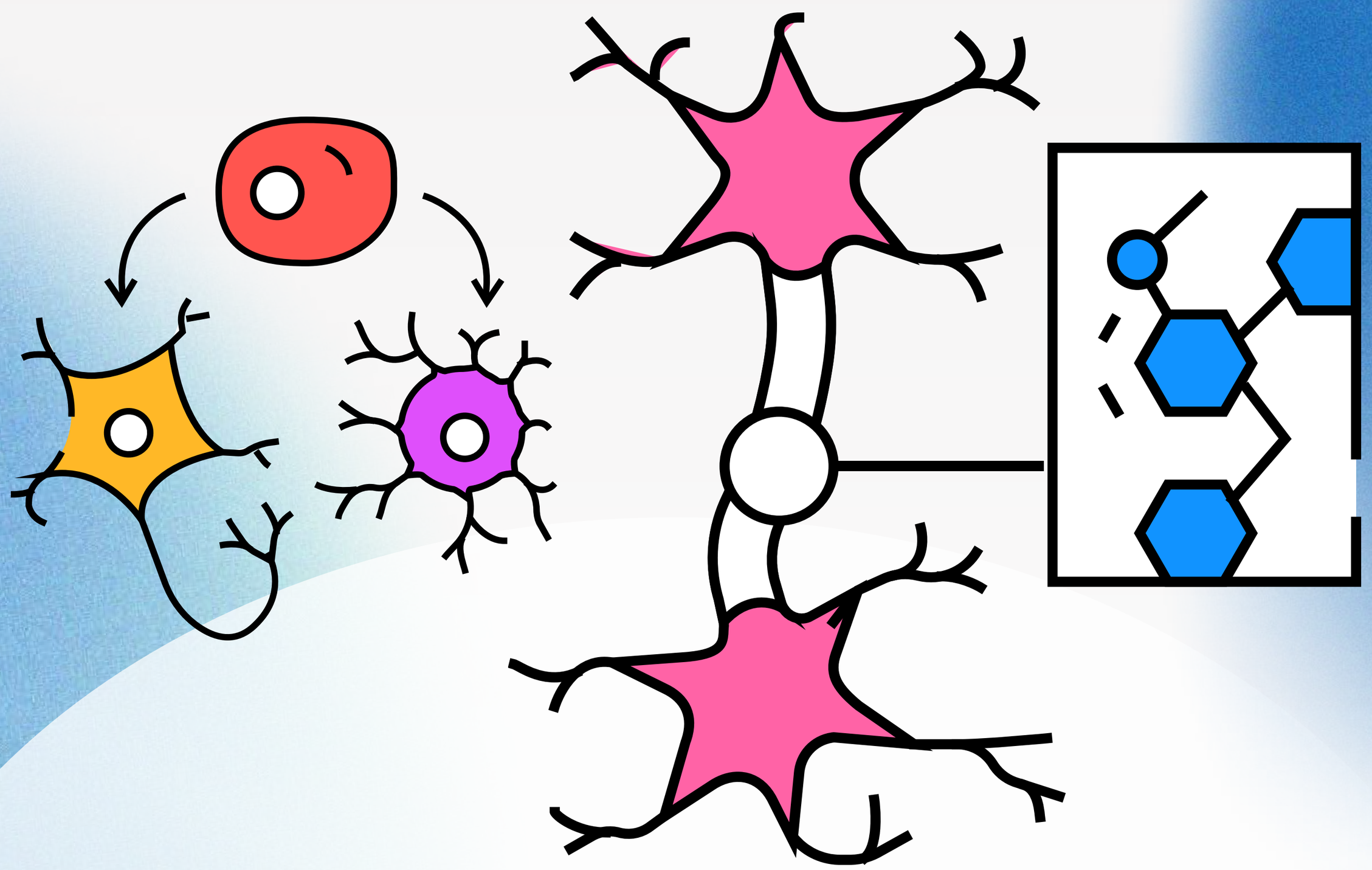
ISSN No:2584-2781

SPECIAL ISSUE

INTERNATIONAL JOURNAL OF PHARMACEUTICAL AND HEALTHCARE INNOVATION

Advanced Research Methodology in Neuroscience



2024 NOVEMBER 11

SHRI RAMSWAROOP MEMORIAL UNIVERSITY,LUCKNOW

DEVA ROAD, BARABANKI UTTAR PRADESH, INDIA

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International journal of Pharmaceutical and Healthcare innovation (IJPHI) is a peer-reviewed journal published quarterly. It is a peer-reviewed journal aiming to communicate high-quality original research work, reviews, short communications, case reports, Ethics forums, Education forums and Letters to the editor that contribute significantly to further the scientific knowledge related to the field of pharmaceutical sciences. International journal of Pharmaceutical and Healthcare innovation publishes Original Research Articles, Short Communications, Review Articles in all areas of pharmaceutical sciences from the discovery of a drug up to clinical evaluation. Topics covered are: Artificial intelligence machine learning innovation in Healthcare industry, Artificial intelligence ,machine learning innovation in the field of drug discovery, medicinal and analytical chemistry, Pharmaceutical chemistry, Pharmaceutics and Pharmacokinetics; including; Pharmacognosy including herbal products standardization and Phytochemistry; Pharmacology: Allied sciences including drug regulatory affairs, Pharmaceutical Marketing, Pharmaceutical Microbiology, Pharmaceutical biochemistry, Pharmaceutical Education and Hospital Pharmacy. Articles with timely interest and newer research concepts will be given more preference. All articles published in this journal represent the opinion of the authors and do not reflect the official policy of (International journal of Pharmaceutical and Healthcare innovation). All papers are subjected to double-blinded peer review.

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Objective International Seminar

The objective of the International Seminar on Advance Research Methodology in Neuroscience is to equip participants with cutting-edge methods and techniques essential for cognitive neuroscience research. Attending this seminar will enable participants to refine their research skills, stay informed about the latest advancements in the field, and connect with peers and experts in the domain of neuroscience on a global platform.

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Shri Ramswaroop Memorial University (SRMU) Barabanki, Uttar Pradesh, India. It was established in July 2012. SRMU is a confluence of academic, cultural and intellectual resources and seeks to achieve the highest levels of distinction in the innovation and transmission of knowledge and understanding. The Institute of Pharmacy is dedicated to delivering high-quality education and training in the field of Pharmaceutical Sciences. We offer a comprehensive range of undergraduate, and diploma program designed to build a strong foundation for students. Our faculty comprises highly qualified and experienced educators committed to fostering academic excellence and innovation. Equipped with state-of-the-art laboratory and research facilities, we provide students with hands-on experience in various aspects of pharmacy, ensuring they are well-prepared for future challenges in the healthcare and pharmaceutical industries. Our commitment to excellence prepares graduates to become leaders and innovators in their fields, contributing meaningfully to healthcare and scientific advancements.

About the Lucknow

Lucknow, historically a part of the Delhi Sultanate, was later ruled by the Mughals and the Nawabs of Awadh, each leaving a rich cultural legacy. The British East India Company took control in 1856, and after the 1857 rebellion, Lucknow became part of the British Raj until India gained independence in 1947. Known for its classical dance form Kathak, literary traditions, and exquisite chikankari embroidery, Lucknow is a cultural hub. The city’s architecture is a blend of Mughal, Persian, and British styles, seen in its historic monuments and modern sites like the Gomti Nagar Riverfront. Famed for its Awadhi cuisine, particularly kebabs, biryanis, and nihari, Lucknow also enjoys a vibrant food culture. Located on the northwestern shore of the Gomti River, it borders several districts and speaks predominantly Hindi and Urdu.

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Psychedelic-Assisted Therapy: Innovative Methodologies and Neuroplastic Mechanisms in Mental Health Treatment

Aditya Singh[1*], Shubhrat Maheshwari[2], Jagat Pal Yadav[2], Abhishek Kumar[3]

[1*]Faculty of Pharmacy, Integral University, Lucknow, Uttar Pradesh 226026, India

[2]Bioorganic and Medicinal Chemistry Research Laboratory, Department of Pharmaceutical Sciences, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, 211007, Indiaiences, Prayagraj, 211007, India

[3]Institute of Pharmaceutical Research, GLA University,Mathura,Uttar Pradesh, India

Simmu5adityasingh@gmail.com

Abstract

The fields of neuroscience and psychology have recently rediscovered psychedelic-assisted therapy (PAT), as it demonstrates hopeful therapeutic capabilities in the management of mental health disorders. Common treatments for conditions like depression, PTSD, and substance use disorders have exhibited limited effectiveness, with remission statistics for major depressive disorder fluctuating between 30-40% when employing typical pharmacological and therapeutic strategies. Psychedelics, including psilocybin, MDMA, and LSD, have displayed the capacity to elicit substantial neuroplastic alterations, promote emotional processing, and augment therapeutic engagement when applied in meticulously controlled therapeutic environments. Recent clinical investigations have indicated that MDMA-assisted therapy for PTSD has resulted in clinically meaningful enhancements, with nearly 67% of participants no longer fulfilling PTSD diagnostic criteria subsequent to treatment. In a similar vein, psilocybin-assisted therapy for treatment-resistant depression has evidenced remission rates surpassing 50% after merely two sessions, signifying a considerable advancement over conventional treatment modalities. Neuroscientific inquiries suggest that psychedelics may activate serotonin receptors (5-HT2A) and promote a "reset" of maladaptive neural circuitry, particularly within the default mode network, which is associated with self-referential and ruminative cognitive processes. Current methodologies in PAT research involve high-tech neuroimaging tools, such as fMRI and EEG, to illuminate the action mechanisms, while robust double-blind, placebo-controlled trials scrutinize both safety and efficacy. Looking forward, future studies could integrate artificial intelligence (AI) in predictive modeling to tailor psychedelic interventions for individual patients, optimizing outcomes and minimizing risks. Thus, PAT represents a promising frontier in neuroscience, with the potential to revolutionize treatment paradigms in mental health through novel methodological frameworks and interdisciplinary approaches.

Keywords: Psychedelic-assisted therapy (PAT), Neuroplasticity, Neuroimaging, PTSD treatment, Serotonin receptors (5-HT2A).

Emerging Frontiers in Neuroscience: Technological Advancements and Clinical Applications

Aditi Singh [1,2*], Dr. Brijesh Singh [2], Preet Kaur[2], Dr. Shikha Srivastava[1] ,
[1]Shri Ramswaroop memorial university, Lucknow-Deva Road, Barabanki, Uttar Pradesh, India.
[2]Ashoka Institute of Technology and Management (Pharmacy), Paharia- Sarnath ,Varanasi, Uttar Pradesh.

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ABSTRACT

The investigation of the structure, functioning, and development of the nervous system is the focus of the rapidly growing field of neuroscience. The study of neural networks, neuro plasticity, and the cellular processes underlying cognitive and behavioral functions has increased as an outcome of recent studies. From molecular to systems neuroscience, significant developments in neuroimaging, electrophysiological, and genetic methods have made it possible to gain previously unheard-of insights into brain function on multiple levels. Furthermore, intricate brain activities are now being replicated by artificial intelligence and computer models, improving our knowledge of neural computation and information processing. These developments could lead to new treatment approaches for mental and neurological conditions. The combination of multidisciplinary approaches promises to further expand our understanding of the brain and behavior, enabling breakthroughs that could alter therapeutic procedures as neuroscience continues to connect with allied sciences like psychology, computer science, and genetics.

This Abstract provides a broad summary of the state of neuroscience today, emphasizing the intersection of fundamental research and technology developments that are propelling the discipline forward.

Keywords: cognitive, artificial intelligence, neuroscience

3D Bioprinting for Neural Recovery: Shaping the Next Frontier in Nerve Regeneration

Divyadarshan Lohani[1], Asim Rahman[1], Ayeza Sarwar Kalam[1], Tanzeela Siddiqui[1], Gazala Noor[2]*

[1]Faculty of Pharmacy, Integral University, U.P., India- 226026

[2]Department of Pharmacology, Faculty of Pharmacy, Integral University, Lucknow.

gazalanoor6369@gmail.com

ABSTRACT:

The nervous system, comprising central and peripheral components, is vital for internal and external communication within the body. Damage from trauma, ischemia, or toxins disrupts these pathways, often resulting in paralysis, organ dysfunction, or death. In the United States, an estimated 80,000 severe traumatic brain injuries (TBI), 17,000 new spinal cord injuries (SCI), and millions of neurodegenerative cases arise annually, highlighting the limitations of existing treatments, which primarily manage symptoms rather than promote regeneration. Advances in tissue engineering and 3D Bioprinting present promising alternatives for neural repair, with potential to restore function in compromised neural networks.3D Bioprinting is a cutting-edge technique that arranges living cells and biocompatible materials to construct complex, functional tissues with defined 3D architectures. This approach has broad implications in regenerative medicine, disease modeling, and pharmacological testing. Key Bioprinting modalities—inkjet, laser-assisted, extrusion, and stereolithography—enable precise layering of cells and biomaterials, though current methods fall short of replicating the full complexity and scale of native tissues. 3D Bio printing's versatility in employing materials such as hydrogels and bio-inks allows for the fabrication of constructs tailored to specific neural injuries, supporting the development of patient-specific implants that may reduce complications associated with traditional interventions. Additionally, bioprinted scaffolds facilitate personalized therapeutic strategies, enhancing outcomes by aligning regenerative approaches with individual patient profiles.

Keywords: Nervous System; 3D Bioprinting; Nerve tissue engineering; Neural Regeneration.

Nose to brain delivery of chitosan for neurological disorders: Pharmacological aspects, formulation approaches, and therapeutics applications.

Abhishek Singh, Narahari Narayan Palei*

* Amity Institute of Pharmacy, Lucknow, Amity University Uttar Pradesh, Sector 125, Noida, 201313, India

* nnpalei@lko.amity.edu

Abstract

The increasing prevalence of neurological disorders worldwide presents a significant challenge in developing effective therapies, largely due to the difficulty in delivering drugs to the central nervous system (CNS). The brain is protected by multiple physiological barriers, particularly the blood-brain barrier (BBB), which prevents most systemically administered therapeutics from reaching the CNS. Intranasal administration has emerged as a promising non-invasive alternative, capable of bypassing the BBB and facilitating direct drug transport to the brain. Recent advances in nanotechnology-based drug delivery systems, specifically those utilizing chitosan, a naturally derived polymer with excellent biodegradability, biocompatibility, and mucoadhesive properties, offer the potential to enhance the efficacy of nose-to-brain drug delivery. Chitosan-based nanocarriers, including nanoparticles, in situ gels, nanoemulsions, and liposomes, have shown significant promise in improving brain targeting through intranasal delivery. In vitro and in vivo studies demonstrate that these carriers not only enhance drug accumulation in the brain but also mitigate systemic side effects by increasing drug residence time on the nasal mucosa, modifying surface charge, and leveraging their nano-scale size to influence nasal absorption pathways. Additionally, chitosan's ability to transiently open tight junctions in the nasal epithelium further enhances drug permeation. This review provides a comprehensive overview of the pharmacological aspects of chitosan-based nose-to-brain delivery systems, focusing on their formulation approaches and therapeutic applications in treating neurological disorders.

Keywords: Nose-to-brain delivery, Chitosan-based nanocarriers, Neurological disorders, Intranasal administration.

A Review: Advancing Neurogenetics: State-of-the-Art Techniques for Understanding Genetic Contributions to Brain Function.

Mishra , Azam Sani Khan
Mahatma Gandhi Institute of Pharmacy,Lucknow.
E-mail: manisha.anshu1998@gmail.com

Abstract

Developments in neuroscience research techniques have completely changed our knowledge of the anatomy, physiology, and plasticity of the brain. With the help of recent developments in optogenetics, sophisticated neuroimaging, and machine learning, scientists can now examine brain activity with previously unheard-of accuracy and temporal resolution. This approach has revealed previously unrecognized cellular diversity within the brain and has provided insights into the gene expression profiles of distinct cell types across various brain regions. Reviewing the cutting-edge techniques guiding modern neuroscience, this paper emphasizes the incorporation of multimodal approaches to reveal intricate neuronal networks and brain-behavior connections. Innovative uses of single-cell RNA sequencing, the creation of high-resolution functional imaging methods, and the rise of artificial intelligence-driven analysis to decode neural data are some of the major discoveries. The development of more precise models of brain activity, the identification of biomarkers for neurological conditions, and the implementation of focused treatment approaches are all made possible by these developments. This article reviews the integration of AI technologies in both preclinical and clinical neuroscience, highlighting breakthroughs in brain-computer interfaces (BCIs), predictive modeling of neural behavior, and the analysis of multi-modal datasets. Key findings underscore the role of AI in advancing precision medicine by identifying personalized treatment strategies for conditions such as epilepsy, depression, and schizophrenia. A variety of brain-related disorders may benefit from better diagnosis and individualized treatments as a result of the continuous improvement of these approaches, which should close the gap between fundamental neuroscience research and therapeutic applications. Finally, as these cutting-edge research instruments continue to develop, they will greatly expand our knowledge of brain dynamics and pave the way for new areas of neuroscience.

Keywords: Artificial Intelligence, Brain-Behavior Relationships, Neural Networks, Neuroimaging, Optogenetics, Single-Cell RNA Sequencing.

Leveraging Biosensor Technology to Revolutionize Depression Diagnosis

Arvind Kumar1*, Bhumika Chauhan2, Arun K Mishra3
1Faculty of Pharmacy, IFTM University, Lodhipur Rajput, Moradabad, Uttar Pradesh, India. 244001.
2 ITS College of Pharmacy, Ghaziabad, Uttar Pradesh, 2012063
3SOS School of Pharmacy, IFTM University Lodhipur Rajput, Moradabad, Uttar Pradesh, India. 244001.
akarvindsr01@gmail.com

Abstract

The hasty progression of biosensor technology has significantly impacted on mental health of people nowadays, especially in the interpretation and observation of depressive behavior. Traditional depression diagnosis relies on subjective methods like interviews and questionnaires, which often fall short in capturing the dynamic nature of depressive symptoms. Conversely, biosensors offer an objective, continuous, and real-time approach to monitor physiological and biochemical markers linked to depression, promising early detection, personalized diagnosis, and ongoing assessment. Recent advancements in wearable biosensors, like smartwatches, wristbands, and biosensing patches, enable continuous monitoring of key depression-linked biomarkers. These devices track parameters like heart rate variability, electro dermal activity, and sleep patterns, known to be altered in depression. Additionally, innovative biosensors can detect changes in neurochemical markers such as cortisol, serotonin, and stress hormones, providing insights into depressive states. Furthermore, combining biosensors with machine learning algorithms allows for more sophisticated data analysis, identifying complex patterns in biometric data linked to mood changes. This enables clinicians to monitor patients' mental health autonomously and in real-time, facilitating personalized treatment plans and early interventions to prevent depressive episodes.

While biosensor technologies offer promising advancements in depression diagnosis and management, challenges related to data privacy, device accuracy, and clinical validation persist. However, ongoing research and technological innovations continue to push the boundaries, paving the way for a transformative shift towards more objectives, accessible, and efficient mental healthcare approaches.

Keywords: Biosensors, Depression, Biomarkers, Machine Learning, Heart rate variability, Electrodermal activity

In silico study of miRNA in neurological diseases

Anupma Verma, Dr Vandana Ranjan
Department of Biochemistry, Dr Ram Manohar Lohiya Awadh University Faizabad Ayodhya

Abstract

Micro RNA (a non-coding small RNA) regulates gene expression post-transcriptionally via mRNA degradation and playing a critical role in neurological diseases such as, Parkinson disease, Alzheimer's disease, Huntington's disease, multiple sclerosis, and, stroke and anti-NMDA receptor encephalitis. Many remarkable studies looking at the role of miRNAs in neurological disorder. MiRNAs can regulate the development of neurological diseases and act as novel clinical biomarkers and potential therapeutic tool to predict these neuronal diseases conditions.Bioinformatic databases, including experimentally validated and computational prediction tools as well as a novel combination method, were used to identify miRNAs that are able to simultaneously inhibit key genes related to the pathogenesis of neurological disorder. Further validation of genes and miRNAs was conducted using the STRING online tool, KEGG pathway analysis and DIANA-Mir Path. The inhibitory effects of the identified miRNAs in brain cells were verified by real-time PCR. Neurological diseases drug-targeted genes were selected as key genes. Strong interactions between genes were confirmed using STRING. These genes were shown to be integral to critical pathological processes involved in neurological diseases. To identify the most effective miRNAs based on both validated and computational databases, we calculated the C-Score for each miRNA.

Keywords: NMDA, STRING, KEGG, DIANA, PCR, C-Score.

Alzheimer's Disease Treatment Targeting Amyloid β: Obstacles, Achievements, And Prospects

Sushma Singh,
Shri Ramswaroop Memorial University, Lucknow Deva Road, Barabanki, UP, India, UP, India
singhsushmapratap090@gmail.com

Abstract

Amyloid β (Aβ) plaque buildup in the brain is one of the hallmarks of Alzheimer's disease (AD), a progressive neurodegenerative illness marked by cognitive decline and memory loss. Aβ has been a key target in the last few decades as treatment approaches slow or reverse the disease's progress. The development of amyloid-targeting treatments has proven difficult despite tremendous efforts. Early clinical trials of anti-amyloid antibodies, such as those that directly neutralize soluble Aβ or target the production of amyloid precursor protein (APP), have produced conflicting results, with minimal success in improving cognitive outcomes and safety and efficacy issues. The success and challenges of targeting amyloid β for the treatment of AD are discussed in this article. These challenges include the intricacy of Aβ's function in the pathophysiology of the illness, the unpredictability of patient responses, and the challenge of administering effective medicines to the brain. In this review, we discussed innovative treatments that might provide fresh ways to overcome these challenges, like gene therapy, vaccinations, and tiny molecules. Discussed the possibility of combination treatments that focus on several disease pathways in AD, acknowledging that a multifactorial strategy might be required for sustained effectiveness is also emphasized. Lastly, we discuss the potential of amyloid-based medicines in the future, emphasizing the value of customized medicine, early detection, and the incorporation of biomarkers to inform clinical judgment in the search for efficient AD treatments.

Keywords: Alzheimer's disease, amyloid β, therapeutic strategies, anti-amyloid antibodies, challenges.

