APSE®

Association of Pharmaceutical Scientists and Educators

Only Research Nothing Else

EDITION - 2023

- ✓ SCIENCE
- ✓ PHARMACETICAL SCIENCE
- ✓ INNOVATION
- ✓ INVENTION

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About APSE®

Our History

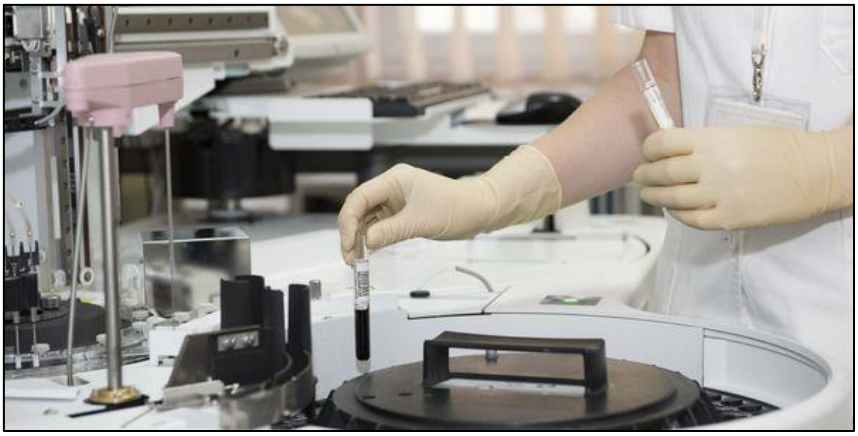
Founded in 2022 and registered with the Registrar of Societies, India, APSE has a distinguished history of conducting research and educative Conferences, Webinars, and symposiums that have had a significant impact on society. Over the years, our team has tackled some of the most challenging problems facing our world, and we are proud of our many accomplishments.

Our Vision

Our vision at APSE is to be a leading Research foundation that is dedicated to solving complex problems that affect our world. We strive to be recognized for our commitment to excellence in pharmaceutical research and the positive impact of our work on society.

Our Approach

At APSE, we take a collaborative and interdisciplinary approach to our research. We believe that by bringing together experts from different fields, we can develop innovative solutions to complex problems that might not be possible through traditional research methods.



Message from the desk of the President, APSE®

Dr. Milind Parle

Professor of Pharmacology,
Hon. Editor & President APSE®,
Ex. Dean, Faculty of Medical Sciences,
Ex. Chairman, Dept. Pharm. Sciences,
Guru Jambheshwar University of Science and Technology,
Hisar, Haryana, India.
E-mail: mparle@rediffmail.com
Mobile: 8799896580 and 9812161998

One of the greatest challenges faced by scientists and cardiologists, neurologists, endocrinologists, psychiatrists, gynecologists, oncologists, psychologists, and physiologists worldwide are to unravel the mystery of brain function and understand precisely the physiological mechanisms involved in maintaining internal equilibrium. This challenge has grown substantially over the years with the enhancement in the lifespan of mankind and the emergence of new diseases (infections due to the Novel COVID-19 virus or Monkey-pox). Artificial intelligence has been applied to solve these mind-boggling problems in recent years. The concept of friendly and harmful nutrients provides a valuable framework for understanding the complex interplay of the processes leading to injury and healing. However, considering genetic, metabolic, and lifestyle factors, a good nutritive approach for preventing and managing a particular disease must be highly individualized. In addition to a healthy diet, regular physical activity, smoking cessation, alcohol abstinence, disciplined lifestyle, 7-h. of sound sleep, and effective stress management have all been shown to reduce the risk of heart attacks, improve glycemic control, and enhance overall physical and mental fitness.

The Association of Pharmaceutical Scientists and Educators (APSE) was constituted during the peak Corona era to provide an interactive and competitive platform to budding pharmacists, scientists, industrialists, and academicians with active global participation. Besides conducting more than three dozen online events to nurture

the innovative potential, productivity, and creativity of budding researchers, the organization is not only on the verge of successfully completing its four years but also a full-fledged Registered body now in India, with perpetual succession and a dedicated bank account. I am delighted to participate in the second offline (physical) two-day international conference hosted at the marvelous premises of KTN College of Pharmacy, Chalavara (Palakkad), Kerala, on Dec. 21-22, 2023. Let me take this unique opportunity in the capacity of the President, APSE, and on my behalf to cordially welcome all the delegates belonging to different regions of the world and states of India, particularly those who have traveled all the way from Punjab, Haryana, Chandigarh, and Delhi specifically for this event. It's a cheering achievement to note that the Editorial Board and the Scientific Committee have meticulously completed the humdrum task of compiling the activities of APSE in the form of a Bulletin and the recent research findings in the form of a concise Abstract book (with ISBN). Nevertheless, we, as the core constituents of APSE, would like to introspect, pause for a while, look back at what we have achieved so far, take stock of how far we have come, and identify what remains yet to be done, and make viable plans accordingly while keeping in mind the mission as well as the vision of APSE. I wish the young graduates, post-graduates, and researchers while following a holistic approach to learning, reach great heights in their research and professional careers. I hope you all enjoy the beautiful ambience, relish the get-together opportunity, have meaningful professional discussions in the vicinity of nature, and carry home pleasant memories of this event. Let us all join hands in making India a Vishva-Guru (विश्वगुरु), showing the righteous path to the entire globe.

Dr. Milind Parle,

Professor of Pharmacology, President, Association of Pharmaceutical Scientists and Educators (APSE), an International Organization dedicated to the cause of Research and Outreaching budding Pharmacists for their Professional Growth), Ex. Dean, Faculty of Medical Sciences, Ex. Chairman, Dept. Pharm. Sciences (Accredited by NBA), Guru Jambheshwar University of Science and Technology ('A+' Grade NAAC Accredited University), HISAR (HARYANA), INDIA. E-mail: mparle@rediffmail.com, Mobile: 8799896580 and 9812161998.

Message from the Secretary

Dr. Hanumanthachar Joshi

Hon. Editor, APSE Bulletin
Hon. Secretary, APSE®
Principal, Sarada Vilas College of Pharmacy
Mysuru, Karnataka, India
Email: amanjoshi17@yahoo.com

Dear Esteemed Members,

As we embark on this intellectual journey, let us collectively embrace the diversity of perspectives and experiences that each participant brings to the table. This bulletin serves as a melting pot of ideas, a crucible where the amalgamation of research and education ignites the sparks of progress. I am happy that this bulletin is being released during the APSE International Conference on Integration of Innovation, Research, and Pharmaceutical Education, 21 -22 December 2023, KTN College of Pharmacy, Chalavara, Kerala, India.

The significance of the presence of delegates here cannot be overstated. Their dedication to advancing the frontiers of knowledge is the cornerstone upon which the edifice of our collective academic pursuits stands. Together, we represent a mosaic of disciplines, each contributing a unique piece to the grand tapestry of human understanding. Throughout the course of this conference, I encourage you to actively engage in the exchange of ideas, engage in spirited discussions, and forge connections that transcend geographical boundaries. It is in this collaborative spirit that breakthroughs emerge, and novel approaches to research and education take root.

The proceedings of this conference which has ISBN, will not merely be a compilation of research papers; they will be a chronicle of the collective wisdom and insights shared within these hallowed halls. As we delve into the various sessions and presentations, let us remain mindful of the impact our work can have on shaping the future of research and education. A special edition of the International Journal of Community Pharmacy will contain the abstracts of the conference.

I sincerely appreciate the excellent efforts of Dr. Arunachalam Muthuraman, Chief Editor, the APSE bulletin for untiring and dedicated efforts in bringing out this bulletin in time.

Warm regards,

Dr. Hanumanthachar Joshi

Secretary, APSE

Message from the APSE Vice Presidents

I am honoured to be a part of the second edition of the APSE 2023 bulletin. The success of this bulletin is evident from the activity of the potential authors – not only reputable scientists, but also young scholars with their fresh ideas and inquisitiveness. "***Reading is necessary for those who wish to rise above the ordinary***". To all the readers, broaden your horizon and think beyond the box. I would also like to commend the team of editors who have continued to bring out the best and wish the association more success in their journey towards academic excellence. The APSE Bulletin also records the achievements and various activities of the association. My best wishes for the entire team and I wish the association to continue its journey of excellence.

Wish you all a happy reading!!!

Dr. K. S. G. Arulkumaran M.Pharm., Ph.D., FAGE (Manipal)

Vice-President of APSE (Kerala)

Principal, KTN College of Pharmacy,

Chalavara, Puliyanamkunnu P O, Ottapalam Taluk, Kerala 679505

Message from the Joint Secretary

Prof. (Dr.) Shailendra Shivaji Gurav

Hon. Editor, APSE Bulletin
Joint Secretary (Goa), APSE
Professor,
Goa College of Pharmacy, Goa University, Goa, India
Email: shailendra.gurav@nic.in

Greetings to all !!!

As we sail into one more edition of the APSE bulletin, let me convey my feelings. I want to extend my heartfelt congratulations to the entire APSE team for the remarkable and fruitful endeavor that was the release of the second bulletin, "APSE- Bulletin-2023".

Revolutionary technology abounds in this modern era. Finding knowledge in the minds of walkers is more than just taking a stand; it's a matter of fact, a journey. We must recognize the importance of scientific research and innovation to raise living standards for all citizens and advance economically as a nation.

Initiated to foster intellectual discourse and new partnerships among scientists worldwide, APSE aims to provide a platform for exchanging ideas and information. Our mission is to advance research that will assist in the form of the dissemination of information, the making of discoveries, the training of future scholars to think critically, the raising of public awareness, and, finally, the improvement of health and fitness for all members of society.

With APSE, researchers and scientists have a platform to showcase their work and research worldwide, allowing their findings to reach every part of the globe. Thanks to its capable leadership, I sincerely believe that APSE will accomplish its mission in the pharmaceutical sciences with the help of our international network of researchers and experts.

Best wishes !!!

Editorial Message from the Chief Editor

Dr. Arunachalam Muthuraman

Associate Professor,
Department of Pharmacology,
Faculty of Pharmacy, AIMST University, Malaysia.

APSE society is primarily focused on encouraging the building of connections between budding researchers, scientists, and educators to reach their carrier advancement and serve in the Pharmacy Profession & Society. Now this APSE® society is a registered governing body and launched an official website (https://theapse.in/). APSE and committee members are actively organizing various events like conferences, webinars, workshops, and public awareness campaigns for exploring pharma developments and nurturing & guiding young/budding researchers.

Every year APSE releases the APSE – Bulletin; this year second copy is made efficiently. Our APSE team members are always supportive of the development of and the opportunities for budding researchers. APSE has a clear vision & mission principles. Hence, successfully grew and was recognized by various government bodies. I would like to extend a very warm welcome to the readership of the APSE Bulletin. I am thankful to APSE to all authors editorial board members, reviewers, and APSE executive members for expressing my view and for contributing to be a part of this APSE society and APSE-Bulletin editorial board.

APSE Bulletin provides the ideal forum for the exchange of information on the health care profession & research advancement and more in various formats: commentary, short communication, novel findings, survey reports, and opinion reports on promising developments and practices of pharmacy and the health care system. I wish all participants and APSE members to share their articles and APSE editorial board members well in advance; to ensure rapid dissemination of information, we aim to complete the peer review process of submitted articles and make the publication in the upcoming APSE Bulletin.

APSE bulletin is committed to publishing all received manuscripts with higher and top priority based on the recommendation of peer reviewers and APSE editorial board members. Further, we will periodically modernize and strengthen the standard & quality of the APSE Bulletin. I close this message by inviting everyone to submit their exciting research to the APSE bulletin. We are committed to publishing all information on the pharmacy healthcare system with significant benefits to the public healthcare system.

