fingolimod users reported lower fatigue severity as indicated by lower FSS scores. Verbal and visual memory scores showed a favorable trend toward the Fingolimod group, although these differences did not reach statistical significance. These findings suggest that Fingolimod may confer greater benefits in alleviating cognitive deficits and fatigue symptoms than DMF in RRMS patients.
Conclusion: Fingolimod may have a superior effect in improving cognitive function and reducing fatigue in RRMS patients compared to Dimethyl Fumarate. These findings suggest that choice of DMT could impact symptomatic management in MS and should be considered in personalized treatment planning.
Keywords: Multiple Sclerosis, Relapsing-Remitting, Fingolimod, Dimethyl Fumarate, Cognitive Dysfunction

P930.The effect of mediterranean diet on cognitive functions in the elderly Population

Mahdiye Askarizade[1]
Islamic Azad University, Quchan Branch, Mashhad, Iran

Background: The world's elderly population is increasing. Cognitive decline and dementia have become major challenges. Since there is no definitive drug treatment, non-pharmacological strategies such as diet are essential to prevent and slow the progression of the disease. To investigate the effect of the Mediterranean diet on cognitive function in the elderly (with normal cognitive status and with impairment) based on recent clinical studies.
Methods: A systematic review was conducted in the PubMed and Web of Science databases from 2016 to 2021. Of the 475 studies, 8 studies met the inclusion criteria. Participants were over 55 years old and included cognitively healthy elderly and those with impairments such as Parkinson's and Alzheimer's.
Results: 1. The Mediterranean diet was introduced as a plant-based dietary pattern rich in healthy fats (main source: olive oil), adequate seafood protein (with emphasis on fish consumption) and limited consumption of red meat and sugar, rich in anti-inflammatory and antioxidant compounds. 2. Positive effect on memory and general cognition in the elderly. 3. Improved attention, language, semantic memory and temporal orientation in Parkinson's and Alzheimer's patients. 4. Women (both healthy and affected), higher education level, more physical activity and avoidance of alcohol and smoking along with diet are associated with better cognitive outcomes. 5. Secondary benefits: reduced depression, reduced frailty and reduced length of hospitalization.
Conclusion: Greater adherence to the Mediterranean diet has a better effect on general cognitive performance of individuals.
Keywords: Cognitive functions, Elderly, Mediterranean diet

P932, The effect of 10 weeks of tabata resistance training on TRF1, TRF2, and BDNF gene expression in obese older women

Zahra Farzin pour[1], Zahra karbakhsh[1], Ahad shafiee[1]
1. Department of Exercise Physiology, Faculty of Sport Sciences, Islamic Azad University, Iran

Background: High Intensity Interval Training (HIIT) can positively affect neuroprotection and telomere stability, but its effect on obese older women remained unclear. The present study examined the effect of 10 Weeks of Tabata Resistance Training on TRF1, TRF2, and BDNF Gene Expression in Obese Older Women.
Methods: In this Randomized control trial study, 28 obese women with a body mass index of 30 ± 5 kg/m² and a mean age of 60 ± 5 years were randomly assigned into two equal groups: control and Tabata training (n = 14). The resistance training protocol consisted of three sessions per week for 10 weeks, lasting 40–50 minutes per session. 24 hours after completion of the training program, blood samples were collected to evaluate the gene expression of TRF-1, TRF-2, and BDNF. Data were analyzed using two-way ANOVA and Tukey's post hoc test at a significance level of $p \leq 0.05$ with GraphPad software Version 9.
Results: A significant increase was observed in the gene expression of TRF-1, TRF-2, and serum BDNF in the Tabata training group compared with the control group.
Conclusion: Based on the findings, Tabata resistance training may be considered an effective exercise strategy, and it is likely that obese older women can benefit from this approach to support neuronal protection and enhance cognitive function.
Keywords: BDNF, TRF-1, TRF-2, Aging, Obesity

P933, Probiotic administration in systemic sclerosis patients: A systematic review

Arezoo Faridzadeh[1], Zahra Mirfeizi[2], Mahmoud Mahmoudi[2]
1. Department of Immunology and Allergy, School of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Rheumatology Department, Rheumatic Diseases Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Systemic sclerosis (SSc) is a complex autoimmune disorder characterized by widespread vascular abnormalities and fibrotic changes. Gastrointestinal (GI) involvement is common and significantly impacts patients' quality of life. Recent research has highlighted the role of gut microbiota in autoimmune diseases, suggesting potential benefits of probiotic therapy. To systematically review the effects of probiotic interventions on gastrointestinal symptoms and immune modulation in patients with systemic sclerosis.
Methods: A systematic literature search was conducted using PubMed, Scopus, and Web of Science databases up to August 2023. Studies were included if they assessed probiotic supplementation in adult SSc patients and reported clinical or immunological outcomes. The review followed PRISMA 2020 guidelines. Non-randomized studies were assessed using ROBINS-I (Risk Of Bias in Non-randomized Studies of Interventions), and randomized controlled trials (RCTs) were evaluated using the Cochrane Risk of Bias Tool.
Results: Four studies met the inclusion criteria, including three RCTs and one non-randomized study. The probiotic strains used varied across studies, with *Lactobacillus* and *Bifidobacterium* species being the most common. Consistent improvements were reported in GI symptoms such as bloating, diarrhea, and constipation. Some studies also observed reductions in systemic inflammatory markers (e.g., CRP, IL-6) and improvements in patient-reported outcomes. However, heterogeneity in study design, probiotic formulations, and intervention durations limits the comparability of results.
Conclusion: Probiotic supplementation appears to offer beneficial effects on gastrointestinal symptoms and may modulate immune responses in patients with systemic sclerosis. Although the findings are promising, the current evidence is limited by small sample sizes and methodological variability. Larger, high-quality randomized controlled trials are needed to establish standardized protocols and better understand the mechanisms of probiotic action in SSc.
Keywords: Bifidobacterium, gastrointestinal, Lactobacillus, probiotic, systemic sclerosis