Psychometric Insights into Stress-Induced Anxiety Among Teenagers

Kalpna Verma, Anupma Verma, Aisha, Subhash Kumar Yadav, Vandana Ranjan
Department of Biochemistry, Dr Ram Manohar Lohiya Awadh University Faizabad Ayodhya

Abstract

Stress-induced mental, behavioral, and neurological disorders are increasingly affecting younger populations, with recent cases highlighting a rise in such issues among children and teenagers. Despite this trend, limited research has focused on this sensitive area. Reported cases reveal symptoms such as depression, panic attacks, social withdrawal, and a pervasive fear of negative evaluation or judgment by others. These challenges often result in academic struggles, suicidal tendencies, and violent behaviors, impacting the individual's quality of life and affecting their families and society at large. This study aimed to assess the prevalence of these concerning traits among teenagers to identify underlying causes and provide targeted interventions. A self-assessment questionnaire, developed using the DSM-IV and DSM-V manuals, incorporated three anxiety scales (GAD-7, PSS-10, and BFNE) and was administered to a sample of 208 teenagers aged 13–19, including both males and females. Responses were analyzed to categorize participants into healthy and pathological anxiety ranges, with data validation conducted via SPSS. The study revealed that approximately 58% of participants exhibited emerging symptoms of generalized anxiety disorders, with females showing higher susceptibility than males. Alarmingly, 99% reported a fear of being negatively judged, and 86% displayed perceived stress traits that may contribute to the early development of generalized anxiety disorder.

Keywords: Anxiety, Teenage, GAD-7, PSS-10, BFNE

Neurobiology Of Smartphone Addiction in Emerging Adults

Nashra Sami[1], Rihan Ahmad[2], Zahid Husain[3]
[1]Aryakul College of Pharmacy & Research, Lucknow
[2]Institute of Pharmacy, Shri Ramswaroop Memorial University, Lucknow Dewa Road, Barabanki, UP, India (225003)
nashrasami84374@gmail.com

Abstract

Among the worries voiced is a growing concern of smartphone addiction and its negative impacton mental health, as well as its deleterious neurobiological effects. The habit is enforced thanksto dopamine release that makes us feel good and want more, making it even harder not to useyour smartphone that often. With time, this could cause desensitization with the need to use moreto get that same level of satisfaction - similar to most other addictions. Previous studies have shown that the longer you spend on your smartphone, the greater changes occur in both brain structure and function; these include premotor cortex associated with decisions impulse control and attentiveness. Furthermore, overusing has been connected with raised levels of anxiety and depression in addition to sleep problems from the ill effects related social media displaced circadian rhythms/social media-caused stress. To decrease the amount of time that is impulsively used on smartphones, it is necessary to understand how smartphone addiction works from a neurobiological perspective. Therapeutic approaches that modify dopamine release, impulse control or cognitive flexibility could be integrated to address this shortfall in the current treatment strategies.

Conclusion: The brain disorders range from neurodegenerative diseases like Alzheimer, Parkinsons and multiple sclerosis to cause cognitive decline or significant sensory defects.

Management consists of medications to alleviate symptoms, physical therapy, lifestyle changes and rarely surgery. Early diagnosis and personalized care improve quality of life & reduces progression of disease.

Keywords: Smartphone Addiction, Executive Function, Cognitive Impairment, Dopamine, Prefrontal Cortex, Mental Health.

Role and Potential Benefits of Nutraceutical in Neuroscience

Divaker Shukla[1]* and Mhaveer Singh[2],
[1]Department of Pharmacognosy and Phytochemistry Laboratory, Pharmacy Academy, IFTM University, Moradabad-244102-India
[2]Department of Pharmacognosy, School of Pharmaceutical Science, IFTM University, Moradabad-244102-India
Email: divakershukla983@gmail.com

Abstract

Nowdays, Nutraceuticals are nourishing substances that have biological activity and the potential to sustain the best possible health in neuroscience. Nutraceuticals are utilized as supplements to functional foods to help prevent and manage neurological disorders. Problems that may impact cellular processes that promote brain health, including neurogenesis, synaptogenesis, neuroinflammation, cell death regulation, and neuronal survival, are treated using nutraceuticals. Nutraceuticals' capacity to alter all of these procedures indicates the possibility of creating dietary methods to support brain growth, improve mind action, possibly repair the cognitive decline caused by Alzheimers disease, the most common kind of dementia in older people. The present study describes the modes of action of the neuroprotective potential of nutraceuticals is evaluated using both in vitro and in vivo models and the scientific proof of their neuroprotective properties against Alzheimer's illness. In this review, numerous drug nutritraceutical interactions have also been explained with numerous examples in neurological disorders. The final section of the review a number of Alzheimer’s disease on nutraceuticals used confirming nutraceuticals' exponential rise of neuroprotective potential.

Keywords: Nutraceuticals, Neuroscience, Alzheimer’s disease, Neurogenesis, Neuroprotective potential

Intracellular Heme-Containing Enzyme's ameliorative function in Neurodegenerative Disorders

Prashant Upadhyay[1]*, Sukirti Upadhyay[1], Krishana Kumar Sharma[2], Siddhant Jai Tyagi[2]
[1]School of Pharmaceutical Sciences, IFTM University, Moradabad-244102, Uttar Pradesh, India.
[2]Department of Pharmacology, Teerthanker Mahaveer College of Pharmacy, Teerthanker Mahaveer University, Moradabad-244001, Uttar Pradesh, India
prashantupadhyay@iftmuniversity.ac.in

Abstract

Objectives: The aim of this study to determine the contributing factors in the development of Neurodegenerative Disorders and ascertain the ameliorative function of Intracellular Heme-Containing Enzyme's Neurodegenerative Disorders.

Methods: Identify and observe the cellular functions such as signal transduction, mitochondrial function, and the management of oxidative stress depend on intracellular heme-containing enzymes such as catalases, nitric oxide synthases, and cytochrome P450s. Data indicates that by promoting damage from oxidation and cellular dysfunction, deregulation of these enzymes is a critical factor in the etiology of neurodegenerative diseases.

Results: All of the research that has been done so far has shown a consistent relationship between higher levels of oxidative stress and poorer neuronal function and the abnormal activity of heme-containing enzymes. In neurodegenerative diseases, studies have shown higher oxidative stress markers along with altered expression and degree of activity of enzymes such nitric oxide synthases and cytochrome P450s. Decreasing oxidative damage and increasing survival of neurons in preclinical models have been demonstrated by experimental therapies that specifically target these enzymes.

Conclusion: This study emphasizes the role of heme-containing intracellular enzymes impact on neural degradation are hallmarks are to the pathophysiology of Neurodegenerative disorders.

Keywords: Heme-containing**,** enzymes impact**,** Neural degradation**,** Neurodegenerative disorders

Neuroprotective potential of phytochemicals: analytical and pharmacological approaches in drug discovery

Pushpendra Soni*, Alisha Bano, Yasmeen Bano, Aleena
Faculty of Pharmacy, Integral University, Dasauli, Kursi Road, Lucknow, Uttar Pradesh, 226026, India.
pushpendrasoni6952@gmail.com

Abstract

Phytochemicals, bioactive molecules isolated from plants are promising drugs for neurodegenerative diseases like Alzheimer's or Parkinson's. Phytochemical compounds fight neuronal dysfunction with antioxidative and anti-inflammatory pathways, changes in neurotransmitter systems, and inhibition of neuron apoptosis. Identifying and characterizing these active neurochemical compounds requires advanced analytical techniques like chromatography, mass spectrometry, and spectroscopy (NMR, IR). Various other pharmacological models can be utilized in their evaluation such as in vitro, in vivo, and in-silico approaches. A pharmacokinetic profile needs to be evaluated especially the ADME analysis and studies on blood-brain barrier (BBB) permeability for any therapeutic potential of phytochemicals. To amplify their effects, synergistic and combinational approaches are increasingly being investigated; a combination of various compounds may be more additive or synergistically neuroprotective than the individual compounds alone. Herb drug interactions and optimization of combination therapies are predicted by in-silico modeling and CADD. However, formulation and attainment of adequate bioavailability remain enormous challenges for the translation of these findings into the clinic. Therefore, future studies would be targeted at countering pharmacokinetic flaws, developing better delivery systems, and modulating phytochemical combinations to address multiple mechanisms. This review brings together a lot of information on the current state of research and gives valuable insights into the future of neuroprotective drug discovery using phytochemicals.

Keywords: Phytochemicals, Neuroprotection, Antioxidant Pathways, Herb-Drug Interaction, In-Silico Modeling, Synergistic Approaches.

Phytochemical and Pharmacological Evaluation of ethanolic leaf extract of *Vitis vinifera* for Nootropic Activity

Dinesh Kumar[1]*, Kavya Vishnoi1, Navneet Verma[2], Sushil Kumar1, Arvind Kumar[1], Raj Kumar Singh Bharti[1], Anesh Sagar[1]

[1]School of Pharmaceutical Sciences, IFTM University Moradabad 244102 (U.P.) India

[2]Pharmacy Academy, IFTM University Moradabad 244102 (U.P.) India

dineshpharama181@gmail.com

ABSTRACT

The present study aimed to evaluate the Phytochemical and Pharmacological Evaluation of ethanolic leaf extract of *Vitis vinifera* (ELEVV) for Nootropic Activity. Extraction was done by Soxhlet apparatus. Extract was used for Phytochemical screening, TLC analysis, Total phenolic and flavonoids content determination, Results showed that numerous phytochemical present in extract. Antioxidant activity as well as for acute oral toxicity and Nootropic activity. Wistar Albino rat weighing 150-200g were selected for acute oral toxicity and Nootropic activity. They were divided into different groups. The animals pretreated with ELEVV at the dose of (100, 200 and 400 mg/kg, p.o.) and Piracetam at the dose of (200 mg/kg, i.p.) for 21 days. Piracetam was used as a standard. Amnesia was induced by the administration of Scopolamine (1mg/kg, i.p.) on 21 days and after 30 min and 24 hours, NORT, Y-Maze and MWM activity was measured. Pretreatment for 21 days with ELEVV at the dose of 100, 200 and 400 mg/kg significantly increased the memory in memory impaired animals as compared to control group and Scopolamine group. It also antagonized the Scopolamine induced amnesia in a dose dependent manner. On the basis of results, it is concluded that ELEVV possesses nootropic activity.

Keywords: *Vitis vinifera*, Piracetam, Scopolamine, Antioxidant, Phenolic and Flavonoids

A study on the knowledge and attitudes of RITM College Pharmacy students towards dementia

Sakshi Gupta[1], Dr. Vishal Dubey[2], Mohd Faizan Siddiqui[3], Dr. Rajgopal Reddy[4], Dr. Rajeev Misra[*5]

[1],[2]Naraina Vidyapeeth Group of Institutions, Faculty of Pharmacy, Kanpur

[3]Rameshwaram Institute of Technology & Management, Lucknow

[4]Chandan Hospital, Lucknow

[5]Department of Community Medicine & Public Health, KGMU, Lucknow

drrajeevmisracmph@gmail.com

ABSTRACT

Dementia is an increasingly significant public health issue, characterized by a decline in cognitive function beyond what might be expected from normal aging. Awareness and understanding of dementia among younger populations, such as college students, are crucial for fostering supportive attitudes and preparing future professionals in various fields. The aim of this study is to assess the knowledge and attitudes towards dementia among Pharmacy students of RITM College and the study seeks to evaluate their understanding of dementia's causes, symptoms, and treatments, as well as their perceptions and attitudes towards individuals living with dementia. This study used a cross-sectional survey to assess the knowledge and attitudes of RITM College Pharmacy students toward dementia. The survey, conducted from October to December 2023, was administered via a Google Form, disseminated through WhatsApp groups. Frequency distributions, percentages, and chi-square tests were employed to summarize and analyze the data. A total of 218 students participated, selected using random sampling. The inclusion criteria required participants to be current pharmacy students, at least 17 years old, and to provide informed consent. Exclusion criteria disqualified students not enrolled in the pharmacy program or those submitting incomplete questionnaires. The study of 218 RITM College pharmacy students found that 60.5% were aware of dementia, but misconceptions were common, 51% didn't consider forgetfulness a disease. 34.5% correctly identified all dementia symptoms. 62% knew dementia isn't contagious. 58.5% believed alcoholism increases dementia risk. In terms of attitudes, 66.5% believed dementia requires special care. 72.5% felt dementia should be a healthcare priority. 44.5% thought dementia patients can't manage daily activities. 58.5% saw dementia patients as potentially dangerous. Overall, awareness was moderate, but misunderstandings highlight a need for better education. The findings underscore the need for increased public education on dementia, focusing on its risk factors, management, and the importance of healthcare support. The demographic data suggests that the opinions might reflect the views of a relatively young and predominantly single population, which could influence their perceptions of dementia's relevance and impact.

Keywords: Dementia ,RITM College pharmacy

The administration of phytonutrients to treat epilepsy, a neurological condition

Alok Singh[1]*, Prevesh Kumar[2], Diksha[2], Navneet Verma[2]
[1] Research Scholar, School of Pharmaceuticals Science, IFTM University, Moradabad, Uttar Pradesh, India
[2] Pharmacy Academy, IFTM University, Moradabad, Uttar Pradesh, India
alokthevictor@gmail.com

Abstract:

About 1% of people worldwide suffer from epilepsy, a neurological condition marked by frequent, spontaneous seizures. Even with the availability of anticonvulsant drugs, many people with epilepsy either have severe side effects or insufficient seizure control. As a result, complementary and alternative therapies, such as the usage of phytonutrients, which are beneficial substances found in plants are becoming more and more popular for managing seizures.**Present novelty:** According to recent studies, certain phytonutrients may alter important pathways related to the pathogenesis of epilepsy, such as neuronal excitability, neurotransmitter imbalances, neuroinflammation, and oxidative stress. The substances that have shown anti-inflammatory, antioxidant, and neuroprotective qualities include curcumin (found in turmeric), resveratrol (found in grapes), and epigallocatechin gallate (EGCG) (found in green tea), which may help describe their anticonvulsant effects.**Findings:** The administration of phytonutrients may provide a promising adjunct to conventional antiepileptic drugs (AEDs) or serve as an alternative for patients who are refractory to traditional treatments. However, while early-stage evidence is promising, further clinical trials are needed to determine optimal dosages, bioavailability, and long-term safety. Moreover, the mechanisms underlying the anticonvulsant effects of phytonutrients require deeper investigation to better integrate these compounds into clinical practice.

Conclusions:

This review examines the current literature on the use of phytonutrients in the management of epilepsy, exploring their potential neuroprotective effects, proposed mechanisms of action, and challenges for clinical application. Ultimately, a better understanding of how phytonutrients can complement or enhance existing therapies may offer new, safer treatment options for patients with epilepsy.

Keywords: Alkaloids, Antioxidant, Epilepsy, Oxidative stress, Phytonutrients

Advanced Research Methodologies in Neuroscience, Techniques and Implications

Saddam Hussain, Safa Marwa
GCRG College of Pharmacy, BKT, Lucknow
saddamcute786@gmail.com

Abstract

Recent advances in neuroscience research methodologies are revolutionizing our understanding of neural function and disease. This review examines state-of-the-art techniques, including high-resolution neuroimaging (fMRI, DTI), optogenetics, CRISPR-Cas9 gene editing, and single-cell RNA sequencing, each providing unique insights into neural circuits, gene expression, and cellular diversity. Additionally, advancements in electrophysiology, machine learning, and computational modeling allow more precise data analysis and predictive modeling, essential for tackling complex neurological and psychiatric disorders. By integrating multimodal data, these methods enable a comprehensive view of neural activity, connectivity, and gene interactions, supporting the development of new treatments and personalized medicine approaches. The review also addresses the ethical implications and challenges of implementing these techniques, emphasizing the need for interdisciplinary collaboration and responsible research practices. Together, these methodologies pave the way for groundbreaking discoveries in brain health and function.

Keywords: Neuroscience, advanced research methods, neuroimaging, optogenetics, CRISPR-Cas9, electrophysiology, single-cell RNA sequencing, machine learning, computational neuroscience, neural circuits, brain health, ethical considerations

Advances in Alzheimer's disease: Unraveling Mechanisms and Harnessing Biosensors for Early Detection

Bhumika Chauhan[1]*, Sweta Pundir[2], Divya Kumari[2] Krishna Kumar[3], Arvind Kumar[1]

[1*, 1] Faculty of Pharmacy, IFTM University, Moradabad, 244001, Uttar Pradesh, India

[2] ITS College of Pharmacy, Ghaziabad, Uttar Pradesh 201206, India

[3] Uttaranchal Institute of Pharmaceutical Sciences, Uttaranchal University, Dehradun 248007, Uttarakhand, India

chauhanbhumi9416@gmail.com

Abstract

One of the most severe neurodegenerative diseases, Alzheimer's disease is typified by steady cognitive deterioration, memory loss, and observable variation. Despite decades of research, the precise mechanisms underlying the pathophysiology of AD are still unknown. Recent advances have brought to light crucial molecular mechanisms underlying this illness, including synaptic dysfunction, amyloid-beta plaque accumulation, brain inflammation and tau protein hyperphosphorylation. These mechanisms are currently being described as probable biomarkers for ongoing illness progression monitoring and early detection. Laterally, cutting-edge biosensors technologies are revolutionizing how we monitor and analyze these biomarkers. Electrochemical, optical, and wearable biosensors are revolutionizing the detection of Alzheimer's disease (AD) by providing non-invasive, real-time, highly sensitive, and specific methods for measuring AD-related biomarkers. The development of this technology has the potential to greatly enhance early diagnosis, customize treatment regimens, and track the disease continually. By providing insight into the fundamental processes of AD, these biosensors are opening up new avenues for diagnosis and treatment, which will ultimately result in better patient outcomes.

Keywords: Alzheimer's disease, amyloid-beta, tau protein, biomarkers, biosensors, Disease monitoring

Magnetoencephalography: Advanced research methodology in neuroscience

Akash Tiwari
Institute Of Pharmacy, Shri Ramswaroop Memorial University,U.P
tiwariakash2779@gmail.com

Abstract

A non-invasive neuroimaging method called magnetoencephalography (MEG) records the magnetic fields produced by brain cell activity. MEG offers real-time, high temporal resolution information on brain activity by identifying the magnetic signals generated by electrical currents, mainly from the synaptic activity of pyramidal neurons in the cortex. MEG is especially helpful for researching dynamic brain functions like motor planning, language comprehension, and sensory processing. In therapeutic contexts, MEG provides information about aberrant brain processes without exposing patients to radiation by helping to map functional brain areas for pre-surgical planning, especially in cases of epilepsy and brain malignancies. The capacity of MEG to precisely localize brain activity over time without interference from the skull and scalp is its primary advantage over other neuroimaging methods like electroencephalography (EEG) and functional magnetic resonance imaging (fMRI). In order to improve the anatomical localization of brain activity and provide better clinical and research outcomes, MEG is frequently used in conjunction with structural imaging modalities such as MRI. Additionally, MEG technology is becoming more accessible and useful due to continuous advancements in portable devices and high-sensitivity sensors like optically pumped magnetometers (OPMs). Current research highlights MEG's function in detecting brain oscillations and network connectivity linked to mental and cognitive illnesses, such as Alzheimer's disease, schizophrenia, and autism. MEG's potential to transform clinical and cognitive research is highlighted by its non-invasive nature and increasing usefulness.

Keywords: Magnetoencephalography (MEG), neuroimaging, brain mapping, SQUID, magnetic fields, neuronal activity, epilepsy, functional mapping, cognitive neuroscience

Neuroprotective Agents in Stroke and Traumatic Brain Injury: Mechanisms and Development

Alankar Shrivastav*, Vijay Sharma, Navneet Verma
Pharmacy Academy, IFTM University, Moradabad, U.P.
Email: alankar1994.ss@gmail.com

Abstract

Stroke and traumatic brain injury (TBI) rank among the foremost causes of neurological disability globally, frequently leading to irreversible brain tissue damage and enduring cognitive and functional deficits. Although there have been considerable advancements in acute care, effective therapeutic approaches to prevent secondary brain injury and enhance neuroprotection remain scarce. This review delves into the mechanisms that contribute to neuronal injury and cell death in stroke and TBI, emphasizing pathophysiological processes such as excitotoxicity, oxidative stress, inflammation, and mitochondrial dysfunction. We also discuss emerging neuroprotective agents that target these mechanisms, including glutamate receptor antagonists, antioxidant substances, anti-inflammatory medications, and mitochondrial protectants. Furthermore, we investigate the significance of neurotrophic factors, particularly brain-derived neurotrophic factor (BDNF), in fostering neuronal survival and repair. The chapter also underscores innovative drug development strategies aimed at improving neuroprotection, such as gene therapy, nanomedicine, and the application of small molecules that influence specific signaling pathways related to neuroinflammation and cell survival. Despite encouraging preclinical findings, the clinical application of these agents has faced challenges concerning efficacy, safety, and appropriate therapeutic timing. We conclude by outlining prospective directions in neuroprotective drug development, highlighting the necessity for personalized treatment approaches, combination therapies, and novel delivery systems to optimize therapeutic outcomes for patients with stroke and TBI.

Keywords: Neuroprotective agents, stroke, traumatic brain injury, excitotoxicity, oxidative stress, inflammation, neuroinflammation.

Artificial Intelligance in Neuro-Oncology

Dr Asawaree, Anand Hable
Associate Professor, Lotus Institute of Pharmacy, Bareilly, Uttar Pradesh, India.

Abstract

Cancer of the central nervous system (CNS) can crosstalk systemically and locally in the tumor microenvironment and has become a topic of attention for tumor initiation and advancement. Recently studied neuronal and cancer interaction fundamentally altered the knowledge about glioma and metastases, indicating how cancers invade complex neuronal networks. There is need to study interactions between neurons and cancers and elucidates new therapeutic avenues. For better understanding of direct or indirect communications of neuronal cells with cancer and the mechanisms associated with cancer invasion Artificial intelligence (AI) can be utilized. Artificial intelligence (AI) is rapidly reshaping cancer research and personalized clinical care. Availability of high dimensionality datasets coupled with advances in high performance computing as well as innovative deep learning architectures, has led to an explosion of AI use in various aspects of oncology research. The interactions between peripheral nervous system and various cancers can be studied with AI. The applications of AI range from detection and classification of cancer, to molecular characterization of tumors and its microenvironment, to drug discovery and repurposing, to predicting treatment outcomes for patients. As these advances start penetrating the clinic, we foresee a shifting paradigm in cancer care becoming strongly driven by AI.

Keywords: Cancer, Central Nervous System, Artificial Intelligence, Neuronal Dysfunction

Neurofilament proteins' distinctive roles in synapses: Implications for neuropsychiatric disorders

Aasif Khana*[1], Saumya Awasthi[2]
[1]Geeta pharmacy college Near STP chauraha, gomti nagar ext. Lucknow, 226010
[2]IOP, Shri Ram Swaroop Memorial University Barabanki, Deva Road Lucknow, 225003
aasifkhan66433@gmail.com

Abstract

Neurofilaments are unique among intermediate filament classes in that they are made up of four subunits (NFL, NFM, NFH, and alpha-internecine in the CNS) with different structures, regulations, and functions. Although neurofilaments were generally thought to be axonal structural components, new research has shown that different assemblages of neurofilament subunits are essential components of synapses, particularly at postsynaptic locations. Individual synaptic subunits affect neurotransmission and behavior differently by interacting with specific neurotransmitter receptors. These recently discovered functions imply that changes in neurofilament amino acids may be essential for cognition and neuropsychiatric disorders in addition to causing axonopathy in a variety of neurological conditions.