Once again, I welcome you to this APSE Bulletin, with your support as authors, reviewers, and APSE editors. Ultimately, we will see bright prospects for the APSE bulletin to serve scientific information and support to the healthcare community.

Dr. Arunachalam Muthuraman
Editor in Chief
APSE Vice-President (North Malaysia)
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Phone No: +91-9988040886 (India); +60-1136293386 (Malaysia whatsapp).

APSE Member Activities
&
Members Performance - Achievements

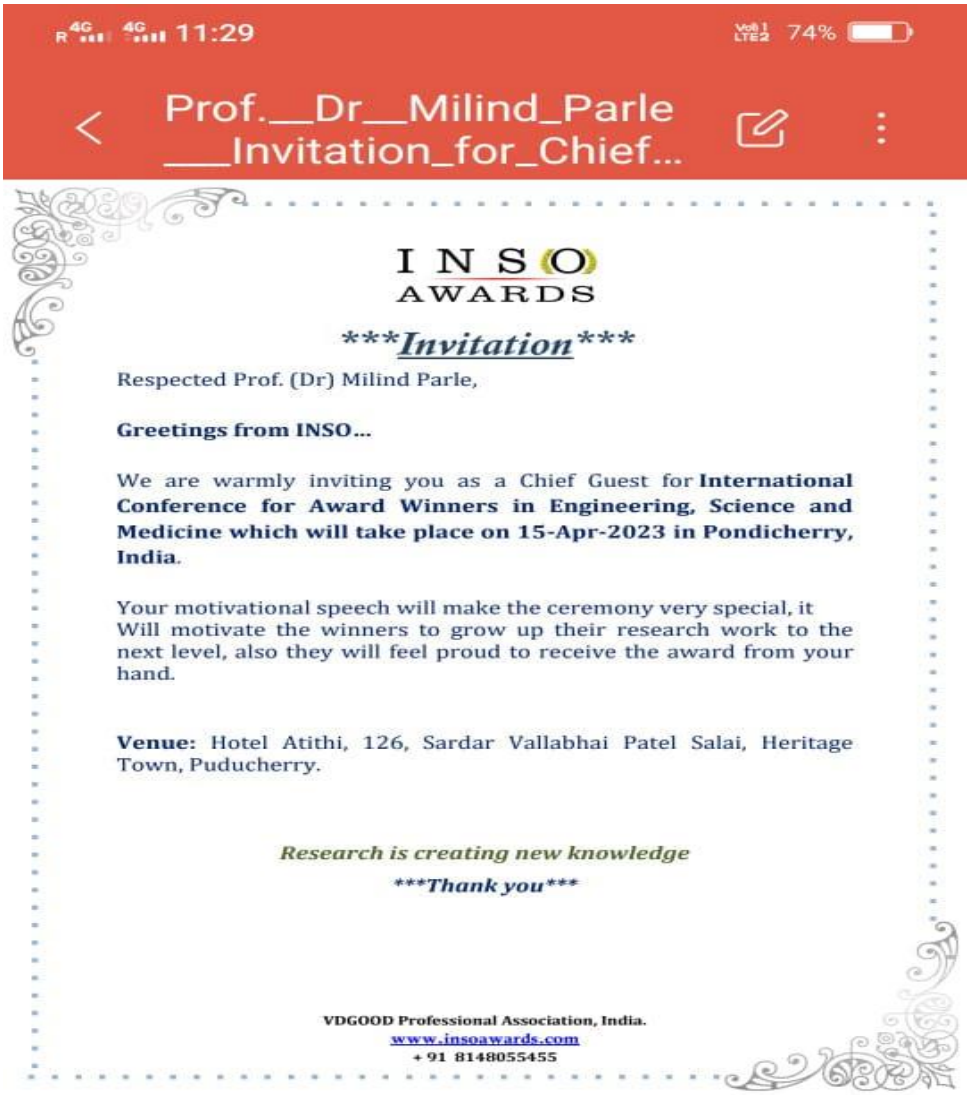
Prof. Dr. Sharad Wakode, DIPSAR, New Delhi elected for Expert Committee to review the Pharmacy Act, 1948; by Ministery of Health & Family Welfare, Nirman Bhuman, New Delhi, India.

Dr Arul Kumaran made an MoU with UGM, Malaysia behalf of KTN College of Pharmacy, India.

Dr. Hanumanthachar Joshi, Secretary, APSE and Principal SVCP, was invited as chief guest and delivered a valedictory address national conference on preclinical to clinical approach in neuropharmacology - global perspectives, organised by Karpagam College of Pharmacy, Coimbatore, India (16.03.2023). Prof. delivered a talk on 'Unravelling Mysteries, Treatment and Management of Dementia'.

Dr. Hanumanthachar Joshi, Secretary, APSE and Principal SVCP, delivered a talk at Pharma Insight 2023, Alapphuza, Kerala, organized by the College of Pharmaceutical Sciences, Govt TD Medical College, Alapphuza, India (16.03.2023).

Dr. Hanumanthachar Joshi, Secretary, APSE and Principal SVCP, was invited as Guest of Honour and flogged off World Kidney Day organized by the Institute of Nephrology, Mysuru. Chief Guest: Dr. Rajendra, District Commissioner, Mysuru, Dr. Dakshayanai, Dean, Mysore Medical College, office bearers of Urological Society of India, doctors and medical and pharmacy students participated in the walkathon and cyclothon (09.03.2023). Venue: Mysore Palace Premises.



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Prof.__Dr__Milind_Parle___Invitation_for_Chief...

INSO AWARDS

Invitation

Respected Prof. (Dr) Milind Parle,

Greetings from INSO...

We are warmly inviting you as a Chief Guest for **International Conference for Award Winners in Engineering, Science and Medicine which will take place on 15-Apr-2023 in Pondicherry, India.**

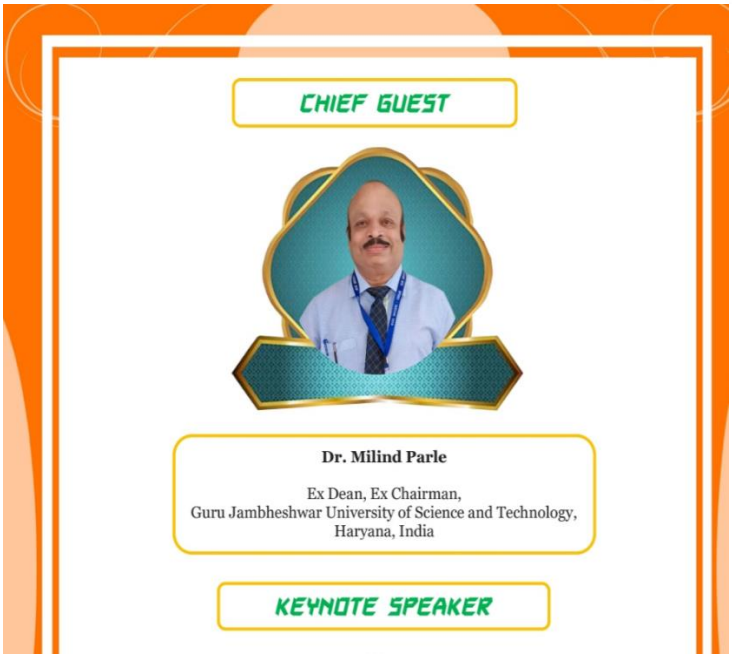
Your motivational speech will make the ceremony very special, it Will motivate the winners to grow up their research work to the next level, also they will feel proud to receive the award from your hand.

Venue: Hotel Atithi, 126, Sardar Vallabhai Patel Salai, Heritage Town, Puducherry.

Research is creating new knowledge

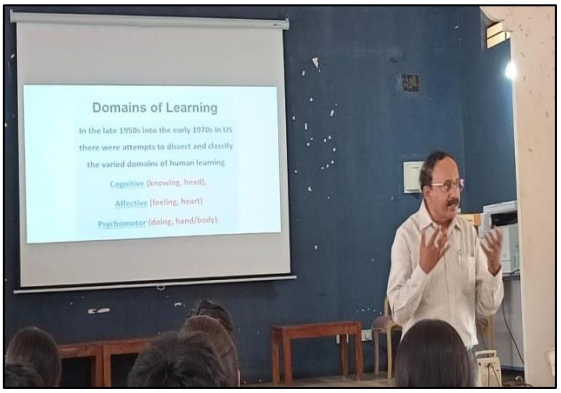
Thank you

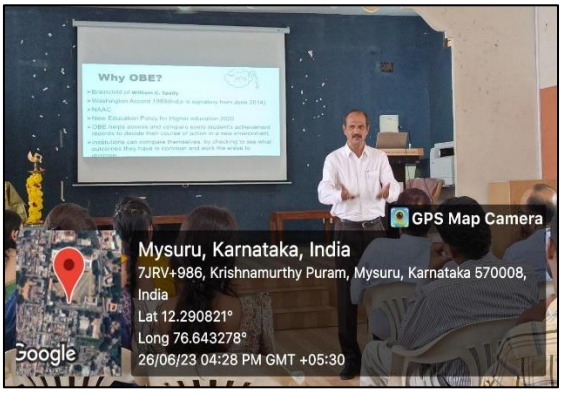
VDGOOD Professional Association, India.
www.insoawards.com
+91 8148055455



Dr. Milind Parle, Hon. Editor & President APSE®, was invited as Chief Guest and Keynote Speaker for the INSO Conference and Award Ceremony.

Dr. Vandana Patel, APSE Committee, delivered the talk on "Teacher Talks Academy" with grand success in her professional endeavor.





Dr. Hanumanthachar Joshi, Secretary, APSE and Principal SVCP, organized Two days Faculty Development Program on innovations in Teaching-Learning and research at SVCP. Dr. Ganesh Bhat, Dean (academics) MES College, Bengaluru, and Prof. Dr. P. K. Kulkarni, JSS College of Pharmacy, Mysuru.

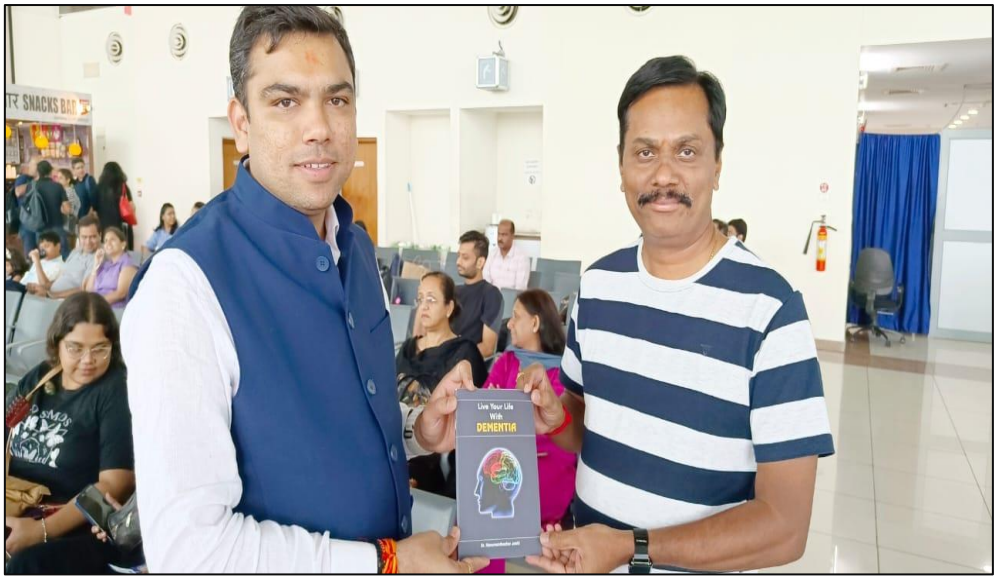
Dr. A. K. Gnanachandran was the Chief Guest and Keynote Speaker at the International Conference on Herbal Drugs Standardization organized by the Antiviral Research Society.