P934.The Impact of Vitamin D deficiency on inflammatory markers in children

Hadi Karimzadeh[1]
1. Student Research Committee, Tabriz University of Medical Sciences, Tabriz, Iran

Background: Vitamin D has important immunomodulatory functions beyond bone metabolism, and its deficiency has been linked to heightened systemic inflammation. This study examined the association between vitamin D deficiency and inflammatory markers in pediatric outpatients in Tabriz.
Methods: A retrospective cross-sectional study was conducted on 180 children (5–14 years) at Mardani Azar Children's Hospital, Tabriz (2021–2024). Records with serum 25-hydroxyvitamin D [25(OH)D] and at least one inflammatory marker (CRP, ESR, or WBC) were included, while those with infections, malignancies, or immunosuppressive therapy were excluded. Vitamin D deficiency was defined as <20 ng/mL, yielding 100 deficient and 80 sufficient cases. Group differences were assessed using t-tests or Mann–Whitney U tests, and correlations with Pearson or Spearman coefficients.
Results: Vitamin D deficiency was found in 56% of children and was associated with higher inflammatory markers. Deficient patients showed elevated CRP (4.1 vs. 2.4 mg/L), ESR (27 vs. 19 mm/h), and WBC counts (8.3 vs. 7.1 $\times 10^9$/L) compared with sufficient peers. Significant negative correlations were observed between vitamin D levels and both CRP ($r = -0.34$) and ESR ($r = -0.27$).
Conclusion: Vitamin D deficiency is common among pediatric outpatients and is associated with higher systemic inflammation. Monitoring and correcting vitamin D status may contribute to reducing inflammatory burden and supporting immune health in children.
Keywords: Vitamin B12 deficiency, Adolescents, Depression, Anxiety, Retrospective study

P935, Impact salivary IL-1 Beta level Is associated with poor sleep quality in university students golestan province

Mansoureh Karimi[1]
1. Department of Human science and Sport Science, Faculty of Sport Sciences, University of Gonbad kavoss, Iran

Good sleep is essential for maintaining adequate physical and mental health. However, only one-third of people with insomnia consult a doctor about this problem and only 5% seek treatment. The most common complaint of those who present is difficulty initiating or maintaining sleep or non-restorative sleep. This sleep problem causes excessive anxiety in the sufferer and contributes to the persistence of the problem. According to reports conducted in 2002, the prevalence of insomnia varies between 5 and 50%, depending on the diagnostic criteria used. Similar to the general population, insomnia is a common problem in the university population that can affect well-being and academic performance. One of the main causes of insomnia in university students is academic stress. Indeed, many students are living away from home for the first time and may be under pressure to socialize and participate in extracurricular activities. This can lead to irregular sleep schedules and a lack of routine, which can make it difficult to establish healthy sleep habits. Poor sleep hygiene is often responsible for insomnia problems in university students, which is characterized by poorer sleep quality, longer sleep latency, more sleep disturbances, and greater daytime dysfunction, especially among caffeine, alcohol, and tobacco users. In addition, it has been shown that sleep quality can be influenced by multiple bio-psycho-social factors. Salivary biomarkers such as interleukin 6 (IL-6), IL-1 beta (IL-1), and tumor necrosis factor alpha (TNF) have been associated with poor sleep quality in blood samples, and they are biological molecules that can be measured in saliva and used as indicators of various physiological and pathological conditions. In the case of university students, salivary biomarkers can be used to assess their overall health status, stress levels, and academic performance.
Overall, salivary biomarkers can provide valuable insight into the health and well-being of university students and may help identify individuals at risk for adverse health outcomes or academic performance.

Keywords: Students, Sleep quality, Salivary index

P936, The effect of antioxidant supplementation on reducing pelvic pain and complications associated with endometriosis

Fatemeh kourepaz[1,2], Pegah Farshchian[1,2]
1. Department of Nutrition Science, Varastegan Institute for Medical Sciences, Mashhad, Iran
2. Student research committee, Varastegan Institute for Medical Sciences, Mashhad, Iran

Background: Endometriosis is a common chronic inflammatory condition affecting women of reproductive age, characterized by the ectopic growth of endometrial tissue outside the uterus, often associated with chronic pelvic pain. The role of oxidative stress and inflammatory processes in the progression of endometriosis-related damage has been well-documented. This has led to growing the use of antioxidant supplements. The aim of this narrative review is to evaluate the impact of antioxidant supplementation on reducing pelvic pain and complications associated with endometriosis.
Methods: In this narrative review, we searched scientific databases including PubMed, Google Scholar, and Scopus using the keywords: "endometriosis", "chronic pelvic pain", "antioxidant", and "inflammation". Articles published between 2018 and 2025 were considered.
Results: The selected studies assessed the effects of antioxidant supplementation on reducing complications and pelvic pain caused by endometriosis. Clinical symptoms such as chronic pelvic pain, Inflammatory markers, dyspareunia, dysmenorrhea, and quality of life were evaluated using tools such as VAS (Visual Analog Scale), NRS (Numeric Rating Scale), and EHP-30 (Endometriosis Health Profile-30). The majority of studies reported positive effects of antioxidant supplements in alleviating endometriosis-related symptoms.
Conclusion: In patients with endometriosis, the use of most antioxidant supplements showed significant improvements in clinical outcomes. These findings highlight the potential role of nutritional and supplement-based interventions as non-invasive strategies in managing endometriosis. However, further research is needed to determine the optimal dosage and type of antioxidant supplements.
Keywords: Endometriosis, Chronic pelvic pain, Antioxidant, Inflammation