Keywords; Axonopathy, alpha-internecine, synapses, postsynaptic, neurotransmitter

AI-Driven Multimodal Imaging Biomarkers for Early Diagnosis and Precision Treatment in Parkinson's Disease

Ayeza Sarwar Kalam[1], Tanzeela Siddiqui[1], Divyadarshan Lohani[1], Asim Rahman[1], Gazala Noor[2]*

[1]Faculty of Pharmacy, Integral University, Lucknow, U.P., India-226026

[2]Department of Pharmacology, Faculty of Pharmacy, Integral University, Lucknow, U.P., India-226026

gazalanoor6369@gmail.com

Abstract

Parkinson's disease (PD) is a complex and the second most common neurodegenerative disorder that often goes undetected until advanced stages, complicating treatment and impacting patient quality of life. However, recent advancements in artificial intelligence (AI), particularly machine learning (ML) and deep learning (DL), are transforming PD research by enabling earlier detection of biomarkers, more accurate monitoring of disease progression, and personalized therapeutic strategies. DL models applied to PET and MRI imaging can identify subtle changes associated with PD, such as dopaminergic and mitochondrial deficits, iron deposition, and neuromelanin alterations in the substantia nigra. Advanced AI methods for image acquisition and reconstruction, like convolutional neural networks (CNNs), also allow for improved resolution of brain regions affected by PD, further facilitating early detection. Early PD detection is a key challenge, and ML algorithms trained on extensive datasets can identify early biomarkers that differentiate prodromal PD from other neurodegenerative diseases. Explainable AI (XAI) techniques have been instrumental in this endeavor, providing interpretability to model predictions and revealing critical brain regions implicated in early PD pathophysiology. AI-driven quantification of molecular and microstructural changes also enables remarkable precision in tracking PD progression. ML models assess structural and functional brain alterations, such as dopamine transporter loss and network degeneration, for dynamic, non-invasive monitoring. These models also predict treatment responses, including personalized deep brain stimulation (DBS) parameters, to enhance therapeutic efficacy. Multimodal data integration represents another frontier, as ML models that combine neuroimaging with clinical, genetic, and molecular data uncover complex interactions and stratify patients based on distinct disease subtypes. This integrative approach not only advances PD diagnosis but also enhances patient selection and monitoring for clinical trials. Ultimately, AI-assisted identification of imaging markers holds transformative potential for early PD diagnosis, patient-specific treatment planning, and disease monitoring. By integrating multimodal data, AI provides a robust framework for understanding PD's underlying mechanisms and heterogeneity, paving the way for precision medicine in PD care.

Keywords: Artificial intelligence, Biomarkers, Deep learning Early diagnosis, Multimodal imaging, Parkinson’s disease.

Beyond the Barrier: Advanced Neuroscience Research Methods and Innovations in Brain Drug Delivery

Asim Rahman*, Divyadarshan Lohani, Ayeza Sarwar Kalam, Tanzeela Siddiqui

Faculty of Pharmacy, Integral University Lucknow, U.P., India-226026

asimr7206@gmail.com

Abstract

The blood-brain barrier (BBB) is a critical obstacle to effective brain drug delivery, selectively restricting most substances from passing into the brain. However, in various neurological diseases, such as stroke, Alzheimer's, Parkinson's, and multiple sclerosis, the BBB's permeability is altered, potentially enabling drug transport under pathological conditions. Traditional approaches to brain medication delivery are often limited, especially when considering aging's effects on the BBB. Liposome-based drug delivery systems have gained attention due to their unique physicochemical properties, which make them suitable for crossing the BBB. Liposomes can be engineered with receptor-targeting molecules like peptides or antibodies, enhancing targeted delivery to affected brain areas. External-stimuli-responsive liposomes represent a promising but early-stage advancement.In neuroscience, innovations like neuroimaging (fMRI, PET), electrophysiology (EEG, MEG), and molecular genetics have transformed the study of brain structure, function, and disorders. These methods, alongside machine learning and deep learning models, support advanced data analysis, aiding in the prediction of disease progression and biomarker discovery. Genome-wide association studies (GWAS) are revealing genetic links to neuropsychiatric conditions, offering new therapeutic targets. Integrating these techniques propels neuroscience into an era of profound discovery, promising advancements in diagnostics and treatments.

Keywords: Blood Brain Barrier, liposomes, neurological disorders, neuroimaging, electrophysiology, Parkinson, Alzheimer's, Liposome, Artificial Intelligence.

Pharmaceutical Advances in Treating Migraine and Cluster Headache: Mechanisms and Drug Development

Pawan Singh*, Vijay Sharma, Navneet Verma
Pharmacy Academy, IFTM University, Moradabad, U.P.-244001
pawansingh690@gmail.com

Abstract

Migraine and cluster headaches are debilitating neurological disorders that significantly impact the quality of life of affected individuals. Despite substantial progress in understanding their pathophysiology, the treatment of these conditions remains complex and challenging. This review provides an overview of the latest pharmaceutical advances in the management of migraine and cluster headaches, focusing on the molecular mechanisms underlying these disorders and the development of novel therapeutic agents. We discuss the role of key neurovascular and neuroinflammatory pathways, including the involvement of calcitonin gene-related peptide (CGRP), serotonin (5-HT) receptors, and the trigeminovascular system, which have been central to drug discovery efforts. Recent advancements, such as CGRP receptor antagonists, monoclonal antibodies targeting CGRP, and 5-HT1F receptor agonists, are highlighted for their efficacy in acute migraine relief and prevention. In addition, we examine the evolving role of gepants, ditans, and neuromodulatory therapies, including non-invasive devices and transcranial magnetic stimulation, as emerging treatment modalities for both episodic and chronic migraine. For cluster headaches, we explore the development of rapid-acting treatments, such as inhaled oxygen, subcutaneous sumatriptan, and the promising use of anti-CGRP therapies. While significant strides have been made, challenges such as treatment resistance, side effects, and the need for personalized medicine remain. The review also discusses ongoing clinical trials and the future directions of drug development, including the potential of targeted biologics and small molecule inhibitors in improving patient outcomes. Overall, these pharmaceutical innovations hold considerable promise for more effective, tailored treatments for migraine and cluster headache sufferers.

Keywords: Migraine, cluster headache, CGRP, 5-HT1F agonists, gepants, ditans, neurovascular, drug development, pharmacological treatment.

Current Advances and Emerging Trends in Treatment of Alzheimer's and Parkinson's Diseases

Yasmeen Bano*, Alisha Bano, Pushpendra Soni, Noor Jameel
Faculty Of Pharmacy, Integral University, Lucknow, U.P., India
banoyasmeen663@gmail.com

Abstract:

For Neurodegenerative diseases like Parkinson's and Alzheimer's, it is important to develop transforming therapy by identifying promising new targets and treatment options. Progressive neuronal degeneration is a hallmark of both Alzheimer's disease (AD) and Parkinson's disease (PD), which are complicated, multifactorial illnesses that present substantial treatment problems because of their variety and diverse symptomatology. Conventional treatments have mostly addressed symptoms, but only slows down the disease progression. However, current research is finding new therapy targets and innovative approaches that could change the course of the disease instead of just reducing its symptoms. Precision medicine has become essential in creating individualized treatments and early diagnostic tools by utilizing genomes and patient-specific biomarker profiles. Anti-inflammatory medications and neuroprotective substances are becoming recognized as possible supplements to conventional therapies, fresh molecular targets, such as alpha-synuclein-based therapies, tau protein modification, and amyloid-beta aggregation inhibitors. There is currently hope that developments in immune regulation, gene therapy, and stem cell techniques could change the course of the disease. These developments in technology are facilitating a move toward individualized, disease-modifying therapies in addition to expanding therapeutic targets. The treatments could be drastically changed as a result of these developments, offering hope for better patient outcomes and more potent therapies.

Keywords: Parkinson, Alzheimer, Molecular targets, Anti-inflammatory, Neuroprotective

Cutting-Edge Neuroscience Research Methodologies: Bridging Technology and Brain Science

Gazala Noor*, Badruddeen, Juber Akhtar, Rabiya Ahsan
Faculty of Pharmacy, Integral University, Lucknow
gazalanoor6369@gmail.com

Abstract

In recent years, advancements in technology have revolutionized neuroscience research, enabling unprecedented insights into brain function, neural connectivity, and the biological underpinnings of cognition and behavior. By integrating tools such as functional MRI, optogenetics, and machine learning algorithms, researchers can decode complex neural networks, map brain activity in real time, and manipulate genetic expression to understand disease mechanisms. The convergence of computational neuroscience and artificial intelligence (AI) is reshaping understanding of brain function and neural dynamics. By harnessing machine learning, deep learning, and neural network modeling, researchers are able to simulate complex neural systems, analyze large datasets, and predict behavioral outcomes, facilitating breakthroughs in cognitive neuroscience and neuroinformatics. These technological breakthroughs not only deepen the understanding of the brain but also pave the way for targeted therapies and brain-computer interfaces that may transform clinical neurology. The aim of this review to enlighten the how AI is used in neuroscience, including neural decoding, brain network modeling, and disease diagnostics as well as decipher the intricacies of neural processing, enhance neuroimaging analysis, and advance brain-computer interfaces. AI algorithms enable precise analysis of neuroimaging data, enhancing diagnostic accuracy for neurological disorders such as Alzheimer's, Parkinson's, and epilepsy. Machine learning techniques can detect disease-related patterns in MRI, PET, and CT scans, assisting clinicians in early diagnosis and treatment planning. This interdisciplinary approach not only expands the knowledge of the brain but also holds promise for future innovations in personalized neuromedicine, prosthetics, and cognitive enhancement technologies.

Keywords: Neuroscience, artificial intelligence, neuro-diagnostics, personalized neuromedicine

Effect of splitting sleep in memory enhancement

Tanuja Mishra
Sagar Institute of Technology and Management
tanujaynarayan@gmail.com

Abstract

The effect of splitting sleep on memory enhancement is a complex topic with mixed findings. However, recent research suggests that splitting sleep into a nighttime sleep and a daytime nap can actually enhance long-term memory. Enhanced Long-Term Memory: Studies have shown that splitting sleep can improve the consolidation of long-term memories. This is likely due to the reduction of homeostatic sleep pressure, which allows for more efficient memory processing during the daytime nap. Improved Cognitive Function: Some studies have suggested that splitting sleep can improve cognitive functions like vigilance, working memory, and executive function. However, this benefit may depend on the total sleep duration and individual differences. Total Sleep Duration is crucial to maintain adequate total sleep duration (around 7-9 hours) to reap the benefits of splitting sleep. The impact of splitting sleep may vary from person to person. Some individuals may find it beneficial, while others may not. Disrupted Sleep Quality: Splitting sleep may disrupt the natural sleep cycle and lead to fragmented sleep, which can negatively impact cognitive function and overall health. Sleep episodes were nocturnal or split between nocturnal sleep and a 90-min afternoon nap, creating four experimental groups: 8 h-continuous, 8 h-split, 6.5 h-continuous and 6.5 h-split. Declarative memory was assessed with picture encoding and an educationally realistic factual knowledge task. Splitting sleep significantly enhanced afternoon picture encoding and factual knowledge under both 6.5 h and 8 h durations. Splitting sleep also significantly reduced slow-wave energy during nocturnal sleep, suggesting lower homeostatic sleep pressure during the day.

In conclusion, while splitting sleep can potentially enhance memory and cognitive function, it's important to consider individual differences and prioritize overall sleep quality. If you're considering splitting your sleep, it's advisable to consult with a healthcare professional to determine if it's suitable for your specific needs.

Keywords: Cognitive function, Memory enhancement, Sleep Duration ,splitting sleep.

Cognitive Impairment in Traumatic Brain Injury: A Neuropsychological Perspective

Dr. Ankur Singh
SOS School of Pharmacy, IFTM University, Moradabad, 244102, India
ankursingh108@gmail.com

Abstract

Traumatic brain injury (TBI) often results in cognitive impairments that significantly affect quality of life and long-term functional outcomes. This research examines cognitive impairment following TBI from a neuropsychological perspective, focusing on the mechanisms, assessment, and rehabilitation of cognitive deficits. Through a systematic review of recent neuropsychological studies, we explore how TBI impacts key cognitive functions, including attention, memory, executive function, and processing speed. This paper also highlights the role of various severity levels, injury mechanisms, and patient demographics in shaping cognitive outcomes post-TBI. Neuroimaging and neurophysiological findings are discussed to elucidate the neural correlates of these impairments. Additionally, we assess current therapeutic approaches, emphasizing evidence-based interventions, including cognitive rehabilitation and pharmacological treatments, to mitigate cognitive deficits. The findings contribute to a nuanced understanding of the cognitive sequelae associated with TBI and underscore the need for personalized, integrative rehabilitation strategies to improve outcomes.

Keywords: Traumatic Brain Injury (TBI), Cognitive Impairment, Neuropsychology, Executive Function, Memory Deficits, Cognitive Rehabilitation.

Molecular and cellular neuroscience

Tilakraj, Nashra*[1] Sami[2], Zahid Husain[3]
Aryakul College of Pharmacy & Research, Lucknow
Institute of Pharmacy, Shri Ramswaroop Memorial University, Lucknow Dewa Road, Barabanki, UP, India (225003)
tkraj0614@gmail.com

Abstract

Molecular and cellular neuroscience is all about understanding how our brain and nervous system work at the most basic level — down to the molecules and cells. It focuses on how brain cells, called neurons, talk to each other using electrical signals and chemicals, like neurotransmitters. This area of science looks at how the brain processes information, forms memories, and controls what we think and do.Researchers also study the different types of cells in the brain, such as glial cells, which support neurons, to better understand diseases like Alzheimer's and Parkinson's. By digging into the molecular machinery inside cells — such as proteins and genes — scientists can figure out how neurons stay healthy and function properly. This research is key to understanding how our brain develops, adapts, and changes over time, and how things can go wrong in cases of disease or injury.

Conclusion-Molecular and cellular neuroscience helps us uncover the secrets of the brain at the most fundamental level. By studying neurons, glial cells, and the molecular processes that make them tick, we can better understand brain diseases and work toward better treatments. This field opens up exciting new possibilities for understanding the brain's incredible complexity.

Keywords: Cellular neuroscience**,** brain, nervous system

Neurodegenerative Diseases: The Degeneration Mechanisms and Therapies

Asheesh Kumar Maurya[1], Abhishek Singh[*2]
[1]Integral University, Lucknow, Uttar Pradesh
[2]Sherwood College Of Pharmacy, Barabanki, Uttar Pradesh, 225001, India
[*]abhisheksinghd1999@gmail.com

Abstract

Aging is a significant risk factor for most primary neurodegenerative diseases, as age-related changes in brain biology increase susceptibility to neurodegeneration. While toxic protein aggregates and misfolded proteins are well-documented contributors to these disorders, additional aging-associated mechanisms, including epigenetic alterations, mitochondrial dysfunction, and inflammation, also play crucial roles in pathogenesis. Approximately 80% of neurodegenerative diseases have a genetic basis, with numerous genetic mutations, epigenetic modifications (e.g., DNA methylation, histone modification, chromatin remodeling, miRNA dysregulation), and environmental factors influencing disease progression. Advances in genomic sequencing and epigenomic tools have led to the identification of predictive biomarkers, enabling early diagnosis and facilitating the development of preventive strategies. Moreover, the emerging fields of pharmacogenetics and pharmacoepigenomics now allow for personalized therapies that consider an individual's unique genetic and epigenetic landscape, improving treatment efficacy and patient outcomes. This review delves into the impact of genetic and epigenetic variations on the pharmacokinetics and pharmacodynamics of drugs used to treat neurodegenerative diseases, highlighting the complexity of these disorders and variability in patient responses to therapy. Key genetic variants associated with increased risk for specific neurodegenerative conditions are examined for their modulatory effects on neuronal structure, gene expression, autophagy, cellular metabolism, and neuroinflammation. We further discuss therapeutic strategies aimed at normalizing these disrupted pathways to enhance resilience against neurotoxic proteins. Beyond traditional treatments targeting protein aggregates, innovative pharmacological approaches, potentially used in combination therapies, offer promising avenues for restoring neurological function in neurodegenerative disease patients.

Keywords: Neurodegeneration, Epigenome, Pharmacoepigenomics, Pharmacogenetics

Anxiety Disorders: Advances in Understanding, Diagnosis, and Management

Pallavi Kasaudhana[1], *Srishti Awasthib[2], Saumya Awasthic[3], Archana[4]
[1]Saroj Institute of Technology and Management, Ahimamau Lucknow, 226002
[2]Institute of Pharmaceutical Sciences and Research, In Unnao
[3]Institute of Pharmacy, Shri Ramswaroop Memorial University Barabanki Deva Road, Lucknow, 225003
archanak729@gmail.com, guptapallavi229@gmail.com

Abstract

Anxiety disorders are among the most common mental health conditions, affecting millions worldwide. Characterized by persistent and excessive worry, fear, and physiological arousal, these disorders significantly impact an individual's quality of life and daily functioning. Anxiety disorders encompass various subtypes, including generalized anxiety disorder (GAD), panic disorder, social anxiety disorder, and specific phobias, each with unique features and diagnostic criteria. While the causes of anxiety disorders are complex and multifaceted, involving a combination of genetic, environmental, and psychological factors, advancements in neuroimaging and genetics have deepened our understanding of their underlying mechanisms. Effective treatment options, such as cognitive-behavioral therapy (CBT), pharmacotherapy, and mindfulness-based approaches, have shown efficacy in managing symptoms and improving outcomes. Nevertheless, barriers such as stigma, accessibility of care, and individual treatment response variability remain challenges. This paper reviews the current understanding of anxiety disorders, examining etiological theories, diagnostic approaches, and treatment modalities, highlighting areas for future research in improving intervention and management strategies.

Keywords : Panic disorder, genetic, psychological factors, cognitive-behavioral

A Overview on phenytoin sodium

Nidhi Pandey
BMS College of pharmacy, Tiloi -Amethi

Abstract

The drug phenytoin Sodium is used for control certain type of seizures and to treat and prevent seizures that may begin during or after surgery to the brain or nervous system. It is an anticonvulsant. It is sold under the brand name Dilantin among others. It is works by the inhibition or block of Na+ Sodium channels, which is responsible for the initiation and propagation of action potentials in neurons. Phenytoin decreases the synaptic release of glutamate and enhance the release of GABA gamma-aminobutyric acid. There are several advantages of phenytoin drug like- Effective for seizure control, long lasting, variety of formulation, relatively low cost, Effective in status epilepticus. Usually, you will take phenytoin once or twice a day. You can take it with or without food The major side effect of phenytoin is-Headache, nausea, vomiting, constipation, dizziness, feeling of spinning sometimes these medications can improve your mood, others can worsen it. Chronic intake of phenytoin sodium can lead to megaloblastic anemia due to folate deficiency, peripheral neuropathy or lupus - like syndrome.

Keyword: GABA, Seizure, phenytoin sodium

A review on palsy neurological disorder: Pathogenesis and clinical management

Prasar Kumar
G.C.R.G. College of Pharmacy, Parvatpur, Uttar Pradesh- 271835
prasar.11@gmail.com

Abstract

Several disorders that impact mobility are known as palsy disorders, including cerebral palsy, Bell's palsy, and progressive supranuclear palsy (PSP). In Europe, the annual prevalence and incidence rates for Parkinson's disease are predicted to be 108-257/100,000 and 11-19/100,000, respectively. Age, male gender, and several environmental factors are also potential risk factors. The etiology of the condition in most people is unknown, but various genetic factors have been identified. Although familial forms of Parkinson's disease account for only 5%-15% of cases, studies on these families have provided interesting insights into the genetics and pathogenesis of the disease, allowing the identification of genes involved in its pathogenesis and providing critical insights into disease mechanisms. Tremor, rigidity, bradykinesia/akinesia, and postural instability are the primary motor symptoms of Parkinson's disease, but additional motor and non-motor symptoms may also be present.

Keywords: Bell's palsy, cerebral palsy, environmental factors and bradykinesia/akinesia

Formulation And Development of Zingiber Officinale-Piperine Loaded S-Snedds For The Treatment Of Alzhemier's Disease

Rishabh Chaurasiya[1*], Kakli Rai[2]

[1*]Assistant Professor, Azad College of Pharmacy, Miyapur, Bansdeva, Azamgarh

[2]Assistant Professor, Pharmacy College, Azamgarh

shakehandrishabh@gmail.com

Abstract

The main aim of this research work is to formulate *Zingiber officinale* active compound and the piperine in combination to form Solid- self- nano emulsifying drug delivery system for the conversion of poor bioavailability and permeability into the enhanced bioavailability and permeability for the treatment of Alzheimer's disease. The self-nano emulsifying drug delivery system is a novel drug delivery system which is used for increasing the bioavailability and permeability of a drug which is orally have poor bioavailability and permeability. SNEDDS can be exist in liquid and solid form, due to which they can be filled in soft gelatin capsules and in hard gelatin capsules. By the gradual destruction the nerve cells and synapses all over the brain, leads to a irretrievable, multifactorial and progressive neurodegenerative disease, known as Alzheimer's disease. We have very well-known phytochemicals such as Piperine and *Zingiber officinale* containing phytochemicals. These are the traditional medicines and widely used foods from the ancient times. There are many researches that claims their therapeutics efficacy in the treatment of Alzheimer's diseases. The phytochemicals of *Zingiber officinale* claims to have poor oral bioavailability and permeability. In the recent advancement of pharmaceutical field, the SNEDDS (Self- nano-emulsifying drug delivery system) were used to enhance the solubility and oral absorption lipophilic drugs. The SNEDDS are the mixture of surfactant, co-surfactant and oil. In the inner layer of a small globule of oil which contains the drug in a dissolve state inside it and having a hydrophilic head group which is responsible for the maintainance of drug. By using this SNEDDS technique the poor bioavailability of phytochemicals of of *Zingiber officinale* can be increased and the combination of *Zingiber officinale* active compound and piperine will be used for the treatment of Alzheimer's disease.