Dr. Hanumanthachar Joshi, Secretary, APSE and Principal SVCP, was felicitated at the 8th World Ayurveda Day, which was held on **10.11.2023** for his significant contribution to AYUSH Research, at Sanjeevini Ayurvedic Medical College and Hospital in Hubballi, and was honored as the chief guest.

Dr. Hanumanthachar Joshi, Secretary, APSE delivered an invited talk at Pharma sight 2023, Unveiling Innovations for Transforming Healthcare, organized by the College of Pharmaceutical Sciences, Govt. TD Medical College, Alappuzha, 18th March 2023.

Dr. Hanumanthachar Joshi, Secretary, APSE delivered an invited talk and participated as chief guest at the National Conference, organized by Karpagam College of Pharmacy, on 19th March 2023.

APSE Meeting at 53rd IPS conference, Bagalkote, 25th August 2023.



Our secretary met **Sri Montu Kumar Patel, President, of the Pharmacy Council of India**, and briefed him on the activities and initiatives of APSE. Presented his book on dementia on 29th June 2023.

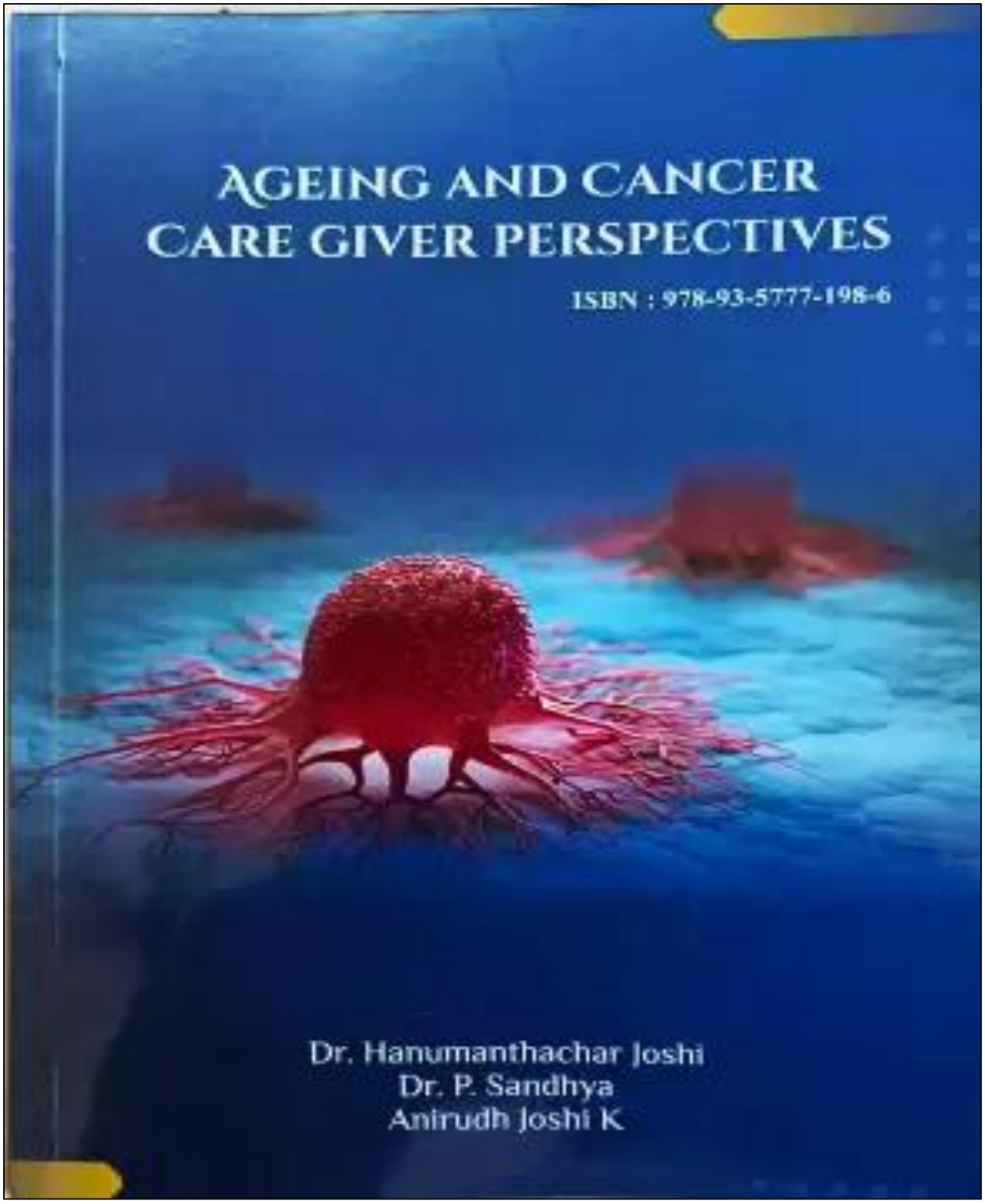
Our secretary Chaired a scientific session at the 53rd IPS International Conference, Bagalkot, India.

Our Hon. Vice President of APSE® **Prof. Dr. Nirmal Singh**, Received the prestigious "***Dr. S. C Lahiri Oration Award***" at the 53rd Annual Conference of Indian Pharmacological Society, 2023.

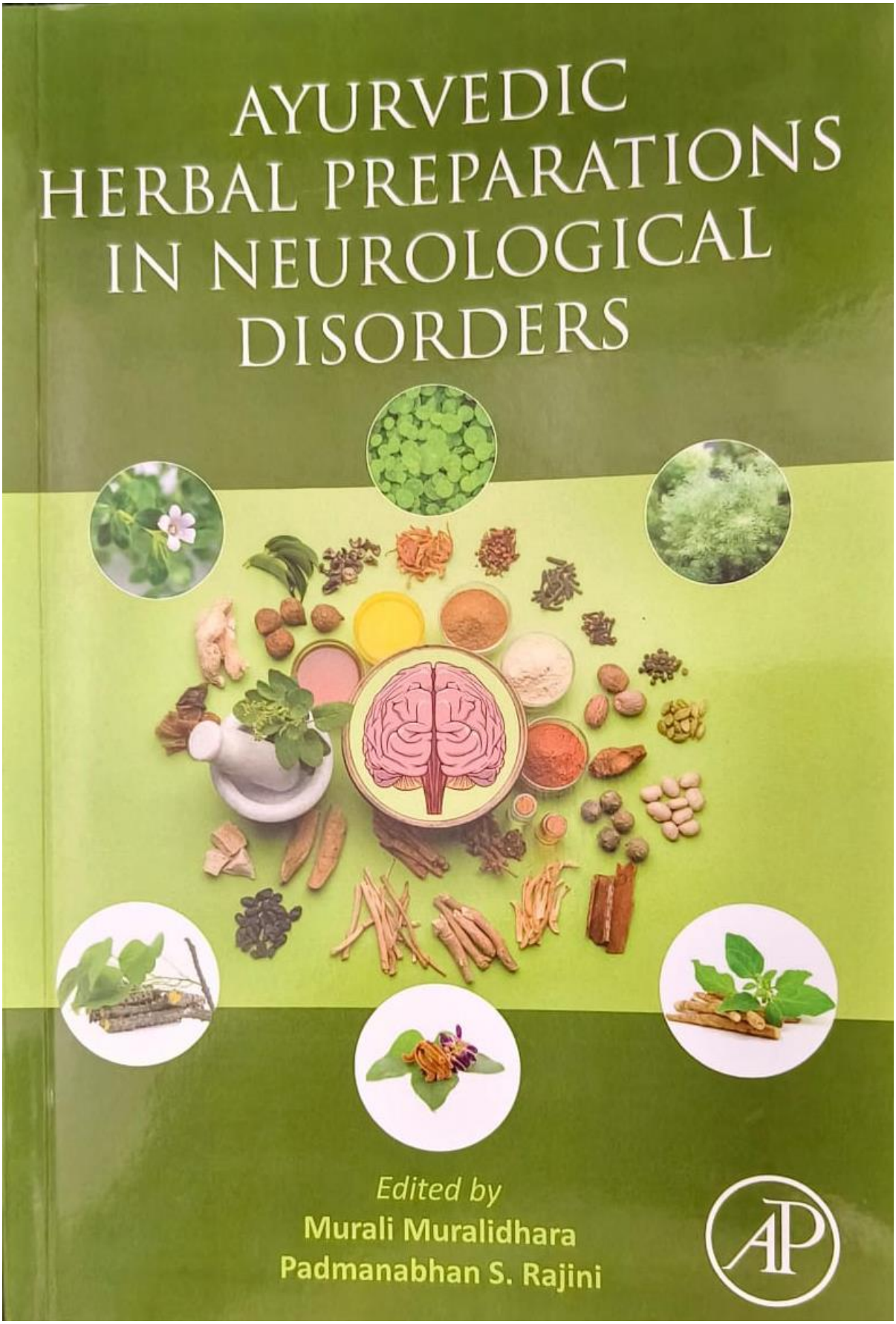
Our APSE Joint Secretary (Goa), Prof. (Dr.) Shailendra Shivaji Gurav was honored with **'Dr. P. D. Patil National Award for Best Thesis in Pharmaceutical Sciences'** in **'Natural Products Category'** for M Pharm project in 2021-22 (March 2023). He also Achieved 02 International and 01 national patents. He wrote 02 Books and 03 Book Chapters and published in reputed publishers (ACS, Wiley, and Elsevier). Crucially, he made 28 Research Publications in reputed journals in the last year period. He was also nominated as Chairperson of BOS in the Faculty of Pharmacy of Goa University, Goa.

Our Hon. Editor, APSE Bulletin, and Hon. Secretary, APSE® **Dr. Himanshu Joshi**, Received the prestigious "***Dr. K. R Bharatdwaj Award***" for Excellence in Laboratory Animal Sciences at NEIST Jorhat. From left: Karunesh Rai Ji, Founder member & Treasurer LASAI, CDRI Lucknow; Dr. Himangshu Bora, Principal scientist NEIST Johrat; Dr. Rajdeep Guha, Secretary General LASAI and in charge animal facility CDRI Lucknow; Dr. Prabodh Kumar Trivedi, Director CSIR- CMAP Lucknow, Dr. Suresh Poosala, Founder and President OncoSeek Pvt Ltd.; Er. J.J.Bora. Chief Scientist, NEIST Jorhat.

Dr. Shimoga Nagaraj Sriharsha was invited as Guest of Honour and keynote speaker at ANAKON 2023 Peak Heights in analytical techniques national conference held in Chalapathi Institute of Pharmaceutical Sciences Guntur Andrapradesh. I delivered a talk on "*Recent trends in oncology drug discovery and analytical techniques*". It was appreciated by Dr. Ramrao Dean and Principal and all research scholars. He also published the research article in the Journal of Molecular Structure.



Dr. Hanumanthachar Joshi, Secretary, APSE published a book on "***Ageing and Cancer-Care Giver Perspectives***" co-authored by Dr. P. Sandhya, Anirudh Joshi K. Publisher: Alzheimer's and Related Disorders Society of India, Mysuru. It is available in Flipkart. ISBN: 9789357771986.