P937, Association between vitamin B12 deficiency and severity of depression and anxiety in adolescents: A retrospective chart review study

Danial Mahrooghi[1]
1. Student Research Committee, Tabriz University of Medical Sciences, Tabriz, Iran

Background: Vitamin B12 plays a crucial role in neurological function and emotional regulation. Evidence suggests that its deficiency may contribute to mood disorders, particularly in adolescents. However, few retrospective studies have explored this association using real-world clinical data.
Methods: In this retrospective cross-sectional study, records of 182 adolescents (12–18 years) attending a psychiatric clinic in Tabriz (2020–2024) were reviewed. Inclusion required serum vitamin B12 levels and completed BDI and GAD-7 assessments. Patients were categorized as vitamin B12 deficient (<200 pg/mL) or normal (≥200 pg/mL). Group comparisons used independent t-tests and Pearson correlation.
Results: Out of 182 patients, 76 (42%) were classified as B12 deficient. The average BDI score in the B12-deficient group was 27.6 ± 6.9, significantly higher than 20.3 ± 5.8 in the normal group. GAD-7 scores were also higher in the deficient group (13.1 ± 4.4 vs. 9.7 ± 3.5). The differences were statistically significant ($P < 0.001$). A moderate negative correlation was observed between serum B12 levels and depression scores ($r = -0.38$), and a weaker but significant negative correlation with anxiety scores ($r = -0.29$).
Conclusion: This study suggests a significant association between vitamin B12 deficiency and greater severity of depressive and anxiety symptoms in adolescents. Screening for B12 levels may be a helpful adjunct in the psychiatric evaluation of youth with mood disorders.
Keywords: Vitamin B12 deficiency, Adolescents, Depression, Anxiety, Retrospective study

P938, The effect of lycopene on the expression of *bax, bcl$_2$* and *caspase*-3 genes during sperm cryopreservation in infertile asthenozoospermic patients

Seyyedeh Masoumeh Mohammadi[1], Malek Soleimani Mehranjani[1], Mohammad Hadi Bahadori[2] Aghil esmaeili[3]

1. Department of Biology, Arak University, Arak, Iran
2. Department of Anatomy, Guilan university of Medical Sciences, Guilan, Iran
3. Department of Biotechnology, Guilan university of Medical Sciences, Guilan, Iran

Background: Sperm cryopreservation, used in assisted reproductive technology is accompanied with many damages to the cell such as apoptosis. Adding an antioxidant to the cryopreservation medium could effectively mitigate these adverse effects. Lycopene, a red carotenoid and powerful antioxidant, has many positive effects on sperm Quality. This investigation studied the impact of lycopene supplementation on the expression of the apoptotic and anti-apoptotic genes during the cryopreservation of semen samples from asthenozoospermic patients.

Methods: Semen samples were collected from 30 asthenozoospermic men. Each sample was then divided into three groups: Control (fresh), Freeze (treated with cryoprotectant alone), and Freeze + Lycopene (treated with cryoprotectant and 5 µmol/L lycopene). In each sample, the expression of the genes *Bax, Bcl$_2$* and *caspase-3*, were analyzed using Real-time PCR. The results were reported as fold change (ΔΔCt formula). Data were analyzed statistically using Repeated Measure Analysis and Bonferroni post-hoc test.

Results: The expression levels of *Bax* and *Caspase-3* genes in the freezing group were significantly increased compared to the control group ($p<0.001$). In contrast, the expression level of the *Bcl2* gene did not change significantly ($p>0.05$). Also, our data show that adding lycopene to sperm freezing medium decreased the expression of *Bax* and *caspase-3* genes, but increased the expression of *Bcl2* gene ($p<0.001$).

Conclusion: Our data showed that freezing significantly upregulated the pro-apoptotic genes *BAX* and *Caspase-3* without affecting the expression of the anti-apoptotic gene *BCL2*. Lycopene supplementation reversed these effects by downregulating *BAX* and *Caspase-3*, and upregulating *BCL2*.

Keywords: Asthenozoospermia, Cryopreservation, Gene expression, Lycopene

P939, Potential glycemic benefits of *Ziziphus jujuba* hydroalcoholic extract in PCOS-related infertility: Findings from a randomized controlled trial

Faezeh Mashhadi[1], Raha Rivaz[1], Nayereh Khadem Ghaebi[2], Fatemeh Roudi[3], Mohsen Nematy[3]
1. Department of Nutrition, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran
2. Fertility, Sterility and Reproductive Biology Research Center, Emam Reza Hospital, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Nutrition, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Infertility affects ~23% globally and 18.3% in Iran. Female factors cause ~37% of cases, mainly ovulatory disorders; polycystic ovary syndrome (PCOS) is the leading cause (80–85% of anovulatory cases). PCOS is linked to insulin resistance, inflammation, and obesity. Treatments include lifestyle change, drugs, and ovulation induction, but side effects increase interest in complementary medicine. This study evaluated *Ziziphus jujuba* (jujube) extract and myoinositol effects on glycemic indices in infertile women with PCOS.
Methods: In this randomized trial, 196 women aged 18–45 with PCOS received myoinositol (2000 mg/day), *jujube extract* (15 g/day), or placebo for 12 weeks. Fasting blood glucose (FBG), triglyceride-glucose index (TyG), weight, and BMI were measured before and after intervention.
Results: At baseline, fasting blood glucose (FBG) levels were comparable among groups ($p = 0.274$), while post-intervention values were significantly lower in the jujube group compared with myoinositol and placebo ($p = 0.028$). TyG index differed at baseline ($p = 0.004$), and after intervention, greater improvement was observed in the jujube group compared with the other groups ($p < 0.001$). No significant changes were found for TyG/BMI.
Conclusion: Jujube may lower blood glucose and improve insulin resistance by: stimulating insulin secretion, inhibiting α-amylase, enhancing muscle glucose uptake, raising adiponectin and reducing inflammation, exerting antioxidant effects, and modulating AMPK and PPAR-α pathways. It may be a promising alternative therapy for PCOS-related metabolic issues.
Keywords: Infertility, Polycystic ovary syndrome, *Ziziphus jujuba*, Myoinositol, Insulin resistance