Key words: Alzheimer's disease, Bioavailability, Piperine, SNEDDS, *Zingiber officinale*

Next-Generation Neurotherapeutics: Blood-Brain Barrier-on-a-Chip for Enhanced Drug Delivery

Seema Yadav, Narahari Narayan Palei*
Amity Institute of Pharmacy, Lucknow, Amity University Uttar Pradesh, Sector 125, Noida, 201313, India
nnpalei@lko.amity.edu

Abstract

The blood-brain barrier (BBB) serves as a highly selective interface, protecting the central nervous system (CNS) but presenting a formidable challenge in neurotherapeutics by restricting the passage of most pharmacological agents. Recent advances in BBB-on-a-chip technology offer a transformative approach to circumvent this limitation, enabling precise, targeted delivery of therapeutic agents directly to the CNS. This micro-engineered platform replicates key physiological features of the human BBB, providing unprecedented insights into its complex structure and function in health and disease. Leveraging organ-on-chip technology, these models facilitate high-throughput screening of drug candidates and hold promise for personalized medicine applications by accommodating patient-derived cells, thereby mimicking individual pathophysiology with high fidelity. The integration of BBB-on-a-chip with neurotherapeutic strategies stands to accelerate drug discovery, optimize delivery vectors, and reduce the dependency on animal models, marking a pivotal advancement in CNS drug development. This review synthesizes current advancements in BBB-on-a-chip technology, evaluates its potential in precision neurotherapeutics, and discusses future directions in bridging the gap between experimental therapeutics and clinical application in the treatment of neurological disorders.

Keywords: Blood-brain barrier (BBB), BBB-on-a-chip, Neurotherapeutics, Organ-on-chip technology.

Recent Advanced techniques used in developmental Neuroscience: an Overview

Pooja Malik*, Prashant Upadhyay, Sushil Kumar, Phushpendra sharma
Department of Pharmaceutics, School of Pharmaceutical Sciences, IFTM University, Moradabad, India, 244102
malikpooja094@gmail.com

Abstract

In addition to being essentially multidisciplinary, contemporary developmental neuroscience research makes extensive use of sophisticated analytical methods. These studies usually use computationally intensive approaches, such as sophisticated methods like machine learning, in conjunction with animal models and imaging of human patient populations, in order to advance our knowledge of brain development. We have published related manuscripts on this special topic that use sophisticated analytical techniques to examine several significant developmental conditions. In addition to being essentially multidisciplinary, contemporary developmental neuroscience research makes extensive use of sophisticated analytical methods. These studies usually use computationally intensive approaches, such as sophisticated methods like machine learning, in conjunction with animal models and imaging of human patient populations, to enhance our comprehension of brain development. We have published linked publications on several significant developmental problems in this unique topic, all of which involve sophisticated analytical methods. Our collection includes a manuscript on the application of machine learning to neurological magnetic resonance imaging (MRI) examinations in a schizophrenia population, along with public domain software to help researchers apply machine learning to their analyses. Machine learning is becoming a powerful technique for analysing neurological data. In order to detect movement disorders, a neural network model was also created to uncover the motoric consequences linked to nicotine consumption. There are other sophisticated techniques for objectively assessing brain development, such as automated software for identifying biomarkers that may be of interest. A possible link between hyperconnectivity and the intensity of autism symptoms has been found using connectomics, a sophisticated computational analysis method that maps the main fibre lines throughout the brain. We may be able to better comprehend neurological development with the help of sophisticated analytical approaches. For instance, the machine learning study reported on a number of brain regions with potentially aberrant development, and the examination of a population with schizophrenia showed associations between patient depression and the thickness of the right medial orbitofrontal cortex.

Keywords: MRI (Magnetic Resonance Imaging), Neuroscience, depression, Autism

The Role of Big Data in Advancing Neurological Care and Neuroscience Research: Opportunities, Challenges, and Future Directions

*Srishti Awasthia[1], Pallavi Kasaudhanb[2], Saumya Awasthic[3]
[1]Institute of Pharmaceutical Sciences and Research, In Unnao,
[2]Saroj Institute of technology and management, Ahimamau Lucknow, 226002
[3]Institute of Pharmacy, Shri Ramswaroop Memorial University Barabanki deva road , Lucknow, 225003
srishtiawasthi50@gmail.com

Abstract

Globally, the prevalence of neurological illnesses is rising, which raises healthcare expenses that lowers individual quality of life. Big Data has begun to change the fields of neurology and neuroscience in the last few years. To solve complicated computational challenges that need the use of ever-more-powerful computer resources, scientists and clinicians are forming international alliances, merging disparate databases on a vast scale, and working together. There are now more opportunities to create novel therapies for neurological conditions because to the Big Data revolution. In this research, we examine the effects of large amounts of data on neurologic patient care, using examples from a wide range of fields, such as connectomics, Alzheimer's disease, stroke, Pain, Parkinson's disease, depression, and addiction. We give an outline of the studies and Big Data-using approaches used in each field, together with an analysis of their present drawbacks and technological difficulties. This review's objective is to encourage the application of neuroscience to tourist studies. It initially examines the benefits of integrating social science and neuroscience, as well as the applicability and utility of applying neuroscience to the travel industry.

Its full potential in many fields is still untapped, despite the potential benefits. Finally, we offer suggestions for further study targeted at maximizing the application of large quantities of data Using neurology and neuroscientist to enhance patient outcomes.

Keywords: neuroscience, Neurological Care, Parkinson's disease

Evaluation of Antidepressant Activity of *Nyctanthes arbor-tristis* Stem Extracts in Experimental Models

Swapnil KumarYadav
swapnilniteshyadav@gmail.com

Abstract

Background: Nyctanthes arbor-tristis (Night-flowering Jasmine) has been used in traditional medicine for its purported antidepressant properties. This study aimed to investigate the antidepressant activity of Nyctanthes arbor-tristis stem extracts.

Methods: Stem extracts were prepared using methanol, ethanol, and aqueous solvents. The extracts were evaluated for antidepressant activity using in vitro (monoamine oxidase inhibition assay) and in vivo (forced swim test, tail suspension test, and locomotor activity test) models.

Results: The methanolic extract exhibited significant monoamine oxidase inhibition (IC50 = 23.4 µg/mL). In vivo studies revealed dose-dependent reductions in immobility time in the forced swim test (50-200 mg/kg) and tail suspension test (25-100 mg/kg). Locomotor activity was increased at 50-100 mg/kg.

Conclusion: Nyctanthes arbor-tristis stem extracts demonstrated significant antidepressant activity, supporting its traditional use. The methanolic extract's potent monoamine oxidase inhibition and in vivo efficacy suggest a potential mechanism of action. Further studies are warranted to isolate active compounds and explore clinical applications.

Keywords: Antidepressant Activity, Nyctanthes arbor-tristis, Stem Extracts

Synthesis and Biological Evaluation of Some Novel Thioxoquinazolinone Derivatives as an Anti-oxidant and motor coordination Agents

Tanu Sharma *, P. K. Singour
Department of Pharmaceutical Chemistry, VNS Group of Institutions-Faculty of Pharmacy, Neelbud, Bhopal (M.P.)
sharma.tanu128@gmail.com

Abstract

1. **Brief Introduction:** Reactive oxygen species (ROS) such as singlet oxygen (O_2) superoxide anion (O_2^-) and hydrogen peroxide (H_2O_2) are often generated as the oxidation product of biological reactions or from exogenous factor. These reactive species exert oxidative damaging effects by bombarding with living cells including DNA. Oxidative DNA damage has been implied as a cause of serious diseases. Antioxidants are first line of defense against free radicals. Thioxoquinazolinone (Quinazolinone derivatives) have sustained to attract a interest for an extensive time due to their diverse pharmacological activities like anti-parkinsonism, anticonvulsant, hypoglycemic, anti-HIV, antimicrobial, anticancer analgesic and antioxidant activity.

2. Method(s): A series of 5 compounds (TS-1, TS-2, TS-3, TS-4, TS-5) of novel Thioxoquinazolinone derivatives were synthesized. The structures of the compounds have been confirmed by spectral analysis (IR, UV and NMR). Antioxidant activity was done by *In-vitro* method by using DPPH free radical scavenging activity.

3. Key Findings(s): As total 5 compounds were synthesized and among them the highest scavenger activity was observed in compound **TS-3** is probably due to the presence of hydroxyl group at para position.

4. Conclusion: All the newly synthesized compounds had significant antioxidant activity. Compound **TS-3** showed promising activity due to present of electron withdrawing group, while the other compounds have moderate activity. The proposed work is to effort towards the development and identification of novel molecules as antioxidant agents by the synthesis of some novel Thixoquinazolinone derivatives with improved biological activity.

Keywords*:* ROS; Thioxoquinazolinone; Antioxidant activity.

Neuroinflammation and Neurodegeneration: A Complex Interplay in Age-Related Neural Disorders

Tanzeela Siddiqui, Ayeza Sarwar Kalam, Divyadarshan Lohani, Asim Rahman1
Rufaida Wasim*
Department of Pharmacology, Faculty of Pharmacy, Lucknow, Integral University, U.P., India-226026
rufaidaw@iul.ac.in

Abstract

The rising prevalence of neurodegenerative diseases (ND), particularly in elderly populations, presents a significant healthcare challenge. This article examines the critical relationship between neuroinflammation and neurodegeneration, focusing on major disorders such as Alzheimer's disease (AD), Parkinson's disease (PD), and Multiple Sclerosis (MS). Recent evidence suggests that neuroinflammatory processes play a pivotal role in the pathogenesis of these conditions, extending beyond the traditional understanding of misfolded protein aggregates. The inflammatory response involves both innate and adaptive immunity, mediated through complex interactions between microglia, astrocytes, and peripheral immune cells. Inflammatory mediators, including pro-inflammatory cytokines (IL-1β, IL-6, TNF-α), chemokines (CCL2, CCL5), and other factors such as matrix metalloproteinases and reactive oxygen species (ROS), contribute to a self-perpetuating cycle of neuroinflammation and neuronal damage. Notably, compromising blood-brain barrier integrity allows peripheral immune cells and inflammatory mediators to infiltrate the central nervous system, potentially exacerbating neurodegeneration. This is particularly relevant in conditions such as AD, where patients show increased vulnerability to cognitive decline. While inflammation appears crucial in both disease onset and progression, therapeutic application of anti-inflammatory agents has shown limited success, highlighting the complexity of these disorders. This Abstract summarizes the current understanding of neuroinflammatory mechanisms in neurodegeneration, examines the roles of various cellular and molecular players, and discusses the implications for potential therapeutic strategies. Understanding these mechanisms is crucial for developing effective interventions for neurodegenerative diseases, which are projected to affect over 135 million people globally by 2050.

Keywords: Blood-brain barrier, Cytokines, Immune response, Microglia, Neural disorders Protein aggregates.

Unraveling the Mysteries of Neuroplasticity: Implications for CNS Repair and Regeneration

Harsh Kumar Singh
Sanskriti University, Mathura, Uttar Pradesh
harshkumarsingh7376@gmail.com

Abstract

Neuroplasticity, also known as neural plasticity or brain plasticity, is a process that involves adaptive structural and functional changes to the brain . Although the adult CNS is traditionally seen as having limited regenerative capacity, recent discoveries have revealed that neuroplasticity plays a key role in the recovery process following events like stroke, traumatic brain injury (TBI), and spinal cord injury (SCI). Despite these insights, the regenerative potential of the adult CNS is often limited by inhibitory factors such as glial scarring and myelin-associated inhibitors. To overcome these barriers, new therapeutic approaches, including gene therapy, stem cell transplantation, and pharmacological agents targeting these inhibitory molecules, are being explored. Stem cell therapies have shown promise in animal models of spinal cord injury (SCI) and stroke, with the potential to replace lost neurons and promote functional recovery. Moreover, non-invasive techniques such as transcranial magnetic stimulation (TMS) are gaining attention for their ability to modulate neuroplasticity and promote recovery. Although these therapies hold potential, further studies are needed to optimize their efficacy and determine their long-term effects in human clinical settings. In summary, while significant strides have been made in understanding the mechanisms of neuroplasticity, further exploration is necessary to fully exploit its potential for CNS repair and regeneration. Although these therapies hold potential, further studies are needed to optimize their efficacy and determine their long-term effects in human clinical settings. In summary, while significant strides have been made in understanding the mechanisms of neuroplasticity, further exploration is necessary to fully exploit its potential for CNS repair and regeneration. In conclusion, neuroplasticity offers immense promise for CNS repair, and further research is critical to fully harness its potential in treating a range of neurological conditions.

Keywords- Traumatic brain injury (TBI), Transcranial magnetic stimulation (TMS), Spinal cord injury (SCI), Myelin-associated inhibitors,

Multiple Sclerosis Treatment in Neuroscience

Somesh Shriwas,
BMS College of Pharmacy
someshshriwas201@gmail.com

ABSTRACT

Multiple sclerosis is a neurological autoimmune disorder. Immune system which normally protects us from various pathogens, viruses, bacteria mistakenly attacks shelf healthy cells. In Multiple sclerosis, the immune system attacks myelin of neurons. Myelin makes a protective covering called myelin sheath made up of protein and fatty acids. Growth in disease causes shrinkage of cerebral cortex, this process is known as **cortical atrophy**. Cortical atrophy may lead to several neurodegenerative disorders . Symptoms of this often include vision problems, such as optic neuritis, mental or physical fatigue, bladder control problems, cognitive changes, problems in concentration, multitasking. With the help of neuroscience and its techniques we step ahead in the diagnosis and treatment of multiple sclerosis. MS can be detected by the help of techniques like MRI(it detects lesions in the brain and spinal cord), Lumbar puncture(analyzes cerebrospinal fluid for specific marker),etc.Disease Modifying Therapies (DMTs) can help to manage symptoms, reduces relapse frequencies , and slows down disease growth. To treat acute relapses often high dose steroids are used. Spasticity is treated with drugs like Tizanidine and Baclofen . **Exosomes** are small vesicles secreted by cells that carry RNA, lipid and protein . these naturally secreted nanoparticles have the potential to deliver the therapeutic molecules on affected brain regions and help to repair damaged tissue and regulate immune function. **Optogenetics** , is a cutting-edge technology that uses light to control genetically modified neurons**.**

Keywords: Neuroscience, Exosomes, Optogenetics, cortical atrophy

Phyto-pharmacological evaluation of *Acacia nilotica* leaves extract for peptic ulcer treatment

Sujeet Kumar Yadav
sujeetkyadav2003@gmail.com

Abstract

In the study, Acacia nilotica leaves extract (ANLE) which is hydroalcoholic was prepared in order to investigate the anti-peptic ulcer activity utilising model of peptic ulcers caused by Pylorus ligation method in Wistar rats. To the extract, TLC & preliminary phytochemical screening were used. Wistar rats were orally administered hydroalcoholic extract & investigated for preventive effect on peptic ulcer & compared their effect with standard drug (Ranitidine 20 mg/kg p.o.) of peptic ulcer prevention for 4 hr. study. Over the course of 4 hr., various parameters were measured including UI, GV, FA, TA & pH. After complete the procedure animals were sacrificed with the help of cervical dislocation method & the histopathological analysis of stomach tissue was investigated. The study demonstrates the role of the leaves of the Acacia nilotica plant play in the entire model for anti-peptic ulcer activity. The extracts appear to hold promise for the creation of phytomedicine with anti-peptic ulcer effects & the study provides the way for further investigation into the elements of the extracts that mediate peptic ulcer prevention.

Keywords: Acacia nilotica, Peptic ulcer, Peptic ulcer caused by Pylorus ligation model. Anti-peptic ulcer, Hydroalcoholic extract of Acacia nilotica.

Recent advances in neurotechnology with broad potential for neuroscience research. A Systemic Review

Verma Yash[1], Singh Pragti[2]
[1]TRC Mahavidyalaya Department of Pharmacy, Vasudev Nagar Satrikh Barabanki (Uttar Pradesh)
[2]Institute of Pharmacy, Shri Ramswaroop Memorial University, Lucknow
yashverma6511@gmail.com, pragtithakur25@gmail.com

Abstract

"Neuroscience is the field of study that endeavors to make sense of such diverse questions…The exchange of information among a half-dozen branches of science and the clinical practice of mental health have shaped a new scientific approach to the study of the brain." Interest in deciphering the fundamental mechanisms and processes of the human mind represents a central driving force in modern neuroscience research. Activities in support of this goal rely on advanced methodologies and engineering systems that are capable of interrogating and stimulating neural pathways, from single cells in small networks to interconnections that span the entire brain. Recent research establishes the foundations for a broad range of creative neurotechnology that enable unique modes of operation in this context. This review focuses on those systems with proven utility in animal model studies and with levels of technical maturity that suggest a potential for broad deployment to the neuroscience community in the relatively near future. We include a brief summary of existing and emerging neuroscience techniques, as background for a primary focus on device technologies that address associated opportunities in electrical, optical and microfluidic neural interfaces, some with multimodal capabilities. Examples of the use of these technologies in recent neuroscience studies illustrate their practical value. The vibrancy of the engineering science associated with these platforms, the interdisciplinary nature of this field of research and its relevance to grand challenges in the treatment of neurological disorders motivate continued growth of this area of study.

Keywords: Neuroscience, Neurotechnology, Neural Interfaces, Brain Research, Neuroengineering.

Cognitive Impairment in Traumatic Brain Injury: A Neuropsychological Perspective

Dr. Ankur Singh
SOS School of Pharmacy, IFTM University, Moradabad, 244102, India
ankursingh108@gmail.com

Abstract

Traumatic brain injury (TBI) often results in cognitive impairments that significantly affect quality of life and long-term functional outcomes. This research examines cognitive impairment following TBI from a neuropsychological perspective, focusing on the mechanisms, assessment, and rehabilitation of cognitive deficits. Through a systematic review of recent neuropsychological studies, we explore how TBI impacts key cognitive functions, including attention, memory, executive function, and processing speed. This paper also highlights the role of various severity levels, injury mechanisms, and patient demographics in shaping cognitive outcomes post-TBI. Neuroimaging and neurophysiological findings are discussed to elucidate the neural correlates of these impairments. Additionally, we assess current therapeutic approaches, emphasizing evidence-based interventions, including cognitive rehabilitation and pharmacological treatments, to mitigate cognitive deficits. The findings contribute to a nuanced understanding of the cognitive sequelae associated with TBI and underscore the need for personalized, integrative rehabilitation strategies to improve outcomes.

Keywords: Traumatic Brain Injury (TBI), Cognitive Impairment, Neuropsychology, Executive Function, Memory Deficits, Cognitive Rehabilitation.

Diagnostics approaches of Neurological Disorders Using Artificial Intelligence in Neuroscience

Ajeet Singh[1] Dr. Neelanchal Trivedi[2]

[1]Institutes of Pharmacy, Shree Ramswaroop Memorial University, Lucknow Deva Road, Utter, Pradesh

[2] Department of Pharmacy, Invertis University, Bareilly Utter Pradesh

Abstracts

Artificial intelligence (AI) represents a domain within computer science focused on emulating human intelligence through machines, enabling these machines to develop problem-solving and decision-making abilities skin to those of the human brain. The understanding of biological neural networks has facilitated the creation of intricate deep neural network architectures, which are instrumental in a variety of applications, including text processing, speech recognition, and object detection. Furthermore, insights from neuroscience contribute to the validation of existing AI models. Recent developments in the application of AI in neuro-oncology, particularly concerning gliomas—brain tumors that pose a significant global health challenge—have been noteworthy. AI has introduced groundbreaking innovations in the management of brain tumors, leveraging imaging, histopathological, and genomic methodologies for effective detection, classification, outcome prediction, and treatment planning. When evaluating its impact on all aspects of malignant brain tumor management diagnosis, prognosis, and therapy—AI models demonstrate superior accuracy and specificity compared to human assessments. The spectrum of AI techniques, ranging from traditional machine learning to deep learning, underscores both current applications and the challenges faced. This discussion highlights recent progress in four key areas where the interplay between neuroscience and AI has yielded significant advancements: (1) AI models of working memory, (2) AI visual processing, (3) AI analysis of extensive neuroscience datasets, and (4) computational psychiatry. Future research avenues appear promising, particularly in multimodal data integration, generative AI, large medical language models, precise tumor delineation and characterization, and the pursuit of equity in addressing racial and gender disparities. The emphasis on adaptive personalized treatment strategies is also crucial for enhancing clinical outcomes.

Keywords:- Artificial intelligence, Brain tumors, Computational psychiatry, Neural imaging Neuroscience; Visual processing.

Synthesis and Biological Evaluation of 1,4-Dihydropyridine Derivatives as Anti-inflammatory Agents

Raksha Vishwakarma, Arun Kumar Rai, Megha Mishra*, P.K. Singour
VNS Group of Institutions-Faculty of Pharmacy, Neelbud, Bhopal (M.P.)
megham.pharma@gmail.com

Abstract

The novel series of 1,4-dihydropyridine derivatives were designed by using SWISS ADME,SWISS Target Prediction and Molecular docking study. These studies revealed that designed compounds have drug likeliness property and maximum COX-II receptor binding activity. The selected six best derivatives of 1,4-dihydropyridine were synthesised by substituting aromatic benzaldehyde with ethyl acetoacetate. The structural elucidation was performed by using UV,IR and 1H NMR spectroscopy.The biological evaluations of all derivatives were performed by paw edema model in rats. The order of anti-inflammatory activity of synthesized compounds is in the order of 3d>3b>3e>3c>3a>3f. Compound 3d showed maximum activity as compared to other compound because of the electron withdrawing methoxy group and electron donating group chlorine present in the 1,4 dihydropyridine derivatives. These both groups are responsible for increasing the anti-inflammatory effect in rats.

Keywords: Inflammation; Dihydropyridine; Synthesis, Anti-inflammatory Activity, Swiss Prediction.

A Review on Phytochemical Properties and CNS Stimulant of Golden Roots

Shubham Goutam *, Akansha Barnawal , Ritika Singh , Amartya Dwivedi , Amrish Mishra
Institute Of Pharmacy, Shri Ramswaroop Memorial University deva road, Barabanki 225003
Goutamshubham123123@gmail.com

Abstract

Golden root (Rhodiolarosea L.), also known as roseroot or arctic root is an herbaceous perennial plant from the Crassulaceae family. It grows in the wild in cold climates in North America, Asia, and Europe, particularly on rocky terrains like mountains and sea cliffs. Nonetheless, the threat of extinction brought on by rising demand and widespread wild collection has aided in the growth of this plant's crop production in numerous nations, including Poland. From ancient times, the underground parts of R. rosea, i.e. Traditionally, roots and rhizomes have been used to improve mental and physical performance during work, illness, and recovery; to protect against high-altitude sickness; to relieve anxiety, exhaustion, sadness, and hysteria; and to stimulate the nervous system and cognitive functions.