AYURVEDIC
HERBAL PREPARATIONS
IN NEUROLOGICAL
DISORDERS
Edited by
Murali Muralidhara
Padmanabhan S. Rajini
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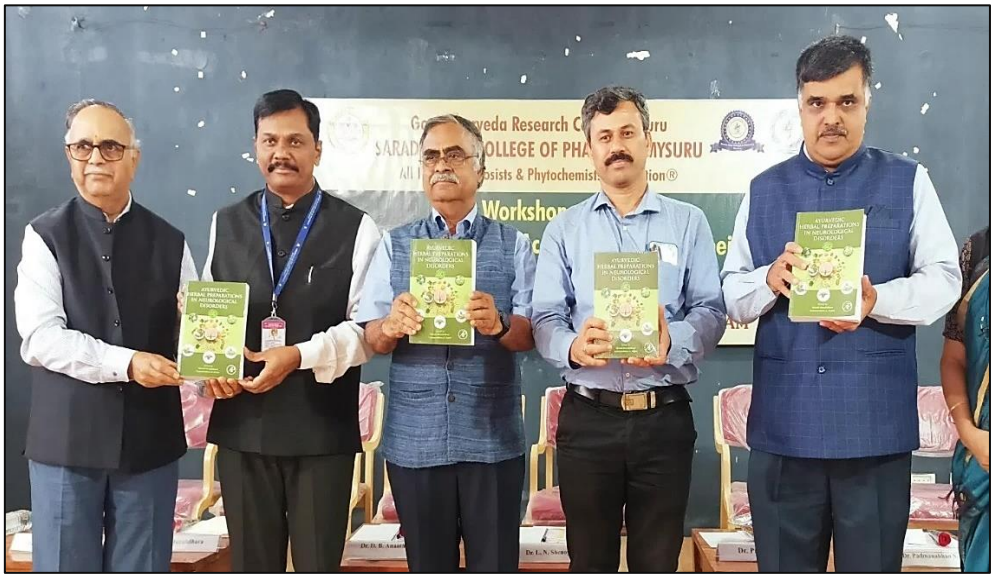
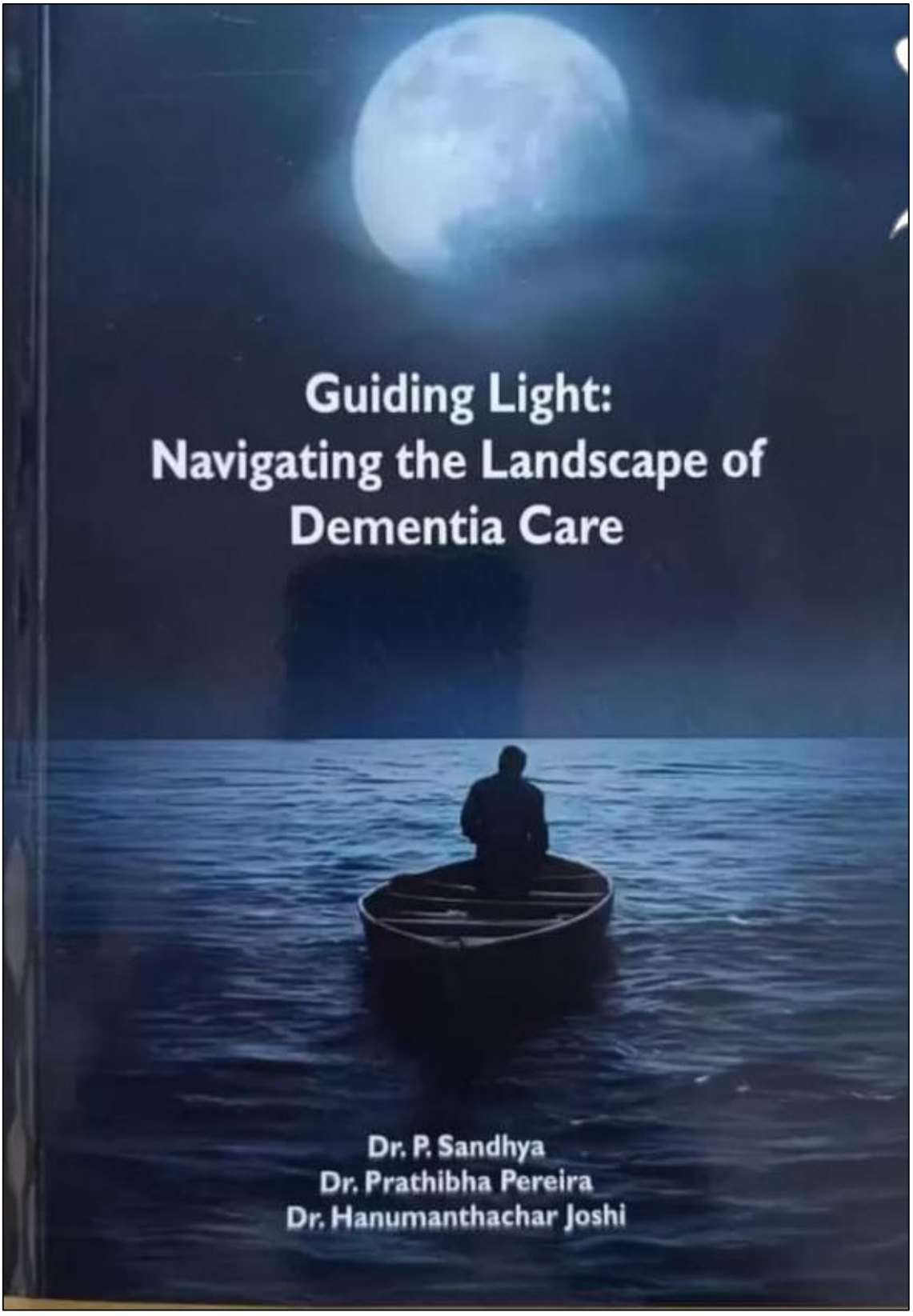
Contents

Dr. Hanumanthachar Joshi, Secretary, APSE published a book chapter on "**Overview of approaches in Ayurveda for neurological health and disorders**" in '***Ayurvedic Herbal Preparations in Neurological Disorders***', Publisher: Elsevier publication. The complementary book copy was received from Dr. Muralidhar, editor and senior scientist, at CFTRI.

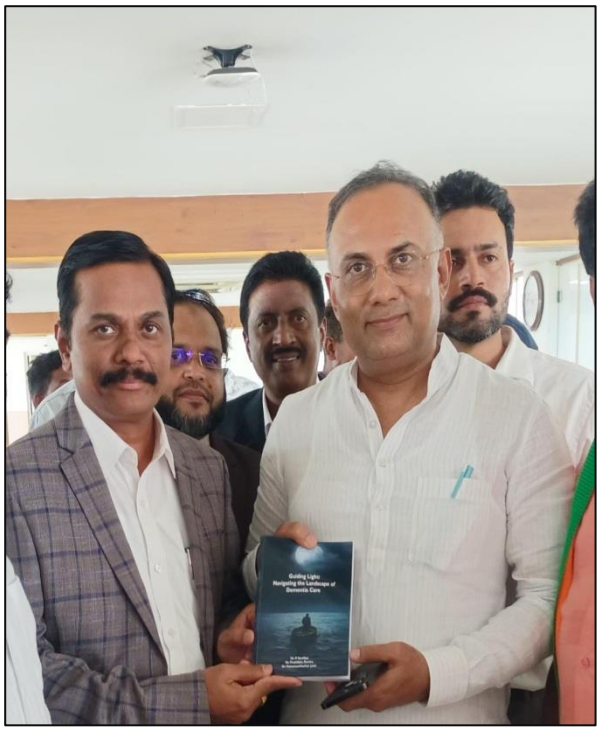


Workshop on Developing Globally Acceptable Pharmacopeial Quality Monographs for Ayurvedic Herbs was organized by Sarada Vilas College of Pharmacy, Mysuru in association with Govt. Ayurveda Research Center, Mysuru and All Pharmacognosists & Phytochemists Association®. Dr. DB Ananthanarayana inaugurated the workshop and delivered a keynote address. Dr. Prakash Hegde, Ayurvedic Pharmacopoeia coordinator delivered a talk followed by a talk of Dr. Anupam Maurya, Scientific Officer, and Pharmacopoeia Commission for Indian Medicine & Homeopathy, New Delhi. Development of herbal pharmacopeia was Demonstrated by Prof. P K Kulkarni, Dean (Research), SVCP, Prof. Dinesh, Mrs. Keerthi, Dr. Hanumanthachar Joshi, Dept. of Pharmacognosy, Sarada Vilas College of Pharmacy, Mysuru. 40 delegates from various ayurvedic medical colleges of Karnataka Participated in the workshop as resource persons. Dr. L. N. Shenoy, Asst. Director, Govt. Ayurveda Research Center, Mysuru was the convener of the workshop. **"A book on Ayurvedic Herbal Preparations for Neurological disorders, Elsevier Publishers was released during the event. 04.10.2023."**



Dr. Hanumanthachar Joshi, Secretary, APSE published a book on "***Guiding Light: Navigating the Landscape of Dementia Care***" co-authored by Dr. P. Sandhya and Dr. Pratibha Pereira. Publisher: Alzheimer's and Related Disorders Society of India, Mysuru (173 Pages). It is available in Flipkart.

The book "Guiding Light: Navigating the Landscape of Dementia Care" authored by Dr. P. Sandhya Dr. Pratibha Pereira and Dr. Hanumanthachar Joshi foreword by **Dr. Radha Murthy, *Managing Director, Nightingale Medical Trust, Dementia care center***.



The book "Guiding Light: Navigating the Landscape of Dementia Care" authored by Dr. P. Sandhya Dr. Pratibha Pereira and **Dr. Hanumanthachar Joshi** was presented to **Sri Dinesh Gundu Rao**, Minister for Health and Family Welfare, Govt. of Karnataka; and also discussed various issues related to pharmacy profession, during a announcing dementia as healthcare priority at NIMHANS program held at Mysuru.

Our honorable APSE committee member **Dr. Gnanachandran** was felicitated by Dr. Peter, Assistant Professor of Pharmacology of Madurai Medical College during the 62nd National Pharmacy Week Celebrations.

Dr. Hanumanthachar Joshi successfully made a ‘Memory Walk’ campaign to create awareness about Alzheimer's disease was organized by ARDSI, Mysuru, NSS wing of Sarada Vilas College of Pharmacy, Rotary Mysuru, JSS Medical College and Hospital at Kote Anjaneya Temple, Amba Vilas Palace premises. It was inaugurated the event and supported by Rajamatha Pramodadevi Wadiyar.

ಆರೋಗ್ಯ

62ನೇ ರಾಷ್ಟ್ರೀಯ ಫಾರ್ಮಸಿ ಸಪ್ತಾಹಕ್ಕೆ ಚಾಲನೆ

ಮೈಸೂರಿನ ಬನ್ನಿಮಂಟಪದಲ್ಲಿರುವ ಜೆಎಸ್‌ಎಸ್ ಫಾರ್ಮಸಿ ಕಾಲೇಜಿನ ಶ್ರೀ ರಾಜೇಂದ್ರ ಭವನದಲ್ಲಿ ಆಯೋಜಿಸಿರುವ 6 ದಿನಗಳ 62ನೇ ರಾಷ್ಟ್ರೀಯ ಫಾರ್ಮಸಿ ಸಪ್ತಾಹಕ್ಕೆ ತಮಿಳುನಾಡು ಡ್ರಗ್ಸ್ ಕಂಟ್ರೋಲರ್ ನ ಮಾಜಿ ನಿರ್ದೇಶಕ ಡಾ.ಜಿ.ಸೆಲ್ವರಾಜ್ ಶುಕ್ರವಾರ ಚಾಲನೆ ನೀಡಿದರು. ಕಾಲೇಜಿನ ಪ್ರಾಂಶುಪಾಲ ಡಾ.ಟಿ.ಎಂ.ಪ್ರಮೋದ್ ಕುಮಾರ್ ಇತರರು ಚಿತ್ರದಲ್ಲಿದ್ದಾರೆ.