P940, Binaural beats effects on interval discrimination: Association with some polymorphisms of genes from dopaminergic and serotonergic systems

Hedieh Matloubi[1], Mohammad Mahdi Abolghasemi Dehaghani[2], Fariba Khodagholi[1], Sareh Asadi[1], Reza Khosrowabadi[3]

1. Institute of Neuroscience and Cognition (INC), Shahid Beheshti University of Medical Sciences (SBMU), Tehran, Iran
2. Convergent technology research center, Tehran University, Tehran, Iran
3. Institute of Cognitive Sciences and the Brain (ICSB), Shahid Beheshti University (SBU), Tehran, Iran

Background: Interval discrimination (ID), the ability to distinguish time between two consecutive sensory stimuli, is modulated by dopaminergic and serotonergic systems, with subjective variations partly related to genetic polymorphisms. Considering the importance of ID in daily life, improvements in it have raised interest in recent studies. Interventions using cognitive training, electrical or magnetic brain stimulation, and neurofeedback have been applied, but they all need specialized clinical settings. Therefore, Binaural beats (BB) stimulation, known to enhance various cognitive functions, could be a remedy; nevertheless, findings on its effectiveness remain controversial.

Methods: In this study, we chose BB stimulation in the delta-frequency band to improve auditory ID in 39 healthy participants. The ID task was performed using a two-alternative forced-choice method, and detection thresholds (DTs) were calculated for sub-second (standard interval = 300ms) and supra-second (standard interval = 1000ms) scales. Participants were genotyped for dopamine transporter (DAT), serotonin transporter (SERT), catechol-O-methyltransferase (COMT), and 5-HTT receptor type 2A (HTR2A) polymorphisms.

Results: We, thereby, found that the BB intervention significantly improved ID in COMT (Val+), DAT (9R9R), and HTR2A (CC) genotypes on a supra-second scale.

Conclusion: These findings emphasize the effectiveness of BB stimulation as a novel, accessible, and non-invasive intervention for improving interval discrimination and suggest that genetic variations of neurotransmitter systems could explain inconsistencies in BB studies.

Keywords: Binaural Beats, *DAT, SERT, COMT, HTR2A*

P941, Comparison of blood sugar levels and lipid profiles among addicted and non-addicted elderly people

Mitra Moodi[1], Zoya Tahergorabi[2], Zeinab Arezomandanmofrad[3], Fatemeh Salmani[4]
1. Department of Health Promotion and Education, Geriatric Health Research Center, School of Health, Birjand University of Medical Sciences, Birjand, Iran
2. Department of Physiology, Geriatric Health Research Center, School of Medicine, Birjand University of Medical Sciences, Birjand, Iran
3. Student Research Committee, School of Medicine, Birjand University of Medical Sciences, Birjand, Iran
4. Department of Epidemiology and Biostatistics, Geriatric Health Research Center, School of Health, Birjand University of Medical Sciences, Birjand, Iran

Background: Addiction is one of the most important problems of the 21st century in the world as well as in Iran. The prevalence of multimorbidity increases with age and is more common in the elderly, so chronic pain is highly prevalent in the elderly and opioids have been used for many years to control acute and severe pain. Therefore, this study was performed to compare the level of lipid profile and fasting blood sugar in addicted and non-addicted elderly people in Birjand.
Methods: This cross-sectional study was conducted on elderly people over 60 years, 115 elderly people with at least one year of drug use history and 115 elderly people without a history of addiction. After the study was approved by the university ethics committee and informed consent was obtained from the individuals, a questionnaire containing demographic information and information about addiction was completed. Body mass index (BMI) and systolic and diastolic blood pressure were also determined. Blood samples were taken from each individual after 12 hours of fasting to measure fasting blood sugar (FBS), lipid profile (high density lipoprotein (HDL), low density lipoprotein (LDL), total cholesterol and triglyceride).
Results: There was no significant difference in FBS between addicted and non-addicted elderly ($P > 0.05$). In the lipid profile, there was only a significant decrease in triglyceride levels in the case group compared to the control ($p = 0.02$). Mean blood pressure in the addicted group was lower than the control group ($p = 0.01$).
Conclusions: Based on results of this study, opium dependence does not seem to have a protective effect on blood sugar and lipid profile. Therefore, education and promotion of community health literacy, especially cardiovascular and diabetic patients, is necessary to improve traditional and old beliefs about opium use.
Keywords: Elderly, Fasting blood sugar, Lipid profile, Opium

P945, The effects of MIND diet and propolis supplementation on metabolic syndrome indices: A randomized controlled clinical trial

Zamzam Paknahad[1], Zainab Gholami[2], Mohammad Reza Maracy[3]
1. Department of Clinical Nutrition, Faculty of Nutrition and Food Science, Isfahan University of Medical Sciences, Isfahan, Iran
2. School of Nutrition and Food Science, Students' Research Committee, Department of Clinical Nutrition, Isfahan University of Medical Sciences, Isfahan, Iran
3. Department of Epidemiology and Biostatistics, School of Health, Isfahan University of Medical Sciences, Isfahan, Iran