In addition, they have also been applied in the treatment of heart diseases, headaches, back pain, diarrhea, kidney stones, swellings, and skin disorders .The parts which used in drug formulation from this plant is rhizome buds, leaf nodes, stem and radix.The presence of six distinct groups of chemical compounds: **phenyl propanoids** (rosavin, rosin, and rosarin), **phenylethanol** derivatives (salidroside and tyrosol), **flavonoids** (rhodiolin, rhodionin, rodiosin, acetylrodalgin, and tricin), **monoterpernes** (rosiridol and rosaridin), **triterpenes** (daucosterol and beta-sitosterol), and **phenolic acids** (chlorogenic, **hydroxycinnamic**, and gallic acids). Rhodiolarosea is a fleshy plant that ranges in height from 5 to 40 centimeters (2.0 to 15.7 inches), with several stems emerging from a short, scaly base. Approximately 1 to 3.5 millimeters (0.039 to 0.138 inches) long, with four sepals and four petals, the flowers are yellow to greenish yellow in hue, occasionally tinged with crimson, and bloom in the summer. The same thick root may give rise to many shoots that range in length from 5 to 35 centimeters. It has been shown to improve physical stamina, provide protection against high altitude sickness, treat depression, and lessen edema and problems of the neurological system and gastrointestinal tract. Rhodiola capsule shows anti-depressive potency in patients with depression disorder when administered in dosages of either 0.3 or 0.6 g/day over a 12-week period.

Keywords: Anti-depressive Rhodiolarosea, flavonoids, Crassulaceae

A Review on Traditional Application and Neuroprotective uses of *Jatamansi*

Shubham Goutam *, Akansha Barnawal , Ritika Singh , Amartya Dwivedi , Amrish Mishra
Institute Of Pharmacy, Shri Ramswaroop Memorial University deva road, Barabanki 225003
Goutamshubham123123@gmail.com

Abstract

Jatamansi (Nardostachys jatamansi) is found in the Himalayan region, particularly in the northern states of India like Uttarakhand, Himachal Pradesh, and Jammu & Kashmir. It also grows in parts of Nepal, Bhutan, and Tibet. It is a Himalayan herb traditionally used for its calming and medicinal properties. It helps reduce stress, anxiety, and insomnia by balancing neurotransmitters like serotonin and GABA. Its sedative effects promote relaxation and restful sleep.

In addition to mental health benefits, Jatamansi has antimicrobial and anti-ulcer effects. It has been used to treat conditions like epilepsy and hysteria. It is also used in the treatment of **CNS depressant, Anti-anxiety , Anti-psychotic.**The active compounds, such as sesquiterpenoids and valeranone, contribute to its therapeutic properties. Jatamansi demonstrates significant neuropharmacological effects, particularly in enhancing cognitive function and protecting the nervous system. It exhibits nootropic activity, improving learning and memory, potentially aiding in the treatment of dementia and age-related cognitive decline. Studies also highlight its antidepressant and anticonvulsant properties, showing its ability to reduce depressive symptoms and increase seizure thresholds. Furthermore, Jatamansi has antioxidant and stress-relieving effects, contributing to its neuroprotective benefits. jatamansi is rich in a wide range of bioactive chemical constituents. Key compounds include flavonoids such as 6-methylapigenin and hesperidin, which exhibit antioxidant and sedative properties, and valepotriates like valtrate and acevaltrate, known for their neuroprotective and anti-inflammatory effects. The plant also contains sesquiterpenoids (valeranone, bakkenolides) with antidepressant and neuroprotective actions, and essential oils (patchouli alcohol, maaliol), providing antioxidant and analgesic benefits. Additionally, phenolic compounds (tannins, lignans), coumarins, triterpenes (betulinic acid), and alkaloids (valeranidine) enhance the plant's therapeutic potential in treating inflammation, neurodegeneration, and anxiety. It works on the central nervous system (CNS) by enhancing the activity of GABA (gamma-aminobutyric acid), a neurotransmitter that inhibits excessive neuronal activity. This leads to its sedative, anxiolytic, and antidepressant effects. It helps alleviate anxiety, insomnia, mental fatigue, and stress by modulating neurotransmitter levels, particularly serotonin and GABA. Jatamansi has also shown neuroprotective properties, improving cognitive function, reducing forgetfulness, and potentially helping in conditions like Alzheimer's disease by reducing oxidative stress and lipid peroxidation in brain cells.

Keyword: Antimicrobial, Neuroprotective, GABA, Serotonin, Alzheimer's disease.

A Review of Medicinal properties of *Euphorbia plant* in the treatment of CNS Stimulant

Shubham Goutam *, Amrish mishra , Akanksha Barnawal ,
Amartya Dwivedi , Ritika Singh
Institute Of Pharmacy, Shri Ramswaroop Memorial University deva road, Barabanki 225003
goutamshubham123123@gmail.com

Abstract

The latex or sap of Euphorbia, a varied genus of flowering plants with therapeutic qualities, is frequently employed in medicine development. The diverse array of species, which includes both poisonous and decorative types, is a member of the Euphorbiaceae family of plants, which includes trees and annuals. There are roughly 2000 species in the kingdom of plants. Plants in the genus Euphorbia, which is a member of the Euphorbiaceae family, are referred to as the biological source of Euphorbia. The genus has a wide range of plant types, including succulents, herbs, and shrubs, some of which are medicinal or yield latex. Some species of Euphorbia were poisons or irritants, and others were used in traditional medicine to cure wounds, inflammation, and digestive problems. The earliest known use of Euphorbia plants was by ancient societies including the Greeks and Egyptians, who used them medicinally to cure stomach disorders, skin disorders, and warts.

Although many species were known to be toxic, several were also utilized in traditional medicine as purgatives and to treat tumors. Studies have demonstrated the neuropathic pain and central nervous system depressant properties of Euphorbia tirucalli. Euphorbia plants have been used medicinally and culturally for thousands of years; their latex can be both a source of healing and a possible threat. Enzymes like urease, HIV-1 reverse transcriptase, prolyl endopeptidase, and α-glycosidase were inhibited by a variety of diterpenoids with a myrsinane carbon structure.

They also showed analgesic and DNA-damaging effects. This review examines the chemistry and biological activity of many compounds that have been found from various Iranian Euphorbia species—diterpenoids that include myrsinane. Skeletons, tannins, flavonoids, alkanes, sterols, mono-, sesqui-, and triterpenoids, and latexes that irritate skin and promote the growth of tumors are all present in addition to their active ingredient.

Keywords: α-glycosidase, diterpenoids, Euphorbiaceae.

A Review of Medicinal Properties of Withania Somnifera in Neuological Disorder

Shubham Goutam *, Sahil Sharma , Manglesh Yadav , Praveen Singh , Aditya Srivastava , Niteesh Kumar , Nitesh Kumar

Institute of Pharmacy, Shri Ramswaroop Memorial University deva road, Barabanki 225003

Corresponding author: Shubham Goutam

goutamshubham123123@gmail.com

Abstract

Withania somnifera (Linn.) Dunal, family (Solanaceae) is an important medicinal herb widely found in Indian subcontinent and mostly consumed as a traditional ethnomedicinal herbal drug since ancient times throughout the South Asian countries and commonly called as ashwagandha, Indian ginseng andwinter cherry. The Geographical sources of this plant is grows wildly in all dry parts and subtropical India. It occurs in Madhya Pradesh, Uttar Pradesh, Punjab plains and North Western parts of India like Gujarat and Rajasthan. It is also found in Congo, South Africa, Egypt, Morocco, Jordan, Pakistan and Afghanistan. The primary components of ashwagandha are steroidal and alkaloids. Among the many alkaloids, the primary component is withanine. Isolated from roots are the two acyl steryl glucosides, Sitoidoside VII and Sitoindoside VIII. The leave contain steroidal lactones, which are commonly called as “withanolodes”. The therapeutic potential of Ashwagandha mainly owes from its reservoir of alkaloids (Isopelletierine0.2%-0.3%, Anaferine 0.2%-0.3%), steroidal lactones (withanolides 1%-2%) and saponins with an extra acyl group (sitoindosideVIIandVIII).WithaferinA(0.1%-0.3%)isanexceptionallypotent withanolide which is found in high concentrations in W. Somnifera plant extracts. It has long been utilized as a traditional Rasayana herb. This plant's traditional applications suggest that it has ameliorative (beneficial) qualities against a wide range of human medical ailments, including cancer, stress, and hypertension. Research has shown that Withania somnifera is particularly effective in treating a variety of neurological and psychological disorders, including attention deficit hyperactivity disorder, Parkinson's disease, and Alzheimer's disease. It is well known valuable adoptogen, nourishes nerve and tissues. Essential to increase energy. Additionally it reduces stress. It is an immune-modulatory agent.

Keywords: Wintercherry, Isopelletierine, Anaferine, Anti-stress, immune-modulatory agent.

A Review on Phytochemical Screening and CNS stimulant activity of Azadirachta indica

Nitesh Kumar, Niteesh Kumar, Shubham Goutam*, Pramod Chauhan
Institute of Pharmacy, Shri Ramswaroop Memorial University deva road, Barabanki 225003
goutamshubham123123@gmail.com

Abstract

Hindu mythology attributes the healing properties of the Neem tree to drops of heavenly nectar and Linksitsorigin to celestial beings. Every part of the Neem tree is utilized in Ayurvedic medicine, particularly the leaves, which address various ailments. Neem is a member of the mahogany family, Meliaceae, and it's called by the name of **Azadirachta indica, family:** Meliaceae.The Indian traditional medical system has made substantial use of Azadirachta indica, also known as neem, due to its many therapeutic benefits. Numerous chemically varied and structurally intricate phytochemicals, including limonoids, flavonoids, phenols, catechins, gallic acid, polyphenols, and nimbins, are found in neem. These phytochemicals possess many therapeutic activities, including antifeedant, anti-viral, anti-malarial, anti-bacterial, and properties. Others include antiulcer, spermicidal, anthelminthic, antidiabetic, anti-implantation, immunomodulating, insecticidal, antifeedant, and insect-repellant effects.

Medicinal Effects of Neem

Pharmacological Effects: Neem is used to treat dermatologic and gastrointestinal diseases, immune dysfunction, respiratory issues, and inflammatory infections due to compounds primarily found in its leaves and seeds:

Nimbin: Anti-inflammatory, antipyretic, anti-histamine, anti-fungal
Nimbidin: Anti-bacterial, anti-ulcer, analgesic, anti-fungal
Ninbidol: Anti-tubercular, anti-pyretic
Gedunin: Vasodilator, anti-malarial, anti-fungal
Sodium Nominate: Diuretic, spermicide, anti-arthritic
Quercetin: Anti-protozoal
Salannin& Azadirachtin: Insect repellents

The therapeutic qualities of Azadirachta indica components include:

Leaves: Leprosy, eye issues, intestinal worms, epistaxis, anorexia, biliousness, and skin ulcers are among the symptoms.
Barks: Alternative, analgesic, and fever-curing.
Fruits: diabetes, piles, intestinal wounds, urinary issues, and eye issues, among others.
Flowers: suppresses bile and gets rid of phlegm and intestinal worms.
Twings – cough, asthma, piles phantom tumor intestinal worms spermatorrhoea, diabetes, etc.
Gum- scabies wounds ulcer skin diseases.
Seeds- leprosy and intestinal worms.

Keywords:-Nimbin, Ninbidol**,** worms spermatorrhoea, anti-implantation, Immunomodulating.

A Review on Neurotransmission Disease of Phytochemical screening of *baheda (Belericmyrobalan)*

Ritika Singh , Shubham Goutam *
Institute Of Pharmacy, Shri Ramswaroop Memorial University deva road, Barabanki 225003
goutamshubham123123@gmail.com

Abstract

Terminalia bellirica belongs to the combretace family and is used in Aryuvedic medicine. The level and lower hill regions of South and Southeast Asia are where it is most prevalent.& West Bengal, Bihar, Orissa, and Chotanagarpur are also home to it. Terminalia bellirica has anti-inflammatory properties and many other health advantages, including improved skin and hair, respiratory and digestive health, wound healing, decreased liver risk, and improved eye health. Additionally, baheda increases the brain's levels of neurotransmitters, which are mediators that aid in signal transmission and have immunomodulatory effects. Terminalia bellirica are used for its bark, seeds, and fruits. Terminalia bellirica's heated potency is one of its adverse effects. The fruit also contains phytosterols, triterpenoids, glycosides, tannins, and phenolic compounds. Terminalia bellierica has been used since ancient times; the first known uses are mentioned in Ayurvedic texts written more than 2,000 years ago and in an Aryuvedic formulation known as triphala. For years, traditional medicine, particularly in India, has utilized it for a variety of health advantages. Gallo-tannic acid, glucoside (bellericanin), coloring matter, gallic acid, lignans, 7-hydroxy 3'4' (methylenedioxy) flavones, anolignan B. Phyllemblin, β-sitosterol, mannitol, glucose, fructose, rhamnose, ellagic acid, ethyl gallate, galloyl glucose, chebulagic acid, and tannins are among its constituents. Terminalia belerica fruits have therapeutic properties. Also, these have antipyretic, anthelmintic, astringent, and laxative properties. Many ailments, such as dyspepsia, asthma, piles, diarrhea, coughing, hoarseness of voice, hepatitis, bronchitis, eye diseases, and scorpion sting, can be cured by eating fruits. Most commonly, the fruit pulp is used to treat leprosy, dropsy, piles, and dysentery. Fruits are utilized to cure menstruation disorders in Khagrachari, and they primarily function as narcotic agents. The fruits contain a triterpenoid that has significantly increased their antimicrobial effect.

Keywords: Dysenteric- diarrhea, Anti-inflammatory, Ellagic acid, anolignan B.

A Review on Neuroprotective properties of *Waterches-nut*

Shubham Goutam* Pramod Chauhan
Institute of Pharmacy, Shri Ramswaroop Memorial University deva road, Barabanki 225003
goutamshubham123123@gmail.com

Abstract

"Water chestnut" or "singhara nuts" are also referred to as "karimbolam" or "vankottakkaya" in Malyalam, "singhara" or "simkhata" in Hindi, and "karimbolam" in English. The Subfamily Rosidae, Class Magnoliopsida, Subclass Rosida, Division Magnoliophyta, Request Myrtales, and Trapaceae family all include Trapa natans L. The water chestnut (Trapanatans L.), an annual floating-leaved aquatic plant, grows in rivers, lakes, ponds, estuaries, and temperate and tropical freshwater wetlands. Water chestnut-producing hydrophytes have the potential to provide a dependable food source, especially in wasteland regions that are prone to flooding. It is abundant in vital nutrients and minerals. Water chestnuts are indigenous to several islands in the Indian and Pacific oceans, as well as Southeast Asia, Southern China, Taiwan, Australia, and Africa. The corm, or bulb, is taken when it becomes dark brown. They are frequently used in Asian recipes like chop suey, stir-fries, curries, and salads because of their crisp, white meat, which may be eaten raw or cooked. Originating in Africa and Eurasia, the water chestnut's enormous, nutrient-dense seed has been collected extensively since the Neolithic and is presently farmed for a variety of purposes, including its high nutritional content and low-calorie content. Water chestnuts are a great source of fiber and may help with blood cholesterol reduction, neuroprotection, blood sugar regulation, bowel movement promotion, and gut health. Furthermore, the majority of the calories in water chestnuts come from carbohydrates. Uncooked water chestnuts are 74% water; therefore they are frequently low in calories even though they are high in fiber, potassium, manganese, copper, vitamin B6, and riboflavin. Trapa natans is one of the most important medicinal plants in Indian Ayurveda because it is used to treat gastrointestinal issues, genitourinary system abnormalities, and liver, kidney, and spleen disorders.

Keywords: Water chestnut, Hydrophytes, Anti-diabetic, neuro-protective, Riboflavin.

Innovative Neuroimaging Techniques for Studying Cognitive Processes

Deepti Dwivedi*[1], Mahima[2], Abhishek Kumar[3], Apurwa Sigh[4], Ankur Srivastava[5]
[1,2]Institute of Pharmacy, Dr Shakuntala Misra University Rehabilitation University Lucknow
[3,4]Institute of Pharmacy, Shri Ramswaroop Memorial University, Lucknow Dewa Road,Uttar Pradesh, India,225003
[5]Institute of Pharmacy, Dr. Ram Manohar Lohia Avadh University Ayodhya
deeptidwivedi303@gmail.com

Abstract

Recent developments in neuroimaging have revolutionized cognitive neuroscience by giving researchers the means to precisely study the complex mechanisms of the brain. By using methods like magnetoencephalography (MEG), positron emission tomography (PET), and functional magnetic resonance imaging (fMRI), researchers may record the brain activity and connection patterns that underlie a variety of cognitive processes, including as language processing, memory, and attention. This article offers a thorough analysis of these cutting-edge neuroimaging methods, highlighting their advantages and disadvantages for researching cognitive processes. More accurate analysis has been made possible by recent advancements in spatial and temporal resolution, and researchers can obtain supplementary data by integrating multimodal imaging (fMRI with MEG or PET) to provide a more comprehensive picture of brain activity. This talk covers pretreatment techniques such artifact elimination and signal-noise ratio enhancements, as well as novel image processing methods that increase data accuracy. Furthermore, ethical issues are examined, including participant permission, the implications of accidental results, and the management of sensitive neuroimaging data. Along with future research approaches that concentrate on improving analytical methods to increase the dependability of findings, challenges are also discussed, such as the necessity for large sample numbers and the difficulty of interpretation. In order to help diagnose and treat neurological and psychiatric diseases, this research demonstrates how advances in neuroimaging can promote a deeper knowledge of human cognition.

Keywords: Neuroimaging, Cognitive Processes, fMRI, Data Analysis

Advanced Machine Learning Models for Neuropsychological Data Analysis

Mahima[1], Deepti Dwivedi*[2], Ankur Srivastava[3] , Apurwa Singh[4], Abhishek Kumar[5]
[1,2]Institute of Pharmacy,Dr Shakuntala Misra University Rehabilitation University Lucknow
[3]Institute of Pharmacy, Dr. Ram Manohar Lohia Avadh University Ayodhya
[4,5]Institute of Pharmacy, Shri Ramswaroop Memorial University, Lucknow Dewa Road,Uttar Pradesh, India,225003
deeptidwivedi303@gmail.com

Abstract

In neuropsychology, machine learning (ML) has become essential, particularly for the processing and interpretation of high-dimensional, complicated data. The categorization and prediction of neurological and psychiatric disorders have been made easier by the ability to uncover significant patterns from neuropsychological datasets using sophisticated machine learning models, such as deep neural networks, support vector machines, and decision trees. The methods and uses of machine learning models in neuropsychological research are examined in this work, with an emphasis on improving algorithm performance for higher prediction accuracy. The study emphasizes methods that increase model efficiency and generalization across various patient populations, including feature selection, dimensionality reduction, and cross-validation.

These models provide insights into the course of disease and possible treatment outcomes by using real-world data, such as genetic markers and cognitive test results. The study also addresses the real-world difficulties with machine learning in neuropsychology, including interpretability issues, overfitting, and the constraints of limited datasets. Researchers are increasingly using ensemble learning models, which integrate many algorithms to provide more reliable predictions, regularization strategies, and data augmentation approaches to overcome these issues. By improving clinical decision-making, enabling early diagnosis and therapy customisation, and providing deeper insights into the underlying processes of complex illnesses, the results show that machine learning (ML) has the potential to revolutionize neuropsychological research.

Keywords: Machine Learning, Neuropsychology, Predictive Modeling, Data Analysis

Functional Connectivity Analysis in the Study of Brain Networks

Ankur Srivastava*[1] Mahima[2], Deepti Dwived[3] , Apurwa Singh[4], Abhishek Kumar[5],
[2,3]Institute of Pharmacy,Dr Shakuntala Misra University Rehabilitation University Lucknow
[3,4]Institute of Pharmacy, Shri Ramswaroop Memorial University, Lucknow Dewa Road,Uttar Pradesh, India,225003
[5]Institute of Pharmacy, Dr. Ram Manohar Lohia Avadh University Ayodhya
drankur189@gmail.com

Abstract

A key component of contemporary neuroscience, functional connectivity analysis (FCA) provides information on how various brain areas interact and coordinate to support cognitive processes. Through the use of sophisticated neuroimaging methods like resting-state functional magnetic resonance imaging (rs-fMRI), FCA enables researchers to examine the dynamic network structure of the brain in both sick and healthy subjects. An overview of the most recent breakthroughs in FCA is given in this work, with particular attention on methodological improvements such as static vs dynamic connectivity models. Finding stable network patterns, like the default mode network, has been made easier with the use of static FCA, which records average connectivity across a scan. However, a more comprehensive understanding of transitory connection states that enable cognition is provided by dynamic FCA, which looks at changes across time.

The combination of machine learning and FCA is emphasized because these methods enable the categorization of connection patterns and the more accurate prediction of neurological effects. For dependable findings, key hurdles include noise reduction, artifact removal, and data preparation. There is also discussion of ethical issues in FCA research, particularly with regard to privacy and inadvertent discoveries. Future uses might include personalized biomarkers for neuropsychiatric disorders and real-time brain connection monitoring, demonstrating FCA's potential to enhance clinical neuroscience and cognitive research.

Keywords: Functional Connectivity, Brain Networks, Neuroimaging, Biomarkers

Ethical and Methodological Challenges in Human Neuroscience Research

Ankur Srivastava*[1], Deepti Dwivedi[2], Apurwa Singh[3], Shivangi Sharma[4] ,Abhishek Kumar[5]

[1]Institute of Pharmacy, Dr. Ram Manohar Lohia Avadh University Ayodhya

[2]Institute of Pharmacy, Dr Shakuntala Misra University Rehabilitation University Lucknow

[3,4,5]Institute of Pharmacy, Shri Ramswaroop Memorial University, Lucknow Dewa Road,

Uttar Pradesh, India,225003

drankur189@gmail.com

Abstract

Rapid growth in human neuroscience research has led to a critical analysis of the methodological and ethical issues particular to this area. Ethical issues are crucial since researching human brain activity is delicate, especially when it comes to permission, data privacy, and inadvertent results. These ethical considerations are thoroughly examined in this work, along with the particular difficulties in gaining informed permission for brain imaging research, particularly in vulnerable groups like children and those with mental health conditions. In order to prevent misuse, best practices for protecting sensitive brain imaging data are examined, along with issues pertaining to data privacy and storage.

The study also addresses the methodological challenges that come with studying human neuroscience, such as individual differences in brain structure and cognitive abilities that might skew experimental findings. Methodological advancements are emphasized as solutions to these problems, including uniformity in data collection and preparation procedures. Additionally, as inadvertent results might have significant ramifications for participants, ethical quandaries surrounding them are investigated. In order to ensure responsible research procedures that safeguard participants and promote public trust in neuroscience research, the study ends with suggestions for creating ethical norms that keep up with the field's fast technical advancements.