ಮೈಸೂರು: ಸಾಂಸ್ಕೃತಿಕ ನಗರಿ ಮೈಸೂರಿನಲ್ಲಿ ಆರು ದಿನಗಳ 62ನೇ ರಾಷ್ಟ್ರೀಯ ಫಾರ್ಮಸಿ ಸಪ್ತಾಹಕ್ಕೆ ಶುಕ್ರವಾರ ಚಾಲನೆ ದೊರೆಯಿತು.

ಬನ್ನಿಮಂಟಪದಲ್ಲಿರುವ ಜೆಎಸ್‌ಎಸ್ ಫಾರ್ಮಸಿ ಕಾಲೇಜಿನ ಶ್ರೀ ರಾಜೇಂದ್ರ ಭವನದಲ್ಲಿ ರಾಷ್ಟ್ರೀಯ ಫಾರ್ಮಾಸ್ಯುಟಿಕಲ್ ಅಸೋಸಿಯೇಷನ್ ಮೈಸೂರು ಶಾಖೆ ಹಾಗೂ ಜೆಎಸ್‌ಎಸ್ ಫಾರ್ಮಸಿ ಕಾಲೇಜು, ಜೆಎಸ್‌ಎಸ್ ಉನ್ನತ ಶಿಕ್ಷಣ ಮತ್ತು ಸಂಶೋಧನಾ ಅಕಾಡೆಮಿಯ ಸಹಯೋಗದಲ್ಲಿ ಆಯೋಜಿಸಿರುವ 62ನೇ ರಾಷ್ಟ್ರೀಯ ಫಾರ್ಮಸಿ ಸಪ್ತಾಹಕ್ಕೆ ತಮಿಳುನಾಡು ಡ್ರಗ್ಸ್ ಕಂಟ್ರೋಲರ್‌ನ ಮಾಜಿ ನಿರ್ದೇಶಕ ಡಾ.ಜಿ.ಸೆಲ್ವರಾಜ್ ಚಾಲನೆ ನೀಡಿದರು.

ಬಳಿಕ ಮಾತನಾಡಿದ ಅವರು, ಸಮಾಜದ ಸದೃಢ ಆರೋಗ್ಯ ನಿರ್ಮಾಣದಲ್ಲಿ ಫಾರ್ಮಾಸಿಸ್ಟ್‌ಗಳ ಪಾತ್ರ ಮಹತ್ವವಾದದ್ದು. 'ರೋಗಿಗಳ ಸುರಕ್ಷತೆಯನ್ನು ಖಚಿತಪಡಿಸಿಕೊಳ್ಳಲು ಫಾರ್ಮಾಸಿಸ್ಟ್‌ಗಳನ್ನು ಸೇರಿಸಿಕೊಳ್ಳಿ' ಎಂಬ ಶೀರ್ಷಿಕೆಯಡಿ ಸಾರ್ವಜನಿಕರು ಇತರೆ ಆರೋಗ್ಯ ಪೂರೈಕೆದಾರರು ಮತ್ತು ಅಧಿಕಾರಿಗಳಲ್ಲಿ ಎನ್‌ಪಿಡಬ್ಲ್ಯೂ ಥೀಮ್ ಮತ್ತು ಆರೋಗ್ಯ ವ್ಯವಸ್ಥೆಗೆ ಫಾರ್ಮಾಸಿಸ್ಟ್‌ಗಳು ನೀಡುವ ಅಮೂಲ್ಯ ಕೊಡುಗೆಗಳ ಬಗ್ಗೆ ಜಾಗೃತಿ ಮೂಡಿಸಲಾಯಿತು.

ಜೆಎಸ್‌ಎಸ್ ಫಾರ್ಮಸಿ ಕಾಲೇಜಿನ ಪ್ರಾಂಶುಪಾಲ ಡಾ.ಟಿ.ಎಂ.ಪ್ರಮೋದ್ ಕುಮಾರ್ ಅಧ್ಯಕ್ಷತೆ ವಹಿಸಿದ್ದರು. ರಾಷ್ಟ್ರೀಯ ಫಾರ್ಮಾಸ್ಯುಟಿಕಲ್ ಅಸೋಸಿಯೇಷನ್‌ನ ಮೈಸೂರು ಶಾಖೆಯ ಉಪಾಧ್ಯಕ್ಷ ಡಾ.ಎಂ.ಮಂಜುನಾಥ, ಕಾರ್ಯದರ್ಶಿ ಡಾ.ಆರ್.ಎಸ್.ಚಂದನ್, ಖಜಾಂಚಿ ಡಾ.ಬಿ.ಎಂ.ಗುರುಪಾದಯ್ಯ, ಫಾರೂಕಿಯಾ ಫಾರ್ಮಸಿ ಕಾಲೇಜಿನ ಪ್ರಾಂಶುಪಾಲ ಡಾ.ನಿಸಾರ್ ಅಹಮದ್, ಶಾರದಾ ವಿಲಾಸ ಕಾಲೇಜಿನ ಪ್ರಾಂಶುಪಾಲ ಡಾ.ಹನುಮಂತಾಚಾರ್ ಜೋಶಿ ಮತ್ತಿತರರು ಹಾಜರಿದ್ದರು.

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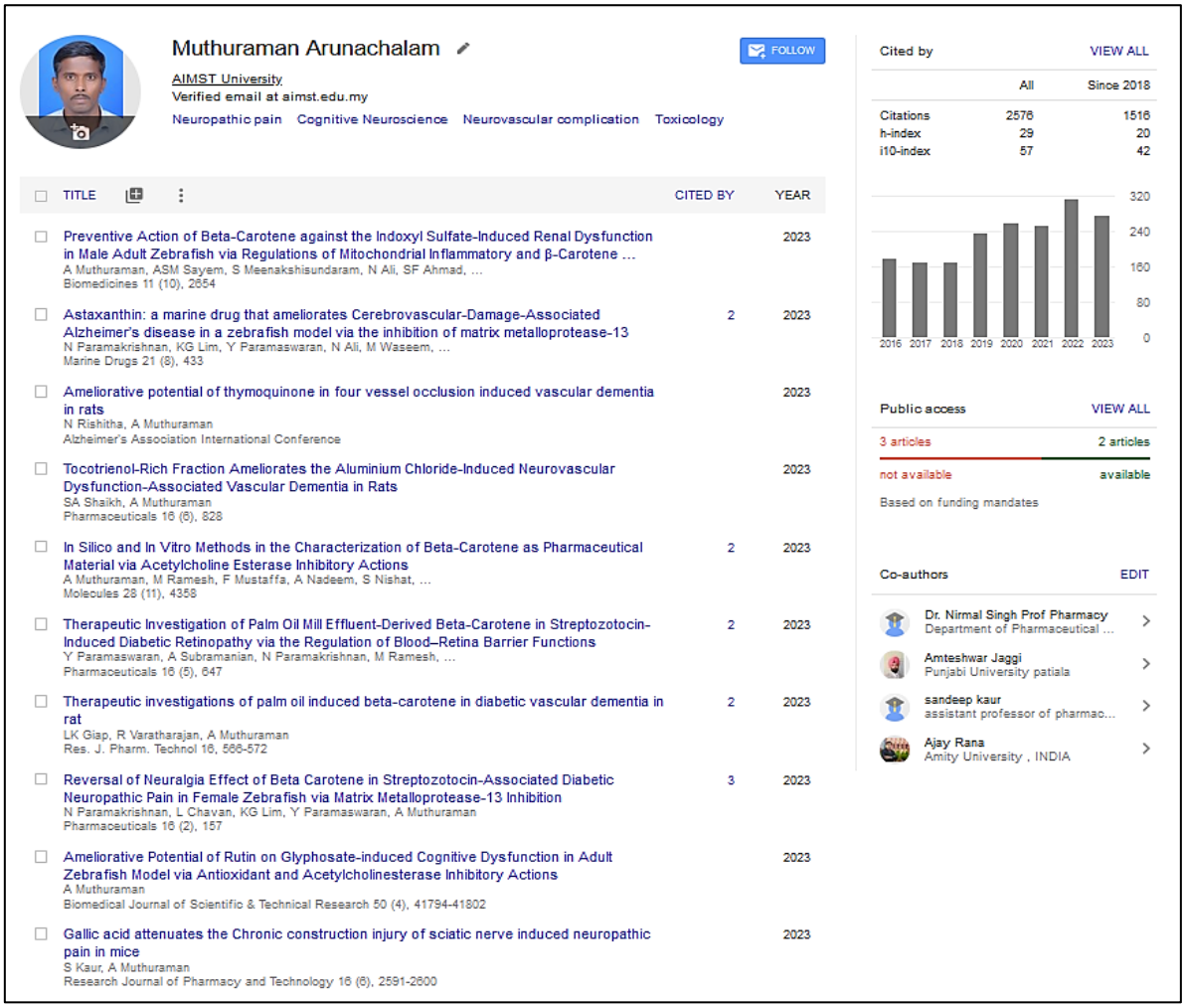
Dr. Hanumanthachar Joshi participated as Guest of Honour, in the National Pharmacy Week celebrations, organized by the Indian Pharmaceutical Association, Mysuru branch at JSS College of Pharmacy, Mysuru. It is released in the newspaper.



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Neuropathic pain Cognitive Neuroscience Neurovascular complication Toxicology

TITLE	CITED BY	YEAR
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Our APSE Vice President, APSE, Malaysia made a ***UK Design Patent*** for the evaluation camera-assisted Y maze test for anxiety behaviour analysis (Approved on Nov 2023). He made 06 international research articles in highly reputed journals. Crucially, he received 02 Malaysian ***FRGS Research Grants*** (Technology Readiness Levels: ***TRL-03***) with the value of ***INR 57,59,912/-***. He organized the AIMST International Conference on Health Science & Technology (AICHST) Date: 24th & 25th of November 2023. He made collaborative work with various international universities. He completed his first FRGS grant (2019) successfully with MoHE – KPI achievement. His third ***PhD student Dr. Lim Khian Giap graduated*** from AIMST University on 11th July, 2023.

Prof. Dr. R. Mythreyi was felicitated by Dr. Peter, Assistant Professor of Pharmacology of Madurai Medical College during the 62nd National Pharmacy Week Celebrations.

Dr. Palaniamy Sivanady,
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- ✓ http://imu.edu.my/irdi/staff/palanisamy-sivanandy/

Dr. Palanisamy Sivanandy, our **APSE Vice-President Malaysia** has been elected as a **FELLOW of the Royal Society for Public Health (RSPH), United Kingdom**. The Royal Society for Public Health (RSPH) is one of the world's longest-established public health bodies - with roots extending back to the mid-nineteenth century (established in 1856). RSPH is an independent campaigning and educational charity dedicated to improving and protecting the health of the public – both in the United Kingdom and around the world. This Fellow membership of RSPH demonstrates the commitment to and engagement with the public health sector, and a career commitment to the improvement of population health and/or wellbeing. This gives exclusive access to RSPH peer-reviewed journals - Perspectives in Public Health, and Public Health, and is also entitled to use the relevant post-nominals after the name (FRSPH), and also provides the opportunity for research collaboration. The Management of International Medical University Congratulated Dr Palanisamy for this achievement and wishes him all the best in his new role.

"As a team member of APSE, we congratulate and wish Dr Palanisamy all the best for his new role and remarkable achievement, and for making the APSE flag fly high."

Vice-President of APSE®, Malaysia **Dr. Palaniamy Sivanady,** was awarded the Leadership in "***Programme Management award"***, by the School of Pharmacy, International Medical University, Malaysia.