Background: The MIND diet is a new eating plan aimed at preserving cognitive function. Propolis, a resinous substance, has various biological and medicinal properties. This study examines the effects of the MIND diet combined with propolis supplementation on indices of metabolic syndrome (MetS).
Methods: This randomized controlled trial (RCT) involved adults referred to the Health Center in Isfahan with metabolic syndrome. A total of 84 eligible participants were divided into three groups: MIND + propolis, MIND + placebo, and a control group based on the type of intervention. Data regarding demographic characteristics and MetS indices were collected at the beginning and end of the study and analyzed using SPSS 26.
Results: The combination of the MIND diet and propolis supplementation resulted in significant reductions in weight, body mass index (BMI), waist circumference (WC), systolic blood pressure (SBP), diastolic blood pressure (DBP), and triglycerides (TG) compared to the control group. Fasting blood sugar (FBS) showed a significant reduction, while high-density lipoprotein cholesterol (HDL-C) levels significantly increased. The MIND diet group also demonstrated significant reductions ($p < 0.05$) in BMI, WC, and SBP, with decreases of 2%, 2%, and 5% respectively. Additionally, significant changes ($p < 0.001$) were observed in DBP, FBS, and TG levels. HDL-C levels rose significantly ($p < 0.001$) while the decrease in weight was not statistically significant.
Conclusion: The MIND diet with propolis and the MIND diet alone can significantly lower BMI, waist circumference, blood pressure, fasting blood sugar, and triglycerides, while also increasing HDL-C levels.
Keywords: MIND, Diet, Propolis, Metabolic Syndrome

P946, The effect of blood flow restriction resistance training on sirtuin-1, PGC-1α gene expression and cardiovascular endurance in middle-aged women

Mahmoud Soltani[1], Hassan Sanian[1], Elham Asadi[2]
1. Department of physical education and sports science, Mashhad Branch, Islamic Azad University, Mashhad, Iran
2. Department of physical education and sports science, Mashhad Branch, Islamic Azad University, Mashhad, Iran

Background: Middle age is a critical period of life during which individuals experience significant physical and physiological changes. The aim of this study was to investigate the effects of resistance training with and without blood flow restriction on the expression of Sirtuin-1 and PGC-1α genes, as well as cardiovascular endurance in middle-aged women.
Methods: This quasi-experimental study included 45 middle-aged women with a mean age of 45.20 ± 3.18 years and a BMI of 27.27 ± 1.55 kg/m². Participants were randomly assigned to three groups: resistance training with blood flow restriction (n = 15), resistance training without blood flow restriction (n = 15), and control (n = 15). The training intervention lasted two months. Training intensity was set at 60–70 percent of one-repetition maximum for the non-restriction group, and 20–30 percent for the restriction group. Tourniquet pressure ranged from 110 to 140 mmHg. Data were analyzed using one-way ANOVA and Bonferroni post-hoc tests at a significance level of $P \leq 0.05$.
Results: Both resistance training protocols, with and without blood flow restriction, increased Sirt1 and PGC-1α gene expression. They also improved cardiorespiratory endurance, lean body mass, upper and lower limb strength, and reduced body fat. However, no significant differences were observed between the experimental groups.
Conclusion: Resistance training combined with blood flow restriction has beneficial effects on several health-related parameters and contributes to improved health status in middle-aged women
Keywords: Resistance Training, Cardiovascular Endurance Sirtuin-1, PGC-1α

P947, The influence of myoinositol to improve biochemical manifestations of serum and follicular fluid and icsi outcomes in patients with PCOS: A prospective randomized study

Zeynab Yazdanpanah[1], Mitra Heydari Nasrabadi[1], Ebrahim Cheraghi[2], Masoud Salehipour[1]
1. Department of Biology, Parand Branch, Islamic Azad University, Tehran, Iran
2. Department of biology, Faculty of Sciences, University of Qom, Qom, Iran

Background: The research investigated the capacity of Myo-inositol (MI) in order that it improves biochemical markers in serum and follicular fluid, and ultimately, intracytoplasmic sperm injection (ICSI) outcomes of women with polycystic ovary syndrome (PCOS).
Methods: Sixty infertile patients with PCOS who were undergoing ovulation induction for ICSI, were randomly divided to two groups. The MI group received 2000 mg Myo-inositol+1 mg folic acid twice a day for 6 weeks with starting the ICSI cycle. For the same period, the control group received a placebo containing only folic acid (1 mg). Levels of hormonal profiles in serum and follicular fluid, as well as oxidative stress markers (MDA, TAC, GPx, and SOD) were estimated using an ELISA assay. Primary end points were ICSI cycle outcomes.
Results: Compared to the placebo group, the MI group demonstrated significant reduction in serum and follicular fluid levels of LH, LH/FSH ratio, total testosterone, AMH, and Androstenedione. Furthermore, the MI group exhibited meaningful increases in TAC, GPx, and SOD, but MDA significantly decreased. While the number of retrieved and mature oocytes is not similar statistically among the groups, the MI group showed significant improvements in the percentage of immature oocytes, cleavage rate, and good embryo quality. A meaningful correlation was checked between follicular fluid AMH level and LH, FSH, total testosterone, Androstenedione, insulin, MDA, the number of retrieved oocytes, and immature oocytes.
Conclusions: Our outcomes indicate that Myo-inositol administration in women with PCOS undergoing ART helps to improve their hormonal profiles, and the quality of oocytes and embryos.
Keywords: Myo-inositol, Polycystic ovarian syndrome, Intracytoplasmic sperm injection, Reproductive outcomes

P948, Evaluation of the treatment results of colchicine/L-carnitine compared to colchicine/pentoxifylline in patients with Peyronie's plaque in Ardabil at 2019–2023