Keywords: Ethics, Neuroimaging, Data Privacy, Human Research

Artificial Intelligence in Brain Mapping and Neural Signal Analysis

Ahtisham Ahamad[1] , Deepti Dwivedi*[2], Apurwa Singh[3], Zahid Hussain[4],Abhishek Kumar[5]
[1]Faculty of Pharmacy, Khwaja Moinuddin Chishti Language University
[2]Institute of Pharmacy, Dr Shakuntala Misra University Rehabilitation University Lucknow
[3,4,5]Institute of Pharmacy, Shri Ramswaroop Memorial University, Lucknow Dewa Road,Uttar Pradesh, India,225003
deeptidwivedi303@gmail.com

Abstract

Brain mapping has been revolutionized by artificial intelligence (AI), which makes it possible to analyze neural signals in a sophisticated way for a variety of uses, from clinical diagnoses to fundamental neuroscience research. In the context of brain mapping and signal analysis, this study examines AI-based techniques such as support vector machines, convolutional neural networks, and deep learning algorithms. Artificial intelligence (AI) methods are very good at deciphering cerebral activity from electroencephalography (EEG) and magnetoencephalography (MEG) data. This allows for the real-time discovery of intricate patterns and offers insights into cognitive functions like language processing and decision-making. The large complexity and unpredictability of brain data, which necessitates intensive preprocessing and feature extraction to allow successful model training and validation, are major obstacles when utilizing AI for neural signal analysis. The function of AI-powered brain-computer interfaces (BCIs), which can decipher neural signals for use in assistive technology and neurorehabilitation, is also examined in this work. There is discussion of ethical issues, such as data privacy and the possibility of abuse in fields like neuromarketing. The study highlights that although artificial intelligence (AI) has its limits, its capacity to process massive datasets with great precision holds promise for expanding our knowledge of how the brain works and enhancing the treatment of neurological and psychiatric conditions.

Keywords: Artificial Intelligence, Brain Mapping, Neural Signals, Brain-Computer Interface

Genomics and Neuroinformatics: Integrating Data for Precision Neuroscience

Apeksha Singh[1], Deepak Kumar *[2], Apurwa Singh[3], Zahid Hussain[4],Abhishek Kumar[5]
[1]Faculty of Pharmacy, Khwaja Moinuddin Chishti Language University
[2]Institute of Pharmacy, Dr Shakuntala Misra University Rehabilitation University Lucknow
[3,4,5]Institute of Pharmacy, Shri Ramswaroop Memorial University, Lucknow Dewa Road,Uttar Pradesh, India,225003
drxdeepak12@gmail.com

Abstract

New directions in precision neuroscience have been made possible in recent years by the combination of genomics and neuroinformatics, which has provided insights into the genetic foundation of complicated neurological disorders. In order to promote customized treatment options, this research examines the methods and difficulties involved in integrating genetic data with neuroimaging and clinical information. This study investigates how researchers might handle the high-dimensional data that is intrinsic to genomics and neuroimaging by investigating bioinformatics algorithms, data harmonization strategies, and sophisticated computational tools. Key techniques for determining the genetic risk factors linked to neurological illnesses are examined, including machine learning algorithms, QTL (quantitative trait loci) mapping, and genome-wide association studies (GWAS).

Data heterogeneity, where various data types (such as genetic, proteomic, and neuroimaging) must be aligned for analysis, and computational complexity, as handling and interpreting enormous volumes of data requires a substantial amount of processing power and sophisticated algorithmic solutions, are challenges in this integration process. Case studies of neurodegenerative illnesses, such as Parkinson's and Alzheimer's, show how genomics may be used practically to find biomarkers and improve diagnostic precision. With the ultimate goal of advancing precision medicine in neuroscience, this study outlines future approaches for applying AI in genomes research, which offers more sophisticated models for risk prediction and treatment planning.

Keywords: Genomics, Neuroinformatics, Precision Medicine, Neurodegenerative Diseases

Behavioral Neuroscience and Virtual Reality: Experimental Approaches

Jay kishan Jaiswal*[1] , Ravi Kumar[2], Shraddha Pandey[3], Pragti Singh[4], Shubham Tripathi[5]
[1]Signa Group of college, Kanpur, Uttar Pradesh
[2]Institute of pharmaceutical sciences JS University, Shikohabad, Uttar Pradesh
[3,4]Institute of Pharmacy, Shri Ramswaroop Memorial University, Lucknow Dewa Road,Uttar Pradesh, India,225003
[5]School of Pharmacy and Research Centre Sanskriti University Chhata Mathura UP
j.kjaiswal8899@gmail.com

Abstract

Virtual reality (VR) has emerged as a key tool in behavioral neuroscience because technology enables researchers to create realistic yet controlled environments for examining human brain and behavior. This study investigates the application of virtual reality technology in experimental neuroscience, with potential uses ranging from understanding spatial navigation to investigating fear reactions and treating phobias. It is sometimes difficult to assess participants' physical and cognitive capacities in traditional lab settings, but virtual reality (VR) provides a unique platform for recreating real-world scenarios. In addition to ecological validity—the extent to which the VR experience closely mimics real-life environments—and immersion, which is essential for participant engagement, this paper discusses the strategy of using virtual reality (VR) in experimental design.Additionally, VR is used in neurorehabilitation and cognitive training, especially for stroke or neurodegenerative illness patients. A critical analysis is conducted of the difficulties that come with virtual reality, including motion sickness and the possibility of reduced validity when activities are converted from real-world environments to virtual reality. The study also looks at VR's potential for longitudinal research, where repeated exposure may track changes in cognition over time. All things considered, this work highlights how VR may revolutionize behavioral neuroscience research by offering fresh perspectives on how people behave in dynamic and realistic environments.

Keywords: Behavioral Neuroscience, Virtual Reality, Cognitive Training, Experimental Design

Advanced Neurostimulation Techniques in Neuroscience Research

Raghvendra Yadav[1], Anupam Kumar Pal[2], Pramod Chauhan[3], Shikha Srivastava[4] Abhishek Kumar*[5]

[1]Institute of Pharmaceutical Sciences, Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)

[2,3,4,5]Institute of Pharmacy Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)

abhiworld1997@gmail.com

Abstract

Transcranial magnetic stimulation (TMS) and transcranial direct current stimulation (tDCS), which modify brain activity and study neural networks, are examples of neurostimulation techniques that have become essential in neuroscience research. The methodological developments of neurostimulation are explored in this work, with an emphasis on their uses in clinical and cognitive neuroscience contexts. TMS is being investigated as a method for examining the neurological underpinnings of processes including memory, attention, and motor control. TMS employs magnetic fields to stimulate specific brain areas. The use of a mild electrical current, known as tDCS, is also examined for its potential to improve cognitive training results and modulate brain development. Important factors are covered, such as neuronal targeting, stimulation protocol selection, and safety precautions, as they are essential for getting accurate findings. It has been demonstrated that combining neurostimulation with neuroimaging techniques like EEG or fMRI yields more thorough understandings of how stimulation impacts brain activity in real time. Emerging methods like closed-loop neurostimulation devices are emphasized for their capacity to adaptively modify brain activity, while limitations like individual heterogeneity in stimulation response are addressed. An view on how neurostimulation could develop further to offer specialized therapies for neurological conditions, promoting customized medicine, is provided in the paper's conclusion.

Keywords: Neurostimulation, TMS, tDCS, Brain Modulation

Multi-Omics Integration in Neuroscience: Methodologies and Applications

Kamran Javed Naquvi[1], Chandan Kumar Singh[2], Shailendra Singh Bhadauria[3], Somesh Shukla[*4]
[1]Department of Pharmacy, Tishk International University, Iraq.
[2]Department of Pharmaceutical Sciences and Technology, BIT Mesra, Jharkhand
[3]Ch. Sughar Singh Pharmacy College, Jasvant Nagar,Etawa,Uttar Pradesh,India
[4]Maharana Pratap College of Pharmacy, Kanpur, India.
someshshukla786@gmail.com

Abstract

The integration of transcriptomics, proteomics, metabolomics, and genomics in multi-omics techniques offers a thorough framework for comprehending the molecular pathways underpinning brain function and illness. With an emphasis on computational difficulties including data normalization, integration, and dimensionality reduction, this study examines the approaches taken to integrate these disparate data types. Researchers can find genetic signs and biomarkers of neurological and mental illnesses by using techniques like network analysis and machine learning, which are emphasized as crucial tools in multi-omics integration. For instance, combining proteomic and genomic data has been successful in finding biomarkers associated with neurodegenerative illnesses such as Parkinson's and Alzheimer's, while metabolomic analyses provide information on the metabolic processes that are changed in mental health conditions.Case studies show how the origin, course, and treatment outcomes of diseases may be informed by multi-omics analysis. Strategies for coordinating data collection and analysis across several omics platforms are covered, along with important obstacles such data heterogeneity and the requirement for high-throughput processing. The study also discusses the potential of multi-omics in customized neuroscience, pointing to a move toward precision medicine in the discipline as a patient's distinct molecular profile may inform tailored treatment options.

Keywords: Multi-Omics, Biomarkers, Neurodegeneration, Data Integration

Computational Neuroscience and Simulation Models in Brain Function Research

Aditya Singh[1]*, Shubhrat Maheshwari[2], Jagat Pal Yadav[3], Abhishek Kumar[4]
[1]*Faculty of Pharmacy, Integral University, Lucknow, Uttar Pradesh 226026, India
[2,3]Sam Bioorganic and Medicinal Chemistry Research Laboratory, Department of Pharmaceutical Sciences, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, 211007, India
[4]Institute of Pharmaceutical Research, GLA University,Mathura,Uttar Pradesh, India
simmu5adityasingh@gmail.com

Abstract

In neuroscience, computational modeling has emerged as a vital tool that allows for the simulation and analysis of intricate brain processes that are hard or impossible to detect experimentally. An overview of the main simulation models used in computational neuroscience is given in this study. These models include large-scale brain models, network-level models, and neuron-level models, which enable researchers to investigate concepts like memory, learning, and sensory processing. The significance of parameter selection, model validation, and the incorporation of empirical data from neuroimaging and electrophysiology are among the methodological underpinnings of computational modeling that are covered. This study also looks at the advantages and drawbacks of utilizing computer models, including how well they can simulate biological processes and the difficulties in guaranteeing model correctness. Model dependability and predictive capacity have greatly increased as a result of developments in computer power and algorithms, especially in machine learning. The use of computer models in hypothesis testing is emphasized; these models are a useful tool for conducting experiments and analyzing data since they can anticipate experimental outcomes and mimic possible brain pathways. A discussion of potential future paths in computational neuroscience is included in the paper's conclusion, with a focus on how models might help guide experimental research and further the creation of neurotechnological applications such as brain-computer interfaces and neuro prosthetics.

Keywords: Computational Neuroscience, Simulation, Neural Networks, Cognitive Modeling

Neuroscience and Glioblastoma Multiforme (GBM)

Aditya Singh[1]*, Shubhrat Maheshwari[2], Jagat Pal Yadav[3], Abhishek Kumar[4]

[1]*Faculty of Pharmacy, Integral University, Lucknow, Uttar Pradesh 226026, India

[2,3] Bioorganic and Medicinal Chemistry Research Laboratory, Department of Pharmaceutical Sciences, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, 211007, India

[4]Institute of Pharmaceutical Research, GLA University,Mathura,Uttar Pradesh, India

simmu5adityasingh@gmail.com

Abstract

Glioblastoma multiforme (GBM) is an aggressive brain tumor that presents unique challenges due to its invasive nature and interaction with the central nervous system (CNS). Neuroscientific studies have shown that GBM cells exploit the CNS's immune privilege to evade immune surveillance, allowing unchecked tumor progression. Research indicates that neuroinflammation plays a pivotal role in creating a pro-tumorigenic environment, where microglial cells are often co-opted to support tumor growth. The blood-brain barrier (BBB) poses both a hurdle and a unique opportunity for targeted therapies, as novel strategies aim to breach the BBB without harming neural integrity. Advances in neuro-oncology are exploring methods to reprogram neural microenvironments, aiming to enhance immune response against GBM cells while minimizing CNS toxicity. Understanding these neural-tumor interactions is essential for developing therapeutic strategies that can mitigate GBM progression and improve patient outcomes.

Keywords: glioblastoma, neuroinflammation, blood-brain barrier, neuro-oncology

Neuroscience and Breast Cancer Brain Metastases

Somesh Shukla[1*], Shubhrat Maheshwari[2], Jagat Pal Yadav[3], Abhishek Kumar[4] ,Shailendra Singh Bhadauria[5]

[1,4]Institute of Pharmaceutical Research, GLA University,Mathura,Uttar Pradesh, India

[2,3] Sam Bioorganic and Medicinal Chemistry Research Laboratory, Department of Pharmaceutical Sciences, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, 211007, India

[5]Ch. Sughar Singh Pharmacy College, Jasvant Nagar,Etawa,Uttar Pradesh,India

someshshukla786@gmail.com

Abstract

Breast cancer frequently metastasizes to the brain, leading to significant cognitive impairment in affected patients. The neurological impact of breast cancer metastasis is profound, with patients often experiencing memory deficits, reduced neuroplasticity, and impaired executive functions. Research highlights that the process of metastasis disrupts neural circuits, particularly in regions associated with memory and cognition. Furthermore, "chemobrain," or cognitive decline following chemotherapy, exacerbates the challenges faced by these patients. Neuroscientific approaches aim to mitigate these impacts through neuroprotective strategies, targeting the neural changes induced by both cancer and its treatment. Understanding how metastatic breast cancer cells interact with and alter brain structures is crucial for developing interventions that preserve cognitive function in affected patients.

Keywords: metastasis, cognitive impairment, neuroplasticity, chemobrain

Neuroscience and Lung Cancer Neurotoxicity

Somesh Shukla[1*], Shubhrat Maheshwari[2], Jagat Pal Yadav[3], Abhishek Kumar[4]Shailendra Singh Bhadauria[5]

[1,4]Institute of Pharmaceutical Research, GLA University,Mathura,Uttar Pradesh, India

[2,3] Sam Bioorganic and Medicinal Chemistry Research Laboratory, Department of Pharmaceutical Sciences, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, 211007, India

[5]Ch. Sughar Singh Pharmacy College, Jasvant Nagar,Etawa,Uttar Pradesh,India

someshshukla786@gmail.com

Abstract

Lung cancer is associated with various neurological complications, including neurotoxicity and paraneoplastic syndromes, where immune responses directed against tumors also attack the nervous system. Patients with lung cancer may develop peripheral neuropathy, often exacerbated by neurotoxic chemotherapeutics, leading to significant pain, weakness, and sensory disturbances. Studies in neuroscience have focused on understanding these neurotoxic effects, particularly the mechanisms by which cancer cells and treatments affect neuronal health. Paraneoplastic syndromes associated with lung cancer also highlight the immune system's dual role in fighting cancer while potentially harming neural tissue. Research into neuroprotective agents and targeted therapies aims to reduce neurological side effects, enhancing both quality of life and survival for lung cancer patients.

Keywords: lung cancer, neurotoxicity, paraneoplastic syndrome, peripheral neuropathy

Neuroscience and Colorectal Cancer Neuropsychology

Abhishek Kumar*, Kamal Shah
Institute of Pharmaceutical Research,GLA University,Mathura,Uttar Pradesh,India
abhiworld1997@gmail.com

Abstract

Colorectal cancer (CRC) patients often experience substantial psychological challenges, including anxiety and depression, due to both the disease and its treatment. Neuropsychological research indicates that the psychological stress associated with CRC can contribute to poorer patient outcomes, as stress and anxiety impact immune function and recovery. Additionally, chemotherapy agents used in CRC treatment have been linked to changes in brain structure and function, exacerbating mood disturbances. Neuroscience-based interventions, such as cognitive-behavioral therapy and mindfulness practices, are increasingly being incorporated into CRC treatment plans to help mitigate psychological symptoms and improve overall resilience. Understanding these neuropsychological impacts is vital for developing comprehensive care strategies that address both the physical and mental health of CRC patients.

Keywords: colorectal cancer, neuropsychology, anxiety, depression

Neuroscience and Prostate Cancer's Impact on Brain Function

Abhishek Kumar*, Kamal Shah
Institute of Pharmaceutical Research, GLA University, Mathura, Uttar Pradesh,India
abhiworld1997@gmail.com

Abstract

Prostate cancer treatments, particularly androgen deprivation therapy (ADT), have been linked to cognitive decline in patients. Androgens are crucial not only for reproductive health but also for brain function, influencing neurogenesis and cognitive processing. Prostate cancer patients undergoing ADT often report issues such as memory loss and reduced attention span, likely due to decreased androgen levels affecting the hippocampus and other brain regions. Neuroscientific research is exploring how ADT disrupts neural plasticity and seeking ways to counteract these effects through neuroprotective strategies. Investigating the interplay between prostate cancer treatment and cognitive health can help develop interventions that minimize cognitive side effects, thereby improving quality of life for prostate cancer patients.

Keywords: prostate cancer, androgen deprivation therapy, cognitive decline, neurogenesis

The Neuroscience Research Methods in Management

Yasmin Khatoon*, Zahid Hussain
Institute of Pharmacy, Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)[1, 2]
yassu.ayaan@gmail.com,

Abstract

There has been enormous progress in understanding fundamental brain processes utilizing neuroscientific methodologies that drive management, marketing, and consumer choice. Neural circuits form the basis for all human thoughts and concepts. People have limited conscious access to these brain systems. As a result, only around 2% of thoughts are conscious, and standard research methods, such as surveys and focus group interviews, have the disadvantage of focusing just on people's conscious parts of mind. On the contrary, the primary advantage of adopting neuroscientific methodologies is that there are numerous opportunities to identify unconscious brain processes that are crucial for human decision in management conditions.

Neuroscientific methods are classified into two types: those that directly collect data from the brain (e.g., EEG/ERP or fNIRS) and those that obtain data indirectly (e.g., skin conductance resistance, eye tracking systems). These procedures are adapted from clinical approaches.

Many of these have a lengthy history in medicine, both in terms of applications and research. This section will provide detailed explanations of various commonly used procedures. EEG/ERP, a neuroelectrophysiological approach, measures brain potentials using electrodes on the scalp. Eye-tracking measures eye look, including direction, attention level, and fixation points. The generally utilized neuroscientific procedures could be evaluated under two conditions. Neuroimaging techniques like fMRI and fNIRS rely on physiological changes in the blood, specifically oxygen levels.

Keywords: Neuroscientific, Neuroelectrophysiological, Neuroimaging techniques.

Barriers to the Implementation of Neuroscientific Techniques in Strategic Management Research

Yasmin Khatoon*, Zahid Hussain
Institute of Pharmacy, Shri Ramswaroop Memorial University, Barabanki, UP, India(225003)[1,2]
yassu.ayaan@gmail.com

Abstract

Understanding the usage and discussion of neuroscientific methods in ongoing organizational strategy research is the aim of this study. To address the research topic, the authors conducted a bibliometric analysis of bibliographic pairing. Using the terms "neuroscience*," "neurostrategy*," and "neuroscientific*," they gathered information from the Web of Science and Scopus databases. This study offers a framework that connects the following basic topics covered in recent research using neuroscientific tools: emotions and information processing; the interdisciplinary application of neuroscientific tools; neuroscience and its research tools in organizations; and moral and ethical influences in the decision-making process of leaders. Research on Strategic Management is still in its early stages of incorporating neuroscientific methods. Regarding the limitations and possibilities to promote further research, there are issues and complaints.Although this study acknowledges the potential of neuroscientific tools in the relationship between the mind and brain, it recommends that, due to criticisms and difficulties, they be used as a supplement to other conventional research methods to evaluate constructs and mechanisms associated with organizational strategic choices and decisions. In the discipline of business ethics, neuroscientific approaches in organizational studies can offer a variety of viewpoints by shedding light on how individuals respond to moral dilemmas and posing difficult normative queries on the nature of moral responsibility, autonomy, intention, and free will. This research contributes to the development of methodological avenues for strategic management studies, while also highlighting the advantages and disadvantages of applying scientific instruments in these investigations.

Keywords: Neuroscientific tools, Ethical, Strategic Management.

Understanding and Enhancing Design Cognition through the Application of Neuroscience Techniques

Yasmin Khatoon
Institute of Pharmacy, Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)
yassu.ayaan@gmail.com,

Abstract

Understanding the brain processes that underpin cognition through experimental laboratory activities has long been the main goal of cognitive neuroscience research. Growing interest in applying related techniques and discoveries to real-world situations is a result of the emerging literature. In this opinion piece, we examine the possibilities and potential of using contemporary cognitive neuroscience techniques in the design domain. We examine the impact and limitations of these approaches, as well as new data from early research that has used them to pinpoint the brain underpinnings of design thinking. Furthermore, we stress the significance of combining proven behavioural paradigms with neuroscience techniques for designing ecologically sound, practical tasks. Professional designers and everyone who does the same cognitive acts both engage in the ubiquitous cognitive act of designing, which is the deliberate creation of new methods to affect the world rather than merely replicating preexisting ones.

These conditions can be met by experimental studies, which can produce strong datasets of neurocognitive measurements that can provide fresh perspectives on the intricate brain and cognitive processes that support design thinking. In order to foster and enhance design thinking in design education and professional practice, we contend that this new understanding may inspire the creation and use of fresh approaches.

Keywords: Cognitive Neuroscience, Design Thinking, Professional Practice.

Alzheimer's Disease Treatment Targeting Amyloid β: Obstacles, Achievements, And Prospects

Sushma Singh
Institute of Pharmacy, Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)
singhsushmapratap090@gmail.com

Abstract

Amyloid β (Aβ) plaque buildup in the brain is one of the hallmarks of Alzheimer's disease (AD), a progressive neurodegenerative illness marked by cognitive decline and memory loss. Aβ has been a key target in the last few decades as treatment approaches slow or reverse the disease's progress. The development of amyloid-targeting treatments has proven difficult despite tremendous efforts. Early clinical trials of anti-amyloid antibodies, such as those that directly neutralize soluble Aβ or target the production of amyloid precursor protein (APP), have produced conflicting results, with minimal success in improving cognitive outcomes and safety and efficacy issues. The success and challenges of targeting amyloid β for the treatment of AD are discussed in this article. These challenges include the intricacy of Aβ's function in the pathophysiology of the illness, the unpredictability of patient responses, and the challenge of administering effective medicines to the brain. In this review, we discussed innovative treatments that might provide fresh ways to overcome these challenges, like gene therapy, vaccinations, and tiny molecules. Discussed the possibility of combination treatments that focus on several disease pathways in AD, acknowledging that a multifactorial strategy might be required for sustained effectiveness is also emphasized. Lastly, we discuss the potential of amyloid-based medicines in the future, emphasizing the value of customized medicine, early detection, and the incorporation of biomarkers to inform clinical judgment in the search for efficient AD treatments.