International Clinical and Medical Case Reports
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Decisive Guidelines for Keeping the Heart Attacks on The Sidelines

Sukhmanpreet Kaur[1], Milind Parle[2*]

[1]*University Institute of Pharmaceutical Sciences, Panjab University, Chandigarh, India.*

[2]*President, APSE, Pharmacology Division, Department of Pharmaceutical Sciences, Guru Jambheshwar University of Science and Technology, Hisar, India.*

**Corresponding author: Milind Parle.*

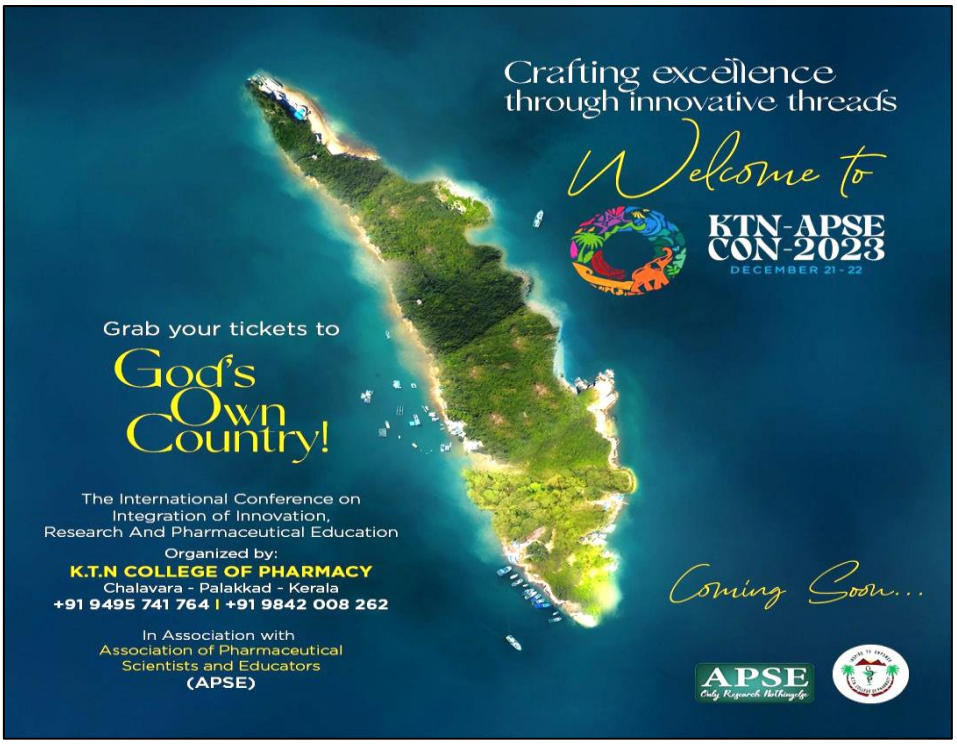
Abstract

A heart attack is usually a shocking event that compels the victim to modify his lifestyle considerably out of fear of death. Cardiovascular disorders have burdened developed and developing nations with increased mortality and morbidity rates. High cholesterol levels increase atherosclerosis risk, resulting in heart attacks, strokes, and chronic kidney disease. There are many ways to reduce the risk of heart disease, although one can't change some risk factors, such as family history, age, or gender. Cessation of tobacco use, reduction of salt in the diet, eating more fruits and vegetables, regular physical activity, avoiding alcohol, and stress management have been shown to reduce the risk of cardiovascular disease. Our small choices every day have a tremendous cumulative impact on cardiovascular health. Social determinants like poverty, housing insecurity, low education, and lack of insurance can adversely influence one's cardiovascular health. One must not fear fatality if one lives a happy, healthy, and peaceful life. A personalized approach that considers individual differences in genes, metabolism rate, presence of other diseases, and lifestyle is likely the most effective strategy in reducing the risk of precipitating heart attacks. A heart-friendly diet, regular physical activity, quitting alcohol, smoking cessation, and keeping blood pressure in the normal range are effective measures to prevent heart attacks. In light of the above, the authors have recommended valuable guidelines to laymen for keeping heart attacks on the sidelines in this fascinating and helpful article.

Keywords: heart attack; atherosclerosis; cardiac arrest; exercise; nutrients

Our APSE® President **Prof. Dr. Milind Parle** and his student **Sukhmanpreet Kaur** research article "*Decisive Guidelines for Keeping the Heart Attacks on The Sidelines*" Bagged First Prize in National Review Article Writing Competition. Additionally delighted to note that is affiliation of APSE has been incorporated with the Corresponding Author.

Dr. Rajasree, Dean, Faculty of Pharmacy, Kerala University of Health Sciences, Thrissur, released the APSECON-2023 brochure. The brochure of KTN-APSECON 2023 and the new website of APSE www.theapse.in was released by Dr. Rajashree, Dean (Pharmacy) Kerala University of Health Sciences at a mega program, Westfort College of Pharmacy, Thrissur, yesterday. She appreciated the efforts of APSE. Chairman of KTNCP Sri Premakrishnan, Dr. Hanumanthachar Joshi, Secretary, APSE, Organising Secretary APSECON Dr. Arul Kumaran, Dr. Anil Babu, Principal, Westfort College of Pharmacy, Thrissur, Dr. Vijesh, joint organizing secretary, Dr. C S Charan, Dr. Umesh, Prof. Jayasimha, Mr. Abhishek, members of APSE and staff of Sarada Vilas College of Pharmacy, Mysuru were present. Faculty and students of WCP witnessed the program.



KTN-APSE 2023 Conference Invitation was released by KTN organizing committee members. It is conducted with the collaboration of the APSE® Committee.

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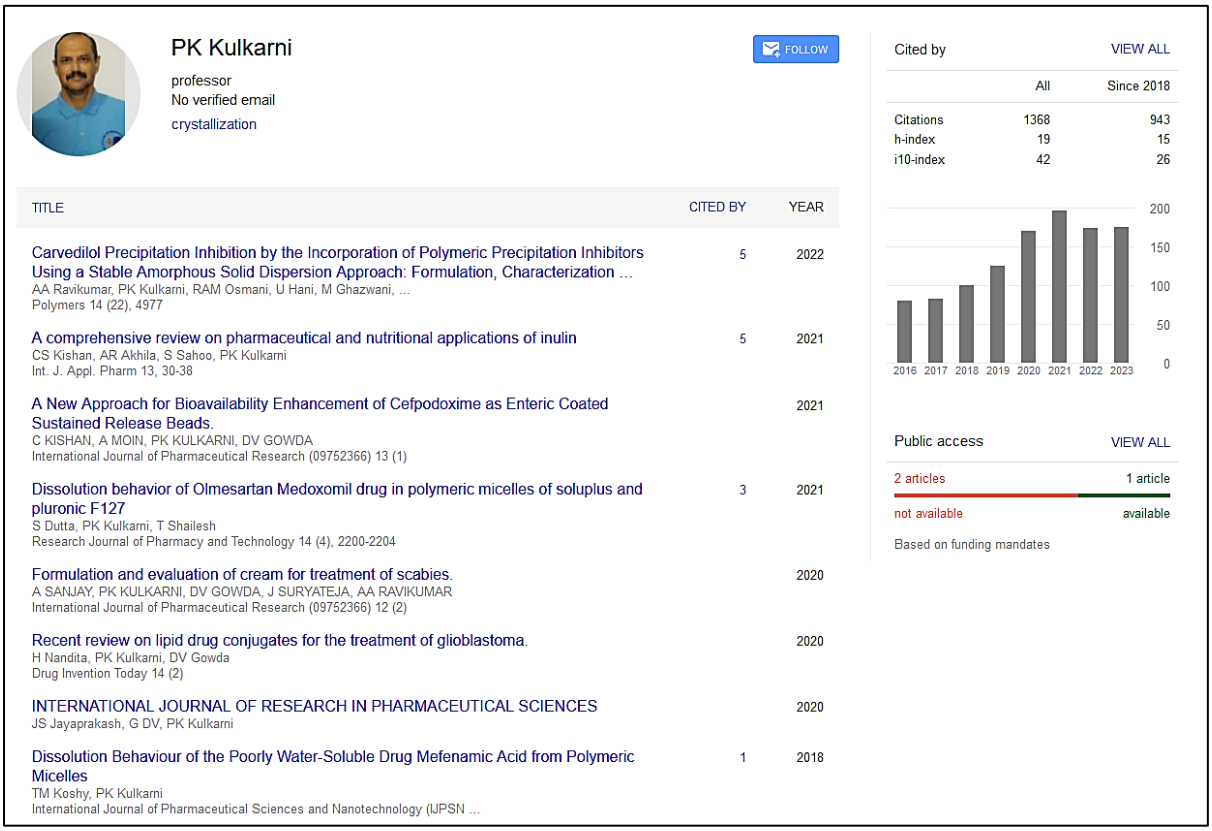

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Prof. Dr. P. K. Kulkarni, JSS College of Pharmacy, Mysuru Joined our Research Forum of APSE. He eminent scientist in Pharmaceutics. He served more than 35 years at JSS College of Pharmacy, Mysuru, India.

Articles

Spacing Effect and Its Importance

Ms. Sireesha Paruchuri, *M. Pharm.,*
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For over a century, it was recognized that learning and/or memory is enhanced when the 'same information is repeatedly distributed over time when compared with the same amount of information massed together in time' (Ebbinghaus, 1885). The 'distribution of practice' (McGaugh, 1966) or 'the spacing effect' has been demonstrated in a variety of learning models. The learning advantage of information that is repeated in a spaced fashion is called the 'Spacing Effect'. The spacing effect was confirmed in many different memory tasks such as recognition, frequency estimation, free recall, and cued recall (The Spacing Effect). In general, learning is better when the first study (or exposure to the knowledge) and subsequent exposure (or review) are spaced out over time rather than occurring in close temporal succession. This phenomenon is called the spacing effect (sometimes also referred to as spaced repetition or distributed practice). The optimal duration of spaced exposures varies across studies and has ranged anywhere from a few seconds (Carpenter & DeLosh, 2005) to several weeks (Cepeda et al., 2008) to several months (Sobel et al., 2011).

Repetition of an event spaced further apart in time will improve memory more than repetition of an experience spaced close together in time (massed practice). The spacing effect is centered on the exposure or spacing out of an ideology or concept. One prominent and extensively studied memory-related phenomenon is the spacing effect. It is robust in the sense that it is (a) applicable to a wide range of contexts and learning styles and (b) trustworthy. The closer you are to forgetting something, the more fresh exposure to it helps. A general concept is that repetition will help most if the material (information) had been in storage long enough to be just on the verge of being forgotten (Banaji & Crowder, 1989; Kerfoot et al., 2007).

People become less able to remember past experiences as time goes on. The well-known progressively gradual forgetting curve is produced when the amount of information lost per unit of time gradually decreases. The process of forgetting after being exposed to the

same knowledge more than once is the subject of far less research. Thus, if one wants to rationally organize learning events temporally, it is essential to understand how the interval between a few exposures influences subsequent forgetting. Effects of the gap between exposures on later memory are usually termed ‘Spaced Repetition’ or ‘Spacing effects’ or ‘Distributed-practice’.

Study phase retrieval theory posits that the repetition of an item retrieves one's memories of the repeated item's earlier occurrences and their associated contexts (Siegel & Kahana, 2014). This retrieved information, in turn, becomes associated with the repeated item, thus providing an additional set of retrieval cues for the repetition. Retrieved context models have been applied to a wide range of recall phenomena involving recall of once-presented items (Gershman et al., 2012; Sederberg et al., 2011; Shankar & Howard, 2012). Repeated encounters with the learning material that are spaced out in time (as opposed to recurring back-to-back) are an effective way to foster long-lasting learning. Incorporating spaced repetitions into existing educational practice is feasible and has great potential to produce gains in learning and improving knowledge (Sean, 2016). A spacing experiment should involve multiple periods of ‘study’ or ‘exposure’ devoted to the same material (information), separated by some variable time gap, with a final memory test administered after an additional retention interval (RI) measured from the second exposure to the same information (shown in Fig 1.1). No gap between the periods or phases results in worse final test performance than does a brief gap (Cepeda et al, 2008).