Alireza Mohebbi[1], Ali Hosseinkhani[2], Farzin Valizadeh[2]
1. Students Research Committee, School of Medicine, Ardabil University of Medical Sciences, Ardabil, Iran
2. Department of Surgery, School of Medicine, Ardabil University of Medical Sciences, Ardabil, Iran

Background: Peyronie's Disease (PD) is a connective tissue disorder causing fibrous plaques in the tunica albuginea, leading to penile curvature. Pharmacological treatments are first-line, with pentoxifylline (PTX) and L-carnitine (LC) being promising options. This study compared the efficacy of colchicine combined with either LC or PTX.
Methods: This cross-sectional, retrospective, census-based study included all patients referred to Imam Reza Hospital in Ardabil between April 2019 and March 2023. Patients were divided into two groups: Group 1 received daily colchicine (1mg) plus L-carnitine (250mg twice daily) (Chol/LC), and Group 2 received daily colchicine (1mg) plus pentoxifylline (400mg twice daily) (Chol/PTX) for four months. Assessments included sonographic plaque measurement, penile curvature angle in flaccid and erect states, and pain levels using a Numerical Rating Scale (NRS). A p-value <0.05 was considered significant.
Results: The study enrolled 81 patients (mean age 54.03±7.93 years), with 43 (53%) in the Chol/LC group and 38 (47%) in the Chol/PTX group. Changes in plaque size (P=0.694) and penile curvature (P=0.595) were not statistically significant between groups. While pre-erection pain change was insignificant (P=0.183), the reduction in post-erection pain was significantly greater in the Chol/LC group (P=0.004). Plaque location and number showed no significant differences before or after intervention.
Conclusion: Both combination regimens demonstrated promising results. However, the Chol/LC combination was significantly more effective in reducing post-erection pain. This pioneering direct comparison provides valuable insights for clinical decision-making. Further multi-center studies with larger sample sizes and different designs are needed to confirm these findings.
Keywords: Peyronie's plaque, pentoxifylline, colchicine, L-carnitine

P949, The effect of metformin on the expression levels *of GDF-9, BMP-15 and miR-320* genes in women with polycystic ovary syndrome undergoing *intracytoplasmic sperm injection (ICSI)*

Shima Sonieshargh[1], Syed Mohammad Ali Shariatzadeh[1], Malek Soleimani Mehranjani[1], Rahil Jannatifar[2], Zahra Ebrahimi[3]

1. Department of Biology, Faculty of Sciences, Arak University, Arak, Iran
2. Department of Reproductive Biology, Academic Center for Education, Culture and Research (ACECR), Qom, Iran
3. Department of Mesenchymal Stem Cells, Academic Center for Education Culture and Research (ACECR), Qom, Iran

Background: *Polycystic ovary syndrome (PCOS)* is the most common endocrine disorder in women and is associated with infertility. In these patients, the expression of the genes *Growth differentiation factor 9 (GDF-9), Bone morphogenetic protein 15 (BMP-15)*, which play a role in the regulation of ovulation, is reduced. The common drug metformin in the treatment of *PCOS* affects the expression levels of some genes and *microRNAs* in these patients. The aim of this study was to investigate the effects of metformin on the expression levels of the genes *GDF-9, BMP-15* and *miR-320* in granulosa cells of these patients.

Methods: Forty women with *PCOS* were randomly divided into two groups. Metformin (1500 mg) and placebo (25 mg *ORS* solution) were both administered for 8 weeks. Treatment started two months before the ovulation cycle and continued until the day of oocyte retrieval. The expression levels of *GDF-9, BMP-15* and *miR-320* genes in granulosa cells of these patients were measured by real-time polymerase chain reaction (*Real-Time (PCR*) method. Data were analyzed using the Independent T Test statistical method, and differences between means were considered significant at the $P<0.05$ level.

Results: The mean expression levels of *GDF-9* ($P<0.01$), *BMP-15* ($P<0.01$), and *mir-320* ($P<0.01$) genes in granulosa cells in the metformin group showed a significant increase compared to the placebo group.

Conclusion: Our results showed that metformin can play an important role in improving oocyte competence, fertilization ability, and embryonic development by increasing the expression of *GDF9*, *BMP-15*, and *mir-320* genes and reducing androgen levels.

Keywords: *PCOS,* Metformin, *GDF-9, BMP-15*

P950, Effect of vitamin C on Levothyroxine Absorption: A systematic review

Shayan Rezanejad[1], Zeynab Golara[2], Elham Abdi[2]
1. Students Research Committee, Bushehr University of Medical Sciences, Bushehr, Iran
2. Students Research Committee, Zanjan University of Medical Sciences, Zanjan, Iran

Background: Levothyroxine (l-T4) malabsorption remains a clinical concern, especially in patients with gastrointestinal disorders or those taking acid-suppressing medications. Vitamin C may enhance l-T4 bioavailability by lowering gastric pH and facilitating tablet dissolution (Jubiz & Ramirez, 2014). This systematic review aimed to evaluate human clinical evidence on the effect of oral vitamin C co-administered with levothyroxine on thyroid hormone levels, particularly in individuals with impaired gastric absorption.
Methods: A systematic search of PubMed was conducted from inception to 2024 to identify randomized controlled trials (RCTs) and observational studies involving adult hypothyroid patients. Eligible studies reported changes in serum TSH, free T4 (fT4), or total T3 (tT3) following vitamin C and l-T4 co-administration. Study quality was assessed using PRISMA and the Cochrane risk-of-bias tool.
Results: Five studies met the inclusion criteria, including three RCTs and two observational studies. A crossover RCT by Jubiz and Ramirez (2014) reported a significant TSH decrease from 6.2 ± 1.4 to 3.5 ± 1.2 mIU/L ($p<0.01$), along with increases in fT4 and tT3. Other studies supported these findings, especially in patients with atrophic gastritis or proton pump inhibitor use (Sachmechi et al., 2007; Sato et al., 2019). No significant adverse effects were noted with vitamin C doses up to 1000 mg/day (Centanni et al., 2006; Wenzel & Kirschsieper, 1977).
Conclusion: Vitamin C may enhance levothyroxine absorption in patients with reduced gastric acidity. However, current evidence is limited. Larger, high-quality trials are needed to confirm efficacy and establish clinical guidelines.
Keywords: Levothyroxine, Vitamin C, Thyroid hormone, Gastric acidity