Keywords: Alzheimer's disease, amyloid β, therapeutic strategies, anti-amyloid antibodies, challenges.

Neuroprotective Potential of Plant-Derived Compounds: A Natural Approach to Treating Neural Disorders

Neeraj Kumar Verma
Institute of Pharmacy, Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)
neerajverma563@gmail.com

Abstract

Neural disorders encompass conditions affecting the nervous system due to infections or neuron degeneration, leading to neurodegenerative or neuropsychiatric disorders. Examples include Parkinson's disease, depression, amnesia, dementia, Alzheimer's disease, schizophrenia, cerebrovascular issues, epilepsy, and seizure disorders. The conventional medical approach primarily involves classes of drugs like psychedelics, sedatives, neurotransmitters, and neuro-stimulants. However, these medications often only slow disease progression and frequently have significant side effects. in recent years, many bioactive compounds from medicinal plants have shown promising neuroprotective effects, with minimal toxicity when administered in prescribed, standardized doses. Notable examples include plant-derived compounds from ***Withania somnifera*** *(*Ashwagandha*)* ***Family*** *Solanaceae* ***Bacopa monnieri*** *(*Brahmi*)* ***Family*** *Plantaginaceae* ***Centella asiatica*** *(*Mandukparni***)** ***Family*** *Apiaceae* which have been traditionally utilized in Ayurvedic, Unani, and Chinese medicine. Isolating and modifying these phytocompounds to create more potent neuroprotective derivatives could lead to highly effective pharmaceutical formulations with fewer adverse effects. This approach may present innovative opportunities in neuropharmacology.

Keywords:-Neuroprotection, phytocompounds, Ayurvedacharya, Alzheimer's disease, Parkinsons's disease

Neuroprotective Effect of Empagliflozin as a SGLT2 Inhibitor

Zahid Husain*[1,2], Vaseem Ahmad Ansari[2], Manju Pandey[3], Shraddha Pandey[4], Yasmin Khatoon[5]
[1,3,4,5] Institute of Pharmacy, Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)
[2]Faculty of Pharmacy, Integral University, Kursi Road, Dasauli, Lucknow, Utrar Pradesh, India (226026)
zahid1392@gmail.com

Abstract

Individuals with diabetes are more likely to experience cognitive impairment and cardiovascular disorders. Newer hypoglycemic medications with numerous pleiotropic effects are SGLT2 inhibitors, which include Empagliflozin, Canagliflozin, Dapagliflozin, Ertugliflozin, and Sotagliflozin. We talk about their neuroprotective potential in this review. Lipid-soluble SGLT2 inhibitors (SGLT2i) have a brain/serum ratio of 0.3 to 0.5. The central nervous system (CNS) contains SGLT receptors. Flozins have an affinity for the SGLT1 receptor, which is linked to protection against ischemia/reperfusion brain injury, and they are not entirely SGLT2-selective. Reduction of proinflammatory cytokines, M2 macrophage polarisation, suppression of the JAK2/STAT1 and NLRP3 inflammasomes, and cIMT regression are all examples of SGLT2i's anti-inflammatory and anti-atherosclerotic effects. They lessen oxidative stress as well. The neurovascular unit, blood-brain barrier, pericytes, astrocytes, microglia, oligodendrocytes, and SGLT2i all benefit from improved endothelial function, prevention of remodelling, and protective effects. Additionally, flozins have the ability to block AChE, which enhances cognition. Empagliflozin dramatically raises cerebral BDNF levels, which regulate neurotransmission and guarantee neurone development, survival, and plasticity. Additionally, they might be able to re-establish the circadian regularity of mTOR activation, which is a very new discovery in the study of cognitive impairment and metabolic illnesses. Patients with type 2 diabetes mellitus may benefit greatly from SGLT2i's protection against atherosclerosis and cognitive decline.

Keywords: SGLT2i, neuroprotection, cognitive impairment, inflammation, oxidative stress

A Review on effect of Purine and Pyrimidine rings on Central Nervous system

Sahil Sharma, Shubham Goutam*, Aditya Srivastava, Praveen Singh, Manglesh Yadav, Nitesh Kumar, Niteesh Kumar

Institute of Pharmacy, Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)

shubham.pharma@srmu.ac.in

Abstract

Purine and Pyrimidine are heterocyclic compounds, which are a type of nitrogenous base that acts as the building block of nucleic acids. Purines are double ring structure containing nitrogen whereas Pyrimidine is single ring structures containing nitrogen. Purine includes Adenine and Guanine whereas Pyrimidine includes Cytosine, Thymine and Uracil. They have an important role in gene regulation and transfer of genetic information. Uridine, a nucleoside made of uracil containing ribose, found in RNA was when administered, showed anti-epileptic actions and improved sleep quality along with strengthening memory. On operating at rat model, some authors found that in rats suffering from Parkinson's disease, showed increase in formation of synaptic membrane by striatal neuron when they were orally administered uridine and omega-3 fatty acids together with choline from diet. Adenosine, a type of Purine was found to be involved in control and management of multiple signaling pathways in Central Nervous System and by regulating glial cell, it behaved as a neuromodulator, and regulated release of neurotransmitter. This signifies the importance of controlling adenosine levels for brain development and neuroplasticity The Purines through purigenic control, regulated maturation of oligodendrocyte from precursor as well as their terminal differentiation to fully myelinated cells. It was also observed that if due to some reason the metabolism of Purine and Pyrimidine and purigenic transmissions is affected, it will result in certain functional disabilities like mental retardation or other disturbances. Changes in concentration of Guanosine, a nucleoside made of guanine and ribose, along with changes in concentration of uric acid, inosine , IMP caused both chronic and acute pain . Derivatives of Purine showed various medicinal uses, for instance Theobromine was found to have antioxidant properties and acted as a bronchodilator and cough suppressant. Another derivative of Purine, Paraxanthine , acts as CNS stimulant and helps in Fat metabolism. Pyrimidine derivatives like Barbiturates showed hypnotic and sedative effects, Another Pyrimidine derivative Stavudine was found effective in treatment of HIV.

Keywords: Adenosine, Uridine, Paraxanthine, neuromodulator, CNS Stimulant.

The Dawn of AI in Psychological and Neurological Disorder Detection.

Ms. Geetika Mishra*, Ms. Nimisha Singh, Ms. Palak Agarwal
Institute of Pharmacy, Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)
geetikamishra0130@gmail.com

Abstract

Artificial intelligence (AI) is rapidly transforming various sectors, and its involvement in healthcare is no exception. Detecting psychological disorders can be a challenging and time-consuming process. Recent diagnostic investigation depends heavily on self-reported symptoms and clinical inspection, which can be influenced by various factors such as perspicacity, subjectivity, and the patient's perception into their condition. One of the most promising rationality of AI lies in the early detection and diagnosis of psychological and neurological disorders. Conventional methods of diagnosis often rely on subjective assessments and can be time-consuming and it is prone to errors. AI, with its ability to analyze vast amounts of data and identify subtle patterns, offers a revolutionary approach to this crucial field. Neurological disorders encompass a wide range of conditions that affect the brain, spinal cord, and nerves. These disorders can manifest in various ways, including cognitive impairment, motor dysfunction, sensory changes, and mood disorders. Early diagnosis is crucial, as it can lead to timely interventions that may slow disease progression, mitigate symptoms, and enhance the quality of life for patients. However, the integration of artificial intelligence (AI) is revolutionizing this landscape, offering a powerful new set of tools for the detection of psychological and neurological disorders. By leveraging machine learning algorithms and advanced data analysis, AI is poised to enhance diagnostic accuracy, improve patient responses, and revolutionize mental health care. By harnessing the power of data and advanced algorithms, AI can provide insights that enable early diagnosis, personalized treatment plans, and improved patient outcomes. As research continues and technology advances, the collaboration between AI and neurology may redefine the future of healthcare, ensuring that individuals affected by neurological disorders receive the timely and accurate care they deserve. It is a promising frontier, and with careful implementation, the potential benefits for patients and the healthcare system are immense.

Keywords: AI, Neurological disorder, Psychological disorder, mitigate, motor dysfunction.

An Overview of Alzheimer's Disease and Its complications and Prospects

IteePandey[1*], Saumya Awasthi[2], Safa marwa[3], Raghvendra Yadav[4], Anshika Pandey[5]
[1,3,4,5] Institute of Pharmaceutical Sciences, Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)
[2]Institute of Pharmacy, Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)
iteepandey.1910@gmail.com

Abstract

One of the most severe cognitive disorders affecting the elderly is Alzheimer's disease. The condition is undertreated and under-recognized, posing a significant public health concern. Over the past decade, there has been a growing focus on understanding the underlying cause of the condition and developing effective treatments. Behavioral disturbances are treated with mood stabilizers, anxiolytics, antidepressants, antipsychotics, and hypnotics. It's not easy to find a medication that works well for the entire trial population.Future directions in the study and care of patients with Alzheimer's disease include the use of functional brain imaging techniques for early diagnosis and treatment efficacy assessment; the creation of novel drug classes that target various neurotransmitter systems (cholinergic, glutamatergic, etc.) to treat behavioral abnormalities as well as cognitive deficits; and the creation of preventative measures.

Keywords: Glutamatergic, cognitive disorders, anxiolytics, cholinergic

Novel Biomarkers in Amyotrophic Lateral Sclerosis: A Systematic Review

Singh Sneha[1*], Singh Pragti[2]

[1]Goel Institute of Pharmacy& Sciences, Ayodhya Road, near Indira Canal, Lucknow, Uttar Pradesh.

[2]Institute of Pharmacy, Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)

singhsneha8707@gmail.com

Abstract

Amyotrophic Lateral Sclerosis (ALS) is a tragic neuromuscular disease with no useful bio-markers that operate for the diagnosis and prognosis of the disease. The recent discovery of several novel biomarkers holds potential in terms of early diagnosis, monitoring of disease progression, and treatment. This systematic review presents a comprehensive overview of emerging biomarkers in ALS, including neurofilament light chain (NFL) in cerebrospinal fluid (CSF) and blood, Phosphorylated axonal neurofilament heavy chain (pNfH), Tar DNA-binding protein 43 (TDP-43) in CSF, microRNAs (miRNAs) in blood and CSF, and extracellular vesicles (EVs) containing ALS-associated proteins. Such biomarkers show promise for early diagnosis (NfL, pNfH), and monitoring of disease progression (TDP-43, miRNAs), whereas prognostic potential was detected for NfL and EVs. Neurofilament light chain (NfL): Raised levels in CSF and blood are associated with disease severity. Phosphorylation neurofilament heavy chain (pNfH): Reflecting axonal degeneration, helpful in detecting and monitoring ALS specifically. Tar DNA-binding protein 43 (TDP-43): found in CSF, linked to disease progression. MicroRNAs (miRNAs) —altered expression in blood and CSF, diagnostic and prognostic value. They carry ALS-related proteins and are effective for diagnosing ALS soon in development. Cerebrospinal fluid (CSF) proteomics to identify protein signatures for diagnosis of ALS. Blood-based biomarkers: Inflammation and oxidative stress markers.

Keywords: Amyotrophic Lateral Sclerosis, neuromuscular disease, Phosphorylated axonal neurofilament, neurodegenerative diseases, Tar DNA-binding protein 43.

New Therapies for Neurological and Psychiatric Diseases: Emerging Trends through Review of Literature

Pragti Singh, Shikha Srivastava , Apurwa Singh, Shraddha Pandey, Shivangi Sharma
Institute of Pharmacy, Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)
pragtisingh.pharma@srmu.ac.in

Abstract

Neurological and psychiatric disorders such as Alzheimer's disease, Parkinson's disease, depression, and schizophrenia are huge burdens on the body and society. Classical therapies fail and often have serious side effects. Breakthroughs of the last years in neuroscience and technology caused researchers to synthesise new therapies to treat neurological and psychiatric diseases and hold new hope for better treatment. Alzheimer's disease (AD) is a progressive neurodegenerative disorder that characterises itself with decreasing cognitive functions, forgetting processes, and dementia. Accounting for 60–80% of dementia cases, AD affects more than 50 million individuals worldwide. Parkinson's disease (PD) is a progressive neurodegenerative disorder; its primary features include motor impairment, cognitive loss, and lack of dopamine. More than 10 million people worldwide suffer from PD, making it the second most common neurodegenerative disease. Emerging Therapies: include- Gene therapies: viral vectors to introduce therapeutic genes hold promise for Parkinson's and Huntington's diseases. Stem cell therapies replacement of damaged neurones with stem cells are promising for treatment in cases of spinal cord injuries and multiple sclerosis. Optogenetics modulates neuronal activity with the use of light, and it offers hope as a futuristic treatment for neurological disorders. Brain-Computer Interfaces (BCIs): enable paralysed individuals or anyone suffering from neurological disorders to communicate or even control certain features of their environment. Ketamine-Derived Therapies: Rapid-acting antidepressants with efficacy in treatment-resistant depression. Psychedelic-Assisted Therapies: Both examples illustrate future possibilities in treating post-traumatic stress disorder and depression as well.

Keywords: Neurological disorders, psychiatric disorders, new therapies, gene therapy, stem cell

An overview of PHACE syndrome in neurological disorders

Pramod Chauhan[1*], Shubham Goutam[2], Raghvendra Kumar yadav[3]
[1,2]Institute of Pharmacy, Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)
[3]Institute of Pharmaceutical Sciences, Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)
bhanupratapchauhan1478@gmail.com

Abstract

The neurocutaneous condition known as PHACE syndrome is characterized by abnormalities of the posterior fossa of the brain, facial infantile hemangiomas, cardiac abnormalities (most frequently coarctation of the aorta), arterial anomalies, and eye abnormalities. Extracutaneous findings, such as developmental abnormalities of the aorta and medium-sized thoracic, cervical, and cerebral arteries, are common and present a significant risk of morbidity and mortality, even though the most clinically obvious feature is the cutaneous finding of infantile hemangioma. In addition to headache and neurodevelopmental symptoms, cerebral arteriopathy can advance and raise the risk of stroke in adulthood and cause arterial ischemic stroke in childhood. Pediatric neurologists should therefore be knowledgeable about this condition and any possible structural and functional neurological after effects. The clinical characteristics, diagnostic factors, epidemiology, and treatment of this illness are compiled in this review paper.

Keywords: Arteriopathy, aorta, hemangiomas, posterior fossa and ischemic stroke

The connection between sleeping, learning, and emotions regulation.

Nimisha Singh
Institute of Pharmacy, Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)
nimishasingh1997m@gmail.com

Abstract

The connection between sleep, learning, and emotional regulation is a multiplex and energetic process that significantly impacts cognitive and emotional functioning. Sleep plays a important role in memory combination, where newly acquired information is stabilized and integrated into existing knowledge networks. This process is crucial for effective learning, as it enhance the ability to retain and recall information. Moreover, sleep, particularly its rapid eye movement (REM) phase, has been shown to make possible emotional processing, enabling the regulation of mood and emotional responses. Lack of sleep or disturbed sleep can impair both learning and emotional regulation, leading to difficulties in memory holding and increased emotional reactivity. Again if, healthy sleep pattern support rational flexibility, attentional control, and emotional adabtability, which are important for adaptive reciprocation to stress and social interactions. This interplay suggests that optimal sleep is not only important for academic and cognitive success but also for maintaining emotional well-being and intellectual stability. Understanding the orientational relationship between sleep, learning, and emotional regulation could inform interventions objected at improving both cognitive responses and mental health responces. Chronic sleep disturbances are connected to a high risk of development of mood disorders like depression and anxiety, as lack of sleep can aggravate emotions and hinder adaptive emotional coping. Adequate sleep supports the regulation of mood and stress by retaining balance in brain parts involved in emotional processes, like the amygdala and prefrontal cortex. Finally, and structuring on this topic, a novel hypothesis and substructure of sleep-dependent affective brain processes will be proposed, climax in testable predictions and translational changements for mood disorders.

Keywords- Emotional adaptability, orientational relationship, aggravate emotions, social interaction

To evaluation and pharmacological features of *Bacopa monniera* in memory enhancing effect

Ajeet Singh[1], Dr. Manju Pandey [2], Dr. Neelanchal Trivedi [3]
[1,2] Institute of Pharmacy, Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)
[3] Department of Pharmacy, Invertis University Bareilly Uttar Pradesh
ajeetsingh.pharmacy@srmu.ac.in

Abstract

Neurodegenerative diseases have been quite common in an aging population around the world. The herb *Bacopa monnieri* (BM) contains some very beneficial components, including bacosides A and B, betulinic acid, loliolide, asiatic acid, and quercetin, which may maintain the potential of healthiness in the brain. Therapeutic use of BM in neurodegenerative diseases is not much highlighted. This systematic review projects BM's helpful effect in brain illnesses. Due to its anti-apoptotic and antioxidant features, BM increases neuroprotection, repairs damaged neurons, restores synaptic function, activates kinase activity, and enhances communication in neurons. The twenty-two clinical trials involved here suggest that BM may reduce the phosphorylation of nuclear factor-κB, as well as enhance emotional and cognitive function, anhedonia, hyperactivity, sleep pattern, depression, attention deficiency, learning incapability, memory retention, impulsivity, and mental illness.BM could reduce the levels of oxidative stress and pro-inflammatory biomarkers. Here, we downplay that BM has major therapeutic benefits and can be used in combination with other strategies for patients affected by brain illnesses and neurodegenerative diseases. This review contributes to the increasing interest in the field of natural products and their possible medicinal application through an enhancement of our knowledge about the mechanisms that may lie at the basis of neurodegeneration and cognitive functioning and guides treatment approaches for the development of novel therapy in neurodegenerative diseases.

Keywords: *Bacopa monnieri*, neurodegenerative diseases, congnition, oxidative stress

Navigating Alzheimer's: Understanding the Disease and Modern Approaches to Management

Sarita Singh*, Dr. Ruchi Singh, Ajeet Singh, Vivek Kumar Pandey, Dr. Manju Pandey
[1,2]Institute of Pharmacy, Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)
saritasingh.pharma@srmu.ac.in

Abstract

Alzheimer's disease (AD) is a prevalent neurodegenerative disorder characterized by cognitive decline, primarily due to the accumulation of amyloid-β plaques and tau tangles in the brain. Management of AD involves a multifaceted approach, combining pharmacological treatments with non-pharmacological strategies to enhance patient quality of life. AD accounts for 60-70% of dementia cases, with symptoms including memory loss and behavioral changes. The disease typically manifests after age 65, with both sporadic and familial forms identified. Current treatments include cholinesterase inhibitors (e.g., donepezil) and NMDA receptor antagonists (e.g., memantine), which provide symptomatic relief but do not alter disease progression. Recent advancements feature monoclonal antibodies like lecanemab and aducanumab, targeting amyloid plaques, showing promise in clinical trials. Behavioral and psychological symptoms of dementia (BPSD) can be managed through psychosocial approaches and alternative therapies.Recent Alzheimer's research focuses on early diagnosis, targeted treatments, and lifestyle interventions. Blood biomarkers and imaging (PET, MRI) now detect AD-related proteins like amyloid-beta and tau early, improving diagnosis. Drugs such as lecanemab and donanemab target amyloid plaques, and new immunotherapies use antibodies to clear harmful brain proteins. Gene-editing techniques like CRISPR aim to mitigate genetic risks, including APOE mutations. Lifestyle strategies, including exercise, Mediterranean diets, and anti-inflammatory foods, show promise in reducing AD risk, while botanicals like curcumin and Ginkgo biloba are being studied for their neuroprotective effects. While pharmacological advancements are promising, the complexity of AD necessitates ongoing research and a comprehensive management strategy that includes both medication and supportive care.

Keyword: Alzheimer's,Dementia , NMDA , CRISPR, APOE mutations.

Healing Minds Naturally: The Role of Medicinal Plants in Dementia Therapy

Dr. Ruchi Singh[1]*, Sarita Singh[2], Ajeet Singh[3], Dr. Manju Pandey[4], Dinesh Kumar Singh[5]
[1,2,3,4] Institute of Pharmacy, Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)
[5]Sunrise University, Alwar Rajasthan
ruchisingh.cse@srmu.ac.in

Abstract

There are currently effective treatments and preventative strategies for the growing "epidemic" of illnesses like Alzheimer's. Galantamine derived from Snowdrop is one such cholinesterase inhibitor that is approved for prescription and used today. Recently, there has been an increasing interest and investigations on the impact of botanicals on memory and cognition. The Behavioral and Psychological Symptoms of Dementia (BPSD) affect how caregivers manage patients contributing also to the likelihood of institutionalization. Plants of certain species are of usefulness in alleviating the symptoms (for instance, St John's wort is effective in curing depression in the people in the population; lavender and lemon balm eases agitation to the care givers suffering from dementia). The available information from clinical studies and epidemiology endeavours up to this point is factored in the assessment of the primary objective which is prevention of the illness. A variety of plant extracts or ingredients (i.e., curcumin) have been reported to be effective for neuroprotection, but no clinical applications have been investigated to date. The following research priorities are suggested in light of the high clinical need and carer concerns that prompted the exploration of other options such as herbal medicine: first, the evaluation of plant compounds to enhance cognition in patients with mild cognitive impairment or early stage of the disease, dementia-related behavioral and psychological symptoms (BPSD) for care of individuals with more advanced dementia; second, the establishment of a comprehensive evidence-based herbal medicine for dementia; third, further epidemiological and interventional studies on the effective phytomedicines or similar nutritional products for the purposes of preventing the diseases.

Keywords: Alzheimer's, Dementia, cognitive impairment, behavioral and psychological symptoms

A Review: Innovations in Neuroscience Research Methodology

Anupam Kumar Pal
Institute of Pharmacy, Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)
anupampal3311@gmail.com

Abstract

The neuroscience research methodology keys tones of brain development. It reveals the complex process that has molded the human brain by exploring the depths of expansion history. Our cognitive evolution is depicted on a canvas provided by comparative neuroanatomy and phylogeny. It considers the limitations that have shaped the structure of the human brain, both genetic and epigenetic. These realizations form the foundation of transformation Neuroscience. Advancements in neuroscience research methodologies have enabled unprecedented exploration of the brain's complexities, bridging cellular mechanisms with cognitive functions. This Abstract highlights cutting-edge techniques transforming the field. High-resolution imaging technologies, such as fMRI (functional magnetic resonance imaging) and PET (positron emission tomography), combined with two-photon and super-resolution microscopy, now allow scientists to observe neural activity with exceptional spatial and temporal precision. Innovations in molecular tools, like optogenetics and chemogenetics, enable manipulation of specific neurons, allowing researchers to link cellular activity with behavior. Breakthroughs in genetic engineering, including CRISPR-Cas9, allow precise modifications to neural genes, offering insights into hereditary neurodevelopmental disorders. Meanwhile, computational neuroscience and machine learning applications aid in analyzing massive neural datasets, facilitating discovery of patterns in neural connectivity and potential biomarkers for diseases. Ethical considerations and reproducibility challenges also shape these methodologies, ensuring that findings are both robust and responsibly applied. Collectively, these advanced methods are not only enhancing the understanding of brain function but also paving the way for novel therapeutic strategies to address neurological and psychiatric disorders.