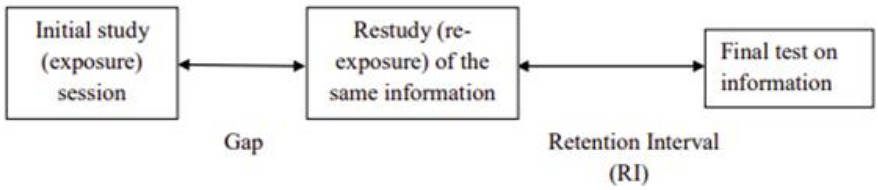

Figure 1.1: Structure of a typical spacing effect (on learning and information retention)

Study episodes are separated by a fixed gap, and the final study episode and test are separated by a fixed Retention Interval (RI). The learning advantage of information that is repeated in a spaced fashion is called the ‘Spacing Effect’. The design of a typical study on the spacing effect is illustrated in Figure 1.2. This design includes (a) At least two study sessions that involve exposure to the same information, (b) A final test over the information, (c) a period of time, referred to here as the spacing gap, that separates the two study sessions, and (d) Another period of time, referred to here as the test delay, that separates the last study session from the final test. In the most basic experimental designs, the test delay is usually

fixed (e.g., twenty minutes), and the spacing gap is manipulated. When the spacing gap is set at zero such that two exposures of the same information occur immediately (i.e., the same vocabulary term is repeated back-to-back), the exposures are said to be massed. When the spacing gap is greater than zero such that the two exposures are separated by some amount of time, the exposures are said to be spaced. The duration of spaced exposures varies across studies and has ranged anywhere from a few seconds (Carpenter & DeLosh, 2005) to several weeks (Cepeda et al., 2008)

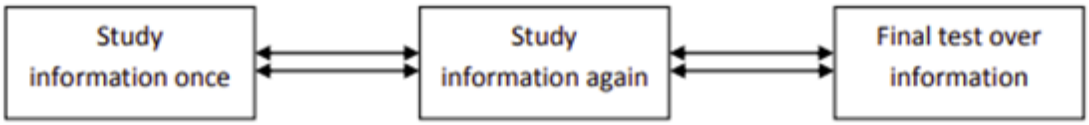

Figure 1.2: Illustration of a typical concept of the spacing effect.

Regardless of the exact value of the spacing gap, spaced repetitions typically yield better learning than massed repetitions. The modus operandi of the spaced repetition effect is as follows: Individuals are exposed to information at least twice, with each exposure Study information again Final test over information Study information once separated by a spacing gap that can range anywhere from zero (i.e., the same information is repeated back-to-back), all the way to several weeks. Retention on the final test is typically better following a spacing gap greater than zero (i.e., spaced) compared to a spacing gap of zero (i.e., massed) (Cepeda et al., 2008).

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Clitoria ternatea as a Natural Sunscreen

Dr. Fazlina Mustaffa,
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Clitoria ternatea (Figure 1) is a roadside plant that can be found on most of the roadside in Malaysia. Various pharmacological activities of this plant have been reported such as antioxidant, anticancer, antidiabetic, and anti-inflammatory. Flower extract of this plant is used as a natural dye for food production. The literature review indicated that this plant has been used in Ayurvedic treatment for Alzheimer's disease.

Despite, many pharmacological activities had been reported for *Clitoria ternatea*, yet there is no report on the sun-protective activity of *Clitoria ternatea*. Therefore, a team of students from AIMST University had anticipated research on its sun-protective activity.

Firstly, the flower was extracted by using ethanol to extract all the phenolic compounds in the plant (Fig. 2). Thereafter, the ethanol extract of *Clitoria ternatea* was air-dried overnight to remove all the ethanol. Then, the sun protective factor of this plant was determined using a spectrophotometer (Fig. 3) at 350 dan 290 nanometers. The reading provided by the spectrophotometer was applied in the Mansur equation that is widely used for the calculation of sun protective factor to determine the sun protective factor.

The research finding discovered that *Clitoria ternatea* flower extract contains higher sun protective factors as compared to *Aloe vera* and commercial sunscreen (Brand A). The finding of this research was published in a journal [Rapports D Pharmacie Vol.4 (2), 2018, 457-461].

This finding suggests that *Clitoria ternatea* can be used as a natural sun protective agent to prevent various types of skin conditions due to prolonged exposure to the sun such as melanin production and skin darkening, hyperpigmentation, wrinkles, and cancer.

This finding showed that *Clitoria ternatea* is a potential natural sun protective agent that can replace synthetic sunscreen. In addition, synthetic sun protective agent is associated with side effect due to the presence of chemical entities in its products.

Figure 1: *Clitoria ternatea*

Figure 2: *Clitoria ternatea* extract

Figure 3: SPF protection activity test using spectrophotometer

Unveiling the Intricacies of Human Energy Systems: A Molecular Exploration

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Energy production is fundamental to the survival and functionality of the human body. The intricate dance of molecular events within our cells ensures that energy is generated efficiently to support a myriad of activities, from the explosive power needed for short bursts to the sustained endurance required for prolonged efforts. Understanding the molecular underpinnings of the three primary energy systems is key to unraveling the mysteries of human physiology. The human body's energy dynamics are a testament to the complexity of biological systems, where multiple pathways intricately weave together to meet the diverse energy demands of various activities. This comprehensive scientific article delves into the three primary energy systems: Adenosine triphosphate-phosphocreatine (ATP-PC) [also known as phosphagen], glycolysis (anaerobic lactic), and oxidative (aerobic) (Gastin, 2001), providing an exploration of the molecular pathways that govern energy production at the cellular level.

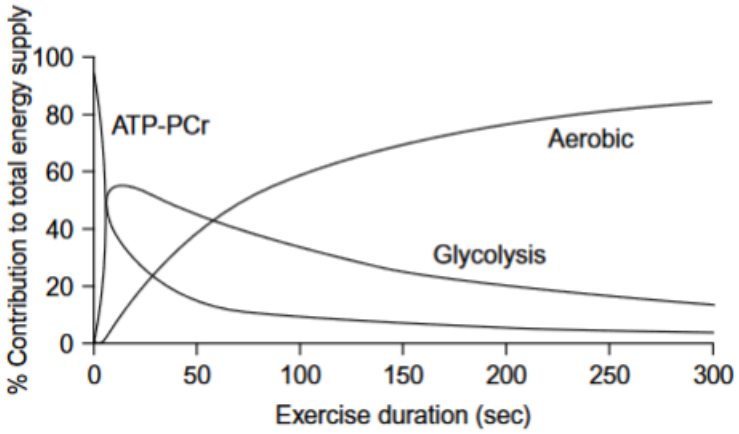

Figure 1: The distribution of energy system contributions to the overall energy supply during maximal exercise for a specific duration.

The ATP-PC system stands as the immediate source of energy during high-intensity, short-duration activities. At its core is the creatine kinase reaction, a swift and finely regulated process occurring in the cytoplasm and mitochondria. Here, creatine phosphate (CP) donates its phosphate group to adenosine diphosphate (ADP), forming adenosine

triphosphate (ATP) and creatine. This system's rapid response is crucial for activities demanding instantaneous energy release. The creatine kinase reaction is orchestrated by the enzyme creatine kinase, strategically located in both the cytoplasm and mitochondria. This enzyme's activity is finely regulated, influenced by the availability of creatine phosphate. The duration of this process is remarkably rapid, unfolding within the first few seconds of high-intensity activity, showcasing the system's efficiency in meeting immediate energy needs (Ana Maria Teixeira and Grasiely F. Borges, 2012).

Glycolysis, the focal point of the anaerobic lactic system, involves a series of enzymatic reactions that break down glucose to produce ATP. This pathway is indispensable during activities with high energy demands but limited oxygen availability. The glycolytic system is characterized by three main phases: The energy investment phase, the cleavage phase, and the energy generation phase. In the energy investment phase, glucose undergoes phosphorylation, facilitated by various enzymes, resulting in the formation of two molecules of glyceraldehyde-3-phosphate (G3P). This process consumes ATP but sets the stage for subsequent ATP production. The cleavage phase further metabolizes G3P, generating ATP and nicotinamide adenine dinucleotide (NADH). Finally, in the Energy Generation Phase, G3P is converted to pyruvate, yielding additional ATP and NADH. In anaerobic conditions, where oxygen availability is limited, pyruvate is diverted away from the aerobic pathways and undergoes conversion to lactate through the action of lactate dehydrogenase. This process allows for the regeneration of NAD^+ required for continued glycolysis, albeit at the expense of reduced ATP production per glucose molecule. The net result of glycolysis, per glucose molecule, includes the production of 2 ATP, 2 NADH, and 2 pyruvate (or lactate). While the anaerobic lactic system provides rapid energy, its efficiency is constrained by the accumulation of lactate, contributing to fatigue and limiting sustained performance (Chaudhry and Varacallo, 2023). The relative contributions of glycolysis and the aerobic energy system depend on the duration of exercise. In general, glycolysis plays a significant role in providing energy during the early stages of exercise, particularly in the first few minutes. As exercise continues beyond this initial phase and extends into a more prolonged duration, the aerobic energy system becomes increasingly predominant in supplying the required energy. The transition from glycolysis to aerobic metabolism is influenced by factors such as exercise intensity, individual fitness levels, and the specific demands of physical activity.

The aerobic system is the powerhouse of sustained energy production, leveraging oxygen to extract maximal energy from substrates. This system encompasses multiple intricate pathways, starting with aerobic glycolysis, where pyruvate undergoes decarboxylation to form acetyl-CoA, entering the Krebs cycle. This cycle, also known as the citric acid cycle, is a central hub for energy metabolism. Within the Krebs cycle, acetyl-CoA combines with oxaloacetate to form citrate, initiating a cascade of reactions that generate reducing equivalents in the form of NADH and $FADH_2$. These molecules shuttle electrons to the electron transport chain (ETC), located in the inner mitochondrial membrane. The ETC is a molecular machinery comprising protein complexes that facilitate the transfer of electrons along the chain. This electron flow pumps protons across the membrane, creating a proton gradient. The subsequent flow of protons back into the mitochondrial matrix through ATP

synthase drives the synthesis of ATP in a process known as oxidative phosphorylation. Crucially, oxygen serves as the final electron acceptor in the ETC, combining with electrons and protons to form water. This dependence on oxygen distinguishes aerobic metabolism from anaerobic pathways, allowing for the complete oxidation of substrates and maximizing ATP production. The net result of the Oxidative system, per glucose molecule, is the potential generation of up to 38 ATP, 6 NADH, and 2 $FADH_2$ (Kelly et al., 2001). This substantial yield underscores the efficiency of aerobic metabolism in meeting the prolonged energy demands of activities such as endurance exercise.

Beyond glucose, the oxidative system extends its reach to alternative substrates, including fatty acids and amino acids. Fatty acid oxidation, also known as beta-oxidation, breaks down fatty acids into acetyl-CoA, contributing to the Krebs cycle. This process yields large amounts of NADH, $FADH_2$, and acetyl-CoA, further enhancing ATP production. Additionally, amino acids, the building blocks of proteins, can be converted to intermediates that enter glycolysis or the Krebs cycle, contributing variable amounts of energy based on the specific amino acid involved (Ricquier, 2005). This adaptability highlights the flexibility of the oxidative system in utilizing diverse substrates to meet energy demands. The oxidative system's remarkable efficiency and capacity for sustained energy production make it the primary player during activities requiring endurance and prolonged effort. In conclusion, the human body's energy systems orchestrate a symphony of molecular events, ensuring a dynamic response to diverse physiological stimuli.