P951, The effect of HIIT training on the levels of liver enzymes in type 2 diabetic women with NAFLD

Zahra Bayat[1], AbbasAli Gaeini[2], Reza Nouri[3], Alireza Gholipour[4]
1. Department of Sports Science, Kish International Campus, University of Tehran, Kish, Iran
2. Department of Exercise Physiology, University of Tehran, Tehran, Iran
3. Department of Sports Science, Kish International Campus, University of Tehran, Kish, Iran
4. Department of Sports Science, Razi University, Kermanshah, Iran

Background: In recent years, non-alcoholic fatty liver disease (NAFLD) has been recognized as a pathogenic factor in insulin resistance and type 2 diabetes. One of the methods for assessing NAFLD is by measuring liver enzymes such as ALT, AST, and ALP. Various studies have reported conflicting results regarding the effect of exercise on liver enzymes. High-intensity interval training (HIIT) is one of the newest and most effective physical activities for individuals with type 2 diabetes. Therefore, this study investigated the effect of HIIT on liver enzyme levels in type 2 diabetic with NAFLD.
Methods: Twenty women with type 2 diabetes and NAFLD were selected as available samples and randomly assigned to either a HIIT training group or a control group. The HIIT group performed training three days a week on a stationary bike for eight weeks. Liver enzyme levels (ALP, AST, and ALT) were measured using kits from the Biosystems Company (Spain). One-way analysis of variance was used for between-group comparisons, and paired t-tests were used to assess within-group changes from pre-test to post-test.
Results: The findings of this study show that all three enzymes decreased in the HIIT group; however, only ALP and AST levels decreased significantly from pre-test to post-test ($p \leq 0.05$). In the control group, no significant changes were observed ($p \geq 0.05$).
Conclusion: HIIT can reduce ALP and AST enzyme levels in women with type 2 diabetes and NAFLD.
Keywords: Diabetes Mellitus, Aspartate Aminotransferase, Interval Aerobic Training.

P952, Formulation and physicochemical evaluation of PEGylated liposomal spironolactone: Active loading method

Alireza Afshoun[1], Mahtab Zhian Mehrizi[1], Seyede Hoda Alavizadeh[2], Fatemeh Gheybi[3], Mahmoudreza Jaafari[2]

1. Department of Advanced Medical Sciences and Technologies, School of Paramedicine, Shahid Sadoughi University of Medical Sciences, Yazd, Iran
2. Department of Pharmaceutical Nanotechnology, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Medical Biotechnology and Nanotechnology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: The clinical utility of spironolactone is constrained by its poor aqueous solubility and suboptimal systemic absorption. Advanced nanocarrier systems, such as PEGylated liposomes, can address these limitations, and active loading techniques offer enhanced drug incorporation and improved vesicle performance compared to conventional methods. Such formulations may also provide a foundation for exploring spironolactone in adjunctive cancer therapy.

Methods: In this study, spironolactone was incorporated into PEGylated liposomes using a transmembrane gradient-based active loading strategy. The resulting vesicles were characterized for hydrodynamic diameter, polydispersity index (PDI), zeta potential, drug entrapment efficiency, and in vitro release under buffered conditions at pH 7.4, 6.5, and 5.5. The effect of active loading on formulation stability and release kinetics was evaluated.

Results: Active-loaded PEGylated liposomes displayed narrow size distribution, stable zeta potential, and improved encapsulation efficiency relative to passive loading approaches. In vitro release studies demonstrated sustained and predictable spironolactone release over 48 hours, with moderately faster release at acidic pH, indicating environmental responsiveness. PEGylation further enhanced vesicle stability and minimized premature drug leakage.

Conclusion: Active loading of spironolactone into PEGylated liposomes results in enhanced drug incorporation and controlled release, providing a robust platform for formulation optimization and potential development of liposomal delivery systems for poorly soluble therapeutics, including applications in adjunctive cancer treatment.

Keywords: Active loading, Spironolactone, Liposome, Cancer treatment

P953, PEGylated liposomes as a carrier for spironolactone: Physicochemical properties and release profile

Mahtab Zhian Mehrizi[1], Alireza Afshoun[1], Seyede Hoda Alavizadeh[2], Fatemeh Gheybi[3], Mahmoud reza Jaafari[2]

1. Department of Advanced Medical Sciences and Technologies, School of Paramedicine, Shahid Sadoughi University of Medical Sciences, Yazd, Iran
2. Department of Pharmaceutical Nanotechnology, School of Pharmacy, Mashhad University of Medical Sciences, Mashhad, Iran
3. Department of Medical Biotechnology and Nanotechnology, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

Background: Spironolactone, a lipophilic potassium-sparing diuretic with anti-fibrotic properties, suffers from poor solubility and limited oral bioavailability. Nanocarrier systems such as PEGylated liposomes offer a strategy to enhance stability, improve solubility, and provide controlled drug release.

Methods: In this study, PEGylated liposomes were prepared using thin-film hydration. Formulations were characterized for particle size, polydispersity index (PDI), zeta potential, encapsulation efficiency, and in vitro drug release in buffered media at pH 7.4, 6.5, and 5.5 to assess release kinetics.

Results: Liposomes exhibited nanometric size (120–170 nm), narrow PDI (<0.2), and stable zeta potential, indicating good colloidal stability. Encapsulation efficiency was moderate, reflecting successful but partial drug loading. In vitro release studies showed sustained spironolactone release over 48 hours, with slightly faster release at lower pH values. PEGylation improved liposome stability and reduced premature drug leakage.

Conclusion: PEGylated liposomes provide a stable and effective carrier system for spironolactone, with controlled release properties and favorable physicochemical characteristics, suitable for further formulation optimization.

Keywords: Spironolactone, Nano drug delivery, liposomes

P954, Neonatal outcomes following maternal pethidine administration in labor: A systematic review

Zeinab Alavizadeh[1], Mina Ghalenovi[1]
1. Midwifery Department, Nursing and Midwifery Faculty, Sabzevar University of Medical Sciences, Sabzevar, Iran

Background: Pethidine is one of the most commonly used opioid analgesics in obstetric care. It is administered during labor for two primary purposes: to shorten the active phase and to provide sedation for pain relief. Like most medications, Pethidine crosses the placenta, potentially affecting the fetus. This study aims to evaluate its impact on neonatal outcomes.
Methods: PubMed, Cochrane Library and Google Scholar were searched along with SID, Magiran and Irandoc up to June 2025. The search focused on research where Pethidine was used during the active phase of labor, either intravenously or intramuscularly. Using keywords like Pethidine, labor, analgesia and neonatal outcomes. 1209 article titles were reviewed and 21 studies that met the inclusion criteria were surveyed in more detail.
Results: Most studies indicate that Pethidine administration does not typically result in adverse neonatal outcomes. Findings show no significant impact on Apgar score at 1 and 5 minutes, respiratory complications, vital signs, breastfeeding success rates, hyperbilirubinemia prevalence or the need for intensive care unit admission or resuscitation.
Conclusion: Based on the collected data, Pethidine appears to be safe for fetal health, with no significant adverse effects. As a widely used opioid analgesic in obstetric care, Pethidine could be considered a reliable option for managing labor pain. Additionally, its affordability makes it a practical choice for many individuals, allowing for its use without major concerns.
Keywords: Pethidine, Labor, Analgesia, Neonatal outcomes, Meperidine

P955, Dietary supplement use and regression from prediabetes to normoglycemia: A population-based cohort study

Zahra Bahadoran[1], Zahra Nozari[1], Fereidoun Azizi[2]
1. Micronutrient Research Center, Research Institute for Endocrine Disorders, Research Institute for Endocrine Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran
2. Endocrine Research Center, Research Institute for Endocrine Disorders, Research Institute for Endocrine Sciences, Shahid Beheshti University of Medical Sciences, Tehran, Iran

Background: This study aimed to investigate the association between dietary supplement use and regression from pre-diabetes (Pre-DM) to normal glucose regulation (NGR) in a well-characterized population-based cohort.
Methods: A total of 2,174 adults with Pre-DM (mean age 51.9 ± 14.2 y; 48.6% men) were enrolled from the Tehran Lipid and Glucose Study (2009-2011) and followed for a median of 6 years to assess regression to NGR. Baseline dietary supplement use was assessed via structured interviewer-administered questionnaires and verified when possible with supplement containers, medication lists, or written records. Participants reporting any supplement, including vitamins and minerals, were classified as users. Cox proportional hazards models were used to estimate hazard ratios (HRs) and 95% confidence intervals (CIs) for regression to NGR. The overall mean fasting serum glucose (FSG) and 2-hour serum glucose (2h-SG) levels over time were compared between supplement users and non-users using repeated measures analysis of variance (ANOVA).
Results: Overall, 44.2% of participants regressed to NGR during follow-up. Calcium supplementation was linked to a 25% lower probability of regression (HR=0.75, 95% CI=0.59–0.96). Iron supplementation was associated with a 45% higher likelihood of regression to NGR (HR=1.45, 95% CI=1.05–2.02). Participants who reported taking iron supplements had a significantly lower mean FSG compared with non-users (99.7 vs. 104 mg/dL, P= 0.003), while mean 2h-SG concentrations were slightly lower in this group (133 vs. 139 mg/dL, P= 0.09).
Conclusion: Use of iron supplement may increase, whereas use of Ca supplement may decrease the likelihood of regression from Pre-DM to NGR.
Keywords: Prediabetes, Normal Glucose Regulation, Dietary Supplements, Iron, Calcium

6th International and 27th National Congress of Physiology and Pharmacology of Iran

Mashhad – Iran

4-6 February 2026



Location: Shohadaye Salamat International Convention Center, between 10th and 12th Khaghani, Piroozi Boulevard, Mashhad, Iran

+98-5138002627 / +98-5138827030

phypha2025.cong@mums.ac.ir / Phypha27@gmail.com

https://cong-phypha2025.mums.ac.ir/en

"SPONSORS"

"Iranian Society of Physiology and Pharmacology"

"Iranian Society of Basic and Clinical Pharmacology"

"Iranian Pharmacists Association Khorasan Razavi Branch"

"Applied Biomedical Research Center"

"Pharmacological Research Center of Medicinal Plants"

"Health Science and Technology Park"

Mashhad University of Medical Sciences

SAMEN
Pharmaceutical Co.

"Samen Pharmaceutical Company"

خوشگوار

"Khoshgovar Company"

شرکت داروسازی سامی ساز
SAMISAZ

"SamiSaz Pharmaceutical Company"

"Neysan Shargh Company"