Keywords: Neuroscience, Neurotechnology, Brain Research, Neuroengineering, neuroanatomy, Transformation Neuroscience etc,

Neuronal Nitric Oxide Synthase Treatment and its Implications in Neurobehavior Disorders

Safa Marwa[1*], Syed Salman Ali[2], Prasar Kumar[3]

[1] Institute of Pharmaceutical Sciences, Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)

[2] Lloyd Institute of Management and Technology, Greater Noida, Uttar Pradesh, India-201306

[3]G.C.R.G. College of Pharmacy, Parvatpur, Uttar Pradesh- 271835

Safakhankni@gmail.com

Abstract

Neuro-behavior refers to the mental and sensory aspects of behavior, such as praxis, focus, recollection, and spatial awareness. The main role of neuronal nitric oxide synthase (nNOS) is to convert L-arginine to nitric oxide (NO), a gaseous molecule that has multiple biological effects. Mostly found in neurons, NOS is a Ca2+-dependent constitutive synthase. NOS also plays a major role in neuropsychiatric disorders. Multiple regions of the brain, such as the cortex, hippocampus, amygdala, hypothalamus, dorsal raphe nuclei, striatum, basal ganglia, and locus coeruleus, show increased nNOS levels and functioning throughout the lifespan. The impact of selective NOS inhibitors mirrors that of anxiolytics and antidepressants. The progress in creating drugs that focus on nNOS is restricted since blocking nNOS enzymatic function can lead to adverse effects such as memory issues and aggressive actions. nNOS in the brain is involved in ischemic brain damage, regulating MDD and GAD, and anxiety caused by chronic pain. To sum up, preclinical studies have shown promising results for treatments targeting NO/NOS and drug delivery systems related to NO. However, well-designed clinical trials are necessary to determine the effectiveness of this approach in individuals.

Keywords: Neuro-behavior, Neuropsychiatric disorders, Neuronal nitric oxide synthase, NO/NOS drug delivery systems.

Innovative approaches to improve the management of autoimmune neurological disorders

Saumya Awasthi, Shikha Srivastava*
Institute of Pharmacy, Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)
shikha_ceutics@yahoo.co.in

Abstract

Autoimmune neurological disorders, such as multiple sclerosis (MS), neuromyelitis optica spectrum disorders (NMOSD), and myasthenia gravis, are complex conditions marked by immune system attacks on components of the central or peripheral nervous system. Traditional therapies for these disorders often focus on broadly suppressing immune responses, but they can result in significant side effects and insufficiently address disease progression. Innovative approaches are thus crucial to advancing the management and quality of life for affected individuals. This review explores emerging strategies that offer new avenues for managing autoimmune neurological diseases. Precision medicine, informed by genetic and biomarker profiling, enables tailored treatment protocols that target specific disease mechanisms, thereby minimizing unnecessary immunosuppression. Biologic therapies, including monoclonal antibodies and checkpoint inhibitors, are showing promise in selectively modulating immune pathways with greater specificity. Advances in cellular therapies, particularly regulatory T-cell therapies and mesenchymal stem cell treatments, aim to restore immune tolerance and repair damaged neural tissues. Furthermore, the integration of digital health tools, such as wearable devices and telemedicine platforms, supports early disease detection, patient monitoring, and personalized intervention adjustments. These novel approaches, combined with machine learning algorithms for data analysis, represent a shift toward a more individualized and proactive model of care. Collectively, these innovations hold the potential to significantly enhance patient outcomes by reducing relapse rates, slowing disease progression, and improving neurological function, paving the way for a new era in the management of autoimmune neurological disorders.

Keywords: NMOSD, myasthenia gravis, multiple sclerosis, T-cell, neurological diseases

Role of oxidative stress in neurological disorders

Anshika Pandey[1*], Saumya Awasthi[2]

[1] Institute of Pharmaceutical Sciences, Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)

[2] Institute of Pharmacy, Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)

anshikapandey396@gmail.com

Abstract

Long-term inflammatory demyelinating polyneuropathy and Guillain-Barre syndrome are influenced by the ratio of oxidative stress. TNFα appears to have a significant role in the series of events that result in demyelination and even damage to the axon. Serum levels of TNFα and IL-6 are higher during the acute phase, whereas anti-inflammatory cytokines are increased during the recovery phase. The majority of evidence indicates that myelin-specific CD4 T cells secreting Th type 1 cytokines are responsible for the significant role that cytokines play in the pathophysiology of multiple sclerosis. However, several distinct immune cells, such as B lymphocytes, CD8 T lymphocytes, and NK T lymphocytes, are also implicated in the cause. Microglia can activate microglia, which in turn causes the release of pro-inflammatory cytokines, which may contribute to the pathophysiology of AD. Chronic inflammation in the substantia nigra and striatum has been observed in parkinsonism. The degenerating dopaminergic neurons are surrounded by activated microglia that release proinflammatory cytokines, which could be a contributing factor to the loss of dopaminergic neurons. Research on animals with experimentally generated convulsions and people with epilepsy suggests that oxidative stress may also affect the electrical characteristics of neurons.

Keywords: Substantia nigra, NK T lymphocytes, anti-inflammatory, multiple sclerosis

Neurological diseases causing depression: multiple sclerosis, stroke, and Parkinson's disease

Safa Marwa[1*], Itee Pandey[2], Raghvendra Yadav[3], Saumya Awasthi[4], Anshika Pandey[5]

[1] Institute of Pharmaceutical Sciences, Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)

[2] Institute of Pharmacy, Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)

safakhankni@gmail.com

Abstract

A clinical diagnosis that lacks outside validation, depression is a diverse collection of illnesses. It might be especially difficult to diagnose depression when psychomotor impairment and alterations in vegetative function are present. The purpose of this review is to highlight the significance of depressive symptoms and syndromes for the general health of individuals with neurological illnesses and to give doctors the useful tools they need to identify and effectively treat depression. Two primary factors make diagnosing and treating depression in Parkinson's disease (PD) crucial: first, depression is prevalent in PD (more on prevalence is provided below), and second, depression significantly impairs quality of life, disability (as determined by activities of daily living), and caregiver stress. The impact of motor impairment has no bearing on this outcome. There is little evidence to support the treatment of depression in neurological illnesses. As a result, a large portion of therapy recommendations are grounded in clinical consensus and treatment experience in other contexts (i.e., idiopathic depressive disorders). There is an immediate need for controlled trials of depression therapies in this context.

Keywords: Parkinson's disease, psychomotor impairment, depression, and caregiver stress

A Review on Development of Diabetic Neuropathy Models in Sprague Dawley (SD) Rats

Singh Pragti[1*], Singh Sneha[2],
[1]Maharishi School ofPharmaceutical Sciences, MUIT, LucknowUttar Pradesh.
[2]Goel Institute of Pharmacy& Sciences, Ayodhya Road, near Indira Canal, Lucknow, Uttar Pradesh[2].
pragtithakur25@gmail.com

Abstract

Diabetic neuropathy (DN) is a very common condition associated with diabetes. The distal axonopathy that progresses is linked to this kind of DN. important cause of harm to the nerves that regulate internal organs in Americans aged 20 to 64.Understanding the pathogenesis of DN has been greatly aided by the use of rat models, particularly SD rats. Given the high incidence of diabetes mellitus, it is not unusual that 3.4 percent of people have DN. The goal is to create a rat model of DN, the most prevalent cause of nerve damage in diabetic patients, using substances like STZ, a high-fat diet, and genetic models.In order to create a diabetic neuropathy model in rats, Glucometer Accucheck active strips were utilised. All animals received a single intraperitoneal injection of the drug after a 6-hour fast. A normal pellet diet and a 10% sucrose solution were administered to all rats so order to prevent transit hypoglycemia. Rats' body weight, blood sugar, and feed intake were recorded every week. Rats with compounds that caused diabetes displayed high levels of peripheral, autonomic, and focal neuropathy, while the control group displayed typical nerve damage. Our research indicates that chemicals have a major impact on the evolution of the DN model.

Keywords: Nerve injury, Sprague Dawley Rats, STZ, high-fat diet, and genetic models.

Mechanistic Insights into the Pathophysiology of Diabetes Mellitus

Saniya, Sarita Verma*
Sagar Institute Technology and Management Department of Pharmacy Lucknow, Uttar Pradesh, 225001, India
bbk.sarita@gmail.com

Abstract

Diabetes mellitus, a prevalent metabolic disorder, stems from multifactorial disruptions involving genetic predispositions, environmental influences, and immunological responses, which disturb glucose homeostasis. This review provides a comprehensive examination of the mechanistic pathways involved in the pathophysiology of both type 1 and type 2 diabetes mellitus, focusing on recent advancements in understanding disease etiology. Type 1 diabetes is characterized by autoimmune-mediated destruction of pancreatic beta cells, driven by complex immunologic pathways, while type 2 diabetes involves insulin resistance in peripheral tissues and a progressive decline in beta-cell function. Key molecular mechanisms, such as the PI3K/AKT signalling pathway, mitochondrial oxidative stress, and autophagy dysregulation, are analyzed for their contributions to beta-cell apoptosis and insulin resistance. Furthermore, recent studies reveal the influence of gut microbiota, chronic low-grade inflammation, and epigenetic changes in exacerbating disease progression. The interplay between inflammatory cytokines and metabolic stress pathways further intensifies both beta-cell dysfunction and insulin resistance, creating a vicious cycle of hyperglycemia and metabolic imbalance. Understanding these multifaceted disruptions in molecular signalling and cellular response offers valuable insights into potential therapeutic targets aimed at preserving beta-cell function, enhancing insulin sensitivity, and modulating metabolic inflammation. This synthesis of current research presents a critical perspective for developing advanced intervention strategies in diabetes prevention and management.

Keywords: Diabetes Mellitus, Insulin Resistance, Beta-cell Dysfunction, PI3K/AKT Pathway, Oxidative Stress, Metabolic Inflammation.

Neuroprotective Effects of SGLT-2 Inhibitors in a Rat Model of Parkinson's Disease: Exploring the Role of Empagliflozin

Zahid Husain*[1,2], Vaseem Ahmad Ansari[2], Manju Pandey[3], Shraddha Pandey[4], Yasmin Khatoon[5]
[1,3,4,5] Institute of Pharmacy, Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)
[2] Faculty of Pharmacy, Integral University, Kursi Road, Dasauli, Lucknow, Utrar Pradesh, India (226026)
zahid1392@gmail.com

Abstract

A relatively recent class of antidiabetic medications with anti-inflammatory and antioxidant qualities are sodium-glucose co-transporter 2 (SGLT 2) inhibitors. Thus, the purpose of this study was to find out if SGLT 2 inhibitors have any neuroprotective effects in Parkinson's disease. Four groups of twenty-four Wistar rats were randomly assigned. Dimethyl sulfoxide (DMSO) was administered as a vehicle to the first (control group) at a rate of 0.2 mL/48 hours, S.C. Rotenone (ROT) (2.5 mg/kg/48 hr, S.C.) was administered to the second group (positive control) for 20 days in a row, while empagliflozin (EMP) (1 and 2 mg/kg/day, orally) was administered to the third and fourth groups, respectively. On the fifth day, the two groups were given rotenone (2.5 mg/kg/48 hr S.C.) concurrently with EMP for an additional 20 days. Behavioural analyses were conducted at the conclusion of the experimental period.

Rats were then killed, and samples of their blood and brain tissue were taken for examination. ROT markedly increased α-synuclein, proinflammatory markers, and oxidative stress. However, there was a considerable drop in Parkin, tyrosine hydroxylase (TH), dopamine (DP), and antioxidants. TH activity and dopamine levels were enhanced, α-synuclein and Parkin levels were maintained, and oxidative stress and inflammatory indicators were considerably maintained in the groups of EMP + ROT. EMP had a neuroprotective impact against the PD rat model at both low and high dosages, with the high dose producing a more pronounced effect.

Keywords: Parkinsonism, Neuroprotection, SGLT-2 inhibitors, Neurodegeneration, Rotenone, α-synuclein

A brief review of Sphingomyelinases and their function in neurological disorders

Raghvendra km. Yadav[1*],PramodChauhan[2], IteePandey[3], SafaMarwa[4], AnshikaPandey[5]
[1,3,4,5] Institute of Pharmaceutical Sciences, Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)
[2] Institute of Pharmacy, Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)
raghvendra202060@gmail.com

Abstract

Sphingomyelinases are broadly dispersed in the brain, and hydrolyze sphingomyelin to produce phosphorylcholine and ceramide. These enzymes serve an important role in the rapid synthesis of ceramides in neurological disorders and normal responses to receptor stimulation. We discussed the roles of acid sphingomyelinase (ASME) and neutral sphingomyelinase (N-SMase) in neurons, neuronal progenitor cells, glial cells, and brain endothelial cells; changes in acid and N-SMases in Niemann Pick Disease Type A, major depression, Alzheimer's disease, cerebral ischemia, and pain; and recent advances in the discovery of sphingomyelinase inhibitors. More research is needed to develop pharmacological medicines that block sphingomyelinases to prevent or treat neurological disorders.

Keywords: Phosphorylcholine, sphingomyelin, ceramide, progenitor cells

A Neuroprotective Medical Treatment for Neurodegenerative Maladies : Curcumin

Somesh Shukla[1] , Sonam Parmar[2], Dr. Anubhav Dubey[3], Dhruv Tripathi[4],
[1]Maharana Pratap College of Pharmaceutical Sciences
[2,3,4]Maharana Pratap College of Pharmacy
Someshshukla786@gmail.com

Abstract

Neurological illnesses are medically described as conditions that affect the brain, as well as the nerves present throughout the human body and spinal cord. Tumeric's major therapeutic constituent is curcumin. Curcumin is indicated for iron-deficient anaemia, but turmeric has several chemical ingredients that can cure a wide range of disorders. This is because the extract contains iron, which might promote haemoglobin synthesis. This is because the extract contains iron, which may have a role in the production of haemoglobin. The average turmeric plant contains 0.76 % alkaloids, 0.40 % flavonoids, 0.45 % saponin, 0.82 % phytic acid, 0.08 % phenol, 1.08 % tannin, and 0.03 % sterol. The flavonoid's unique properties are outlined in the cited chapter of the book. In support of flavonoids as neuroprotective agents, we also talk about their mode of action, molecular pathways, and many other things. Turmeric's active component, curcumin, is a polyphenol flavonoid. Loss of neurons and connections between them is a known consequence of neurodegenerative disorders. As neuroprotective treatments are most successful when administered before the onset of symptoms, any viable preventative measure would be eagerly sought after. Brain ischemia is one of the primary causes of mortality, and ischemic strokes account for the vast majority of these deaths. Curcumin's excellent safety profile as well as several pleiotropic properties suggest it may have neuroprotective effects as well. Ischemia comes in two flavours: localized and systemic. Globally, neurodegenerative diseases like Alzheimer's and Parkinson's are also on the rise. They are all similar in that they have a devastating impact on the central nervous system. Flavonoids, a natural bioactive chemical present in many vegetables, fruits, and traditional herbs, have a promising function in the treatment of neurodegenerative illnesses, and this book chapter provides some promising first research in this area. Flavonoid curcumin may protect neurons from damage caused by ischemia.

Keywords: Alzheimer, Parkinson, Neuroprotective agents. Curcumin

Formulation and Evaluation of Esomeprazole Loaded Mucoadhesive Microspheres.

Vinod Kumar Gautam
Khwaja moinuddin chishti language university lucknow UP, India
vinodkumargautam90@gmail.com

Abstract

The purpose of this study was to prepare and characterize mucoadhesive microspheres of Esomeprazole for prolonged retention in intestinal region of GIT. Mucoadhesive microspheres were prepared by ionic gelatine method using the polymers Sodium alginate (SA) along with various copolymers like Hydroxy Propyl Methyl Cellulose K100 (HPMC K100), Carbopol 934P and Chitosan. These microspheres were filled in gelatine capsules and coated with enteric polymer for targeting intestinal region of the GIT. Microspheres were characterized for the parameters like particle size, surface morphology by scanning electron microscopy, percentage yield, micromeritic properties, drug entrapment efficiency, swelling index, mucoadhesion capacity, stability studies and *in-vitro* drug release. The results of mucoadhesion study showed better retention of prepared microspheres in duodenal and jejunum regions of intestine. Pharmacokinetic study revealed that the bioavailability was found to be increased significantly when compared with marketed tablets. The drug release of Esomeprazole from optimized formulation followed matrix type of release. Overall the results indicated prolonged delivery with improved bioavailability of drug from mucoadhesive microspheres which is attributed to prolonged stay of dosage form in intestinal region of GIT.

Key words : Rheumatic Arthritis, RA, Autoimmune disease etc.

The Role of Technology in the Early Detection and Management of Dementia

Vivek Kumar Pandey*, Sarita Singh , Dr. Manju Pandey
Institute of Pharmacy of Shri Ramswaroop Memorial University, Lucknow-Deva Road, Uttar Pradesh India- 225003
vivekpandey878@gmail.com

Abstract

Dementia, a widespread condition among the elderly, includes various types such as Alzheimer's Disease, Vascular Dementia, Lewy Body Dementia, Frontotemporal Dementia, and Mixed Dementia, each distinguished by unique neuropathological features. Alzheimer's, the most common form, involves brain plaques and tangles, while Vascular Dementia results from compromised cerebral blood flow. Management strategies encompass pharmacological approaches, such as Cholinesterase inhibitors and Memantine, alongside non-pharmacological interventions like Cognitive Stimulation Therapy, physical exercise, and occupational therapy. Supportive care also focuses on caregiver assistance, environmental adjustments, and psychological counseling. Innovative advancements in dementia care emphasize early diagnosis through advanced imaging, blood-based and cerebrospinal fluid biomarkers (e.g., neurofilament light chain and phosphorylated tau), and genetic research aimed at personalized treatments. Technological tools, including artificial intelligence, wearable devices, and smartphone applications, play a vital role in early detection and ongoing monitoring by assessing cognitive functions, physical activity, and behavioral changes. Applications like Sea Hero Quest assess spatial navigation impairments, while platforms like BrainCheck measure various cognitive abilities through interactive tests. Preventive measures, including lifestyle adjustments such as diet and social engagement, are under investigation for their protective effects on cognitive health. These comprehensive approaches aim to enhance quality of life, enable timely intervention, and further dementia research with the goal of identifying potential treatments and improving patient outcomes.

Keywords: Dementia, Cholinesterase inhibitors, Psychological counselling, Alzheimer's, Biomarkers.

Specific Derivatization of Reserpine and characterization of the Vesicle Monoamine Transporter for the treatment of psychiatric diseases.

Shiv Prakash Pandey
Chaudhari college of pharmacy Bhiti Ambedkar Nagar UP.
Author for Correspondence: Department of Pharmacy
SGVU Jaipur Rajasthan
Email-sp04.pandey@gmail.com

Abstract

Reserpine, a competitive inhibitor of catecholamine transport into adrenal medullary chromaffin vesicles, consists of a trimethoxybenzoy group esterified to an alkaloid ring system. Reserpine inhibits norepinephrine by binding to chromaffin-vesicle membranes[1]. Methyl reserpate and reserpinediol, derivatives that incorporate the alkaloid ring system, also competitively inhibit norepinephrine transport into chromaffin vesicles, respectively. Similar concentrations inhibit reserpine binding to chromaffin-vesicle membranes. 3, 4, 5-trimethoxybenzyl alcohol and 3, 4, 5-trimethoxybenzoic acid, derivatives of the other part of the reserpine molecule, do not inhibit either norepinephrine transport or reserpine binding. Moreover, trimethoxybenzyl alcohol does not potentiate the inhibitory action of methyl reserpine[2]. Therefore, the amine binding site of the catecholamine transporter appears to bind the alkaloid **ring** system of reserpine rather than the trimethoxybenzoyl moiety. The more potent inhibitors are hydrophobic compounds, suggesting that the reserpine binding site is hydrophobic.

Keywords: Norepinephrine; Methyl reserpate; chromaffin-vesicle; catecholamine transport; Trimethoxybenzoyl moiety; Reserpinediol.

Review on herbal remedies on alopecia

Shweta J. Patil, Sakshi P. Bhamare, Saurabh D. Gaikwad, Khemchand R. Surana*,
Deepak D. Sonawane, Sunil K. Mahajan
Shreeshakti Shaikshanik Sanstha, Divine College of Pharmacy, Satana, Nashik, Affiliated to
Savitribai Phule Pune University, Pune, Maharashtra 423301, India
Khemchandsurana772@gmail.com

Abstract

Alopecia, another name for hair loss, is a condition brought on by a disruption in the body's cycle of keratin and biotin synthesis. Different people grow hair in different ways. An autoimmune condition called alopecia is typified by temporary, non-scarring hair loss while maintaining the hair follicle. Hair loss can manifest itself in a variety of ways, affecting all areas that bear hair, from well-defined patches to diffuse or complete loss. The pathophysiology and management of different types of alopecia are topics of great public interest, and knowledge of them will probably have a significant impact on the lives of patients. The examinations of hair loss Hair loss can happen on its own, be caused by an illness, or be brought on by using certain medication. Many disorders, both inherited and acquired, may be the reason. Making the appropriate diagnosis and course of therapy is aided by the doctors' comprehension of the ethological aspects and the distinctions between these diseases. Alopecia symptoms can range from little bald patches to total loss of body hair, depending on the underlying cause of the disorder. We therefore draw the conclusion that there are numerous herbal treatments that are effective at treating hair loss and have no negative side effects with the aid of this review article.

Keywords: Alopecia, telogen, anagen, remedies, baldness.

Neuroimaging innovations - (Advance functional MRI techniques for mapping real-time brain connectivity)

Manisha Dubey [1,2]*,Dr Brijesh Singh [2],Dr S.P Singh a[1]
[1]Amity University Lucknow, Malhaur Railway Station Road, Uttar Pradesh
[2]Ashoka Institute of Technology and Management (Pharmacy), Paharia-Sarnath, Varanasi, Uttar Pradesh
dubeymanisha008@gmail.com

Abstract

Innovative approaches that allow for in-depth study of the brain and nervous system are propelling advances in neuroscience research. At the cellular and molecular level, new methods like optogenetics, functional MRI (fMRI), and CRISPR gene editing are improving our knowledge of neural networks and brain function. By modifying specific brain circuits, optogenetics, for example, provides insights into behavior and cognition by precisely controlling cell activity with light. Real-time activity in living tissues and the viewing of neural structures are made possible by high-resolution imaging techniques such as two-photon microscopy