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Irisin as Myokine Hormone: Current and Future Perspectives in the Management of Neurovascular Disorders

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Irisin is a cleaved version of fibronectin type III domain-containing protein 5 (FNDC5). The term i.e., irisin is coined by Boström and coworkers (Boström et al., 2012); it represents the Greek messenger goddess Iris (Figure 1).

Fig 1: Greek messenger goddess Iris (Also called Goddess of the rainbow & Messenger of the Olympian gods).

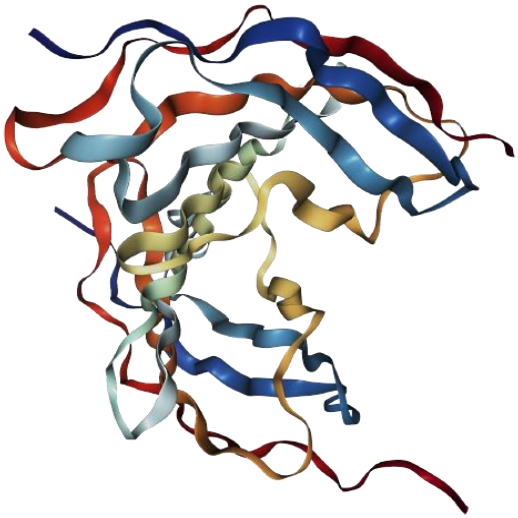

Fig 2: Protein structure of irisin.

Currently, irisin is considered a myokine hormone (Figure 2). This Myokine is produced and secreted by skeletal muscles during/after the exercise process. The type I transmembrane glycoprotein of FNDC5 also acts as a precursor for Irisin production. The browning of adipose tissue also elevates the Irisin concentration due to the thermogenic action of adipomyokine. The evidence of physical exertion and irisin release in experimental animals is well known. However, a clear understanding of irisin release in human skeletal muscles and adipose tissues remains unclear (Arhire et al., 2019).

Irisin proteins are found in multiple mouse tissues. However, abundant levels are expressed in the adult brain & heart; whereas a low level of expression is observed in the lung, skeletal muscle & testis. The Human Embryonic Kidney (HEK) 293 cells also expressed and secreted 100% of identical irisin (Maak et al., 2021). Recent discoveries revealed that irisin potentially regulates the biological system via biosynthesis, release, and enhance the targeted actions. The synthesis and release of irisin is based on the influence of multiple factors like exercise, temperature, drugs, nutraceuticals, and phyto-molecules (Flori et al., 2021). Crucially, it showed the new biomarkers as diagnostic tools and showed the pharmacological actions via activation of the irisin pathway. However, the complete usefulness, effectiveness, and safety remain a challenging issue for the biomedical research field (Hu et al., 2023). The irisin and their biological role with multiple factors are summarized in Figure 3.

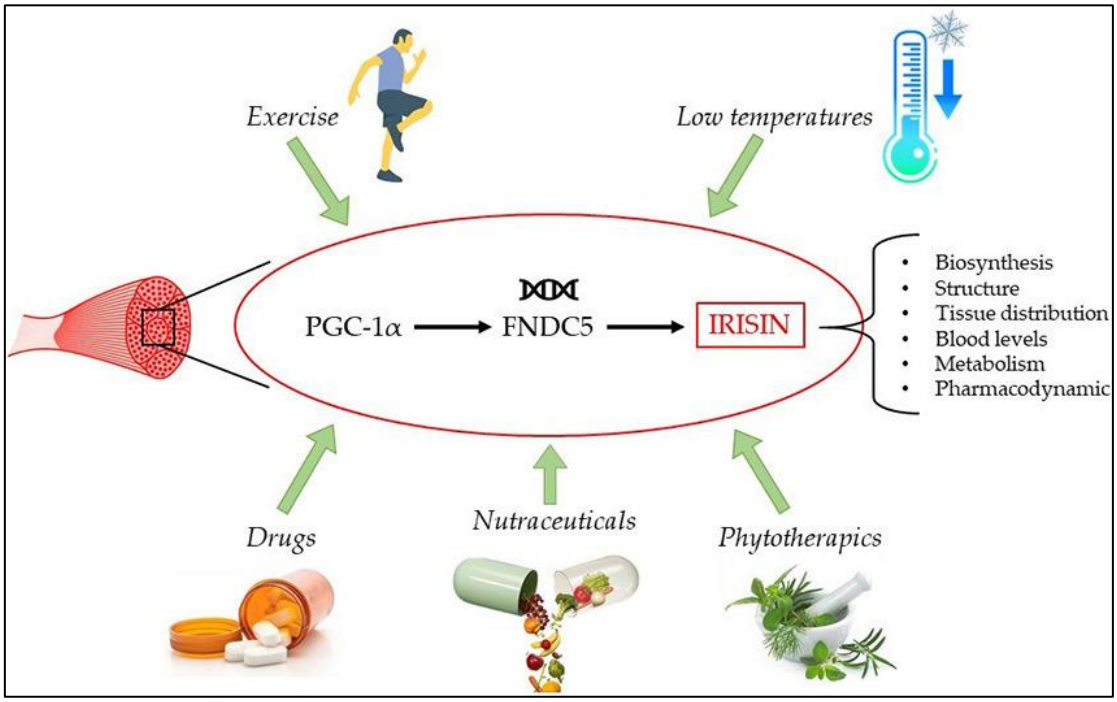

Fig. 3: Summary of irisin synthesis, release, and distribution in a biological system with the influence of various factors (Flori et al., 2021).

In contrast, irisin-based study results raise doubt about the beneficial effects due to continuous inconsistencies in the regulation of vascular functions. It may be due to the molecular and cellular mechanisms & their pathological conditions (Ou-Yang et al., 2021). Irisin possesses a strong connection to the muscle-brain axis. It enhances the FNDC5 expression with the influence of exercise leading to accelerating the irisin secretion in the peripheral blood system. Furthermore, the irisin also crosses the blood-brain barrier and reaches the different parts of the brain. Hence, irisin controls gene expression and various signaling pathways in neurons, glial cells, and neuronal microvascular tissues (Jodeiri Farshbaf and Alviña, 2021; Liu and Lei, 2023). Irisin's therapeutic action in the neurovascular system and their pharmacological roles are summarized in Figure 4.

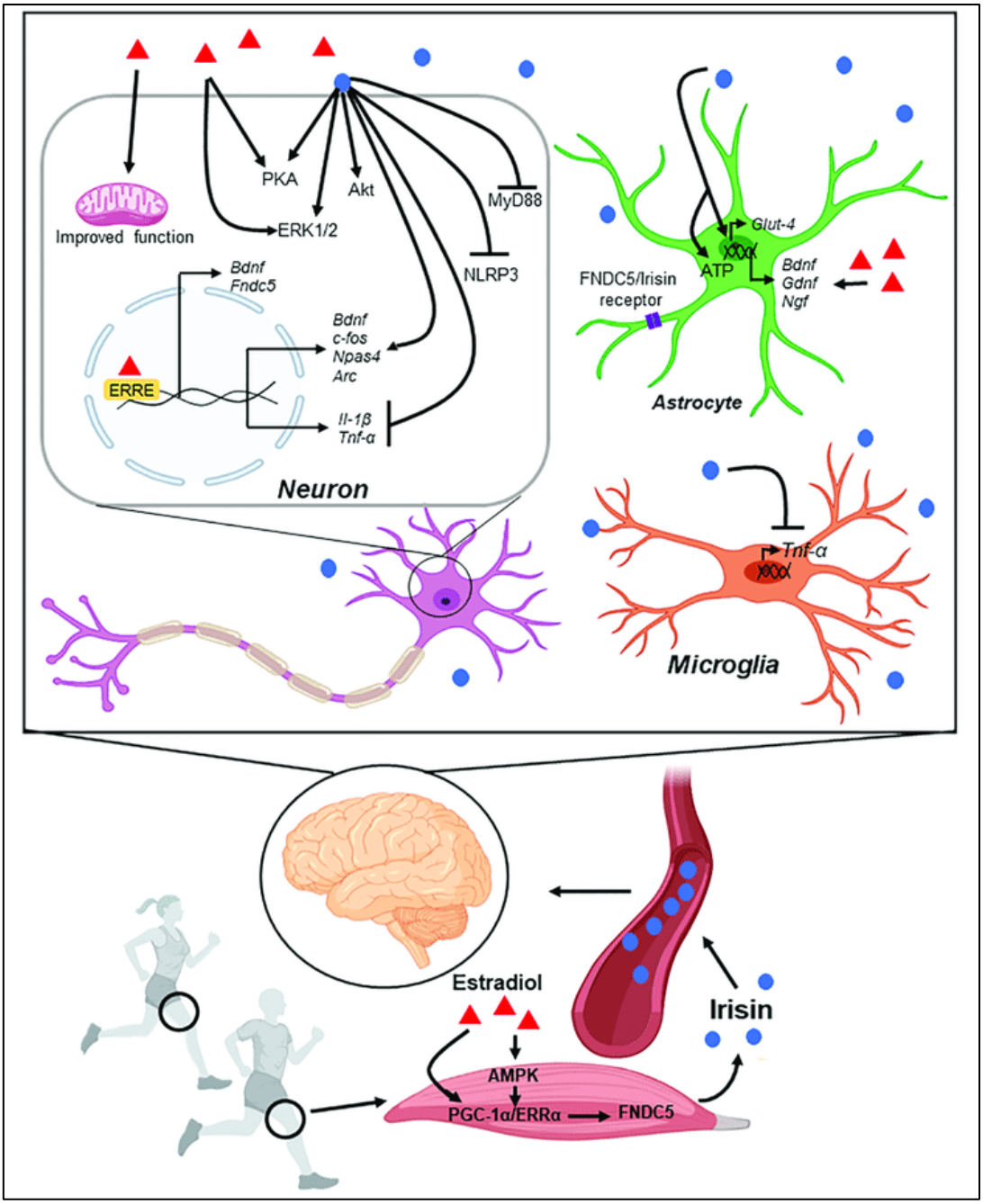

Fig. 4: Summary of irisin action in the neurovascular system and their pharmacological roles (Jodeiri Farshbaf and Alviña, 2021). *Abbreviations:* AKT, Serine/threonine kinase; AMPK, 5' AMP-activated protein kinase; ARC, Activity Regulated Cytoskeleton Associated Protein; ATP, Adenosine triphosphate; BDNF, Brain-derived neurotrophic factor; c-fos, Complete information for FOS Proto-Oncogene; ERK1/2, Extracellular signal-regulated kinase ½; ERRα, Estrogen-related receptor alpha; FNDC5, Fibronectin type III domain-containing protein 5; GDNF, Glial cell line-derived neurotrophic factor; GLUT4, Glucose transporter type 4; IL-1β, Interleukin-1 beta; MyD88, Myeloid differentiation primary response protein 88; NGF, Nerve growth factor; NLRP3, Nucleotide-binding domain, leucine-rich–containing family, pyrin domain–containing-3; NPAS4, Neuronal PAS Domain Protein 4; PGC-1α, Peroxisome proliferator-activated receptor gamma coactivator 1-alpha; PKA, Protein kinase A; TNF-α, Tumor necrosis factor-alpha.

Future Perspectives

This new hormone-like myokine i.e., irisin enhances the exercise-associated activation of peroxisome proliferator-activated receptor gamma coactivator-1-alpha (PGC-1α). It is identified as a regulator of skeletal muscle energy metabolism in metabolic disorders like obesity and diabetic conditions (Chen et al., 2016). The structural characteristics, production, distribution, physiological, and pathological roles are well established. The potential application and therapeutic evidence with identification of suitable route of administration, dose, safety, and usefulness in suitable disease are under investigation. Meanwhile, its prospects and the development of irisin-related products for the promotion of human health have greater attention and scope for the management of neurovascular disorders. It will benefit future research and application of irisin.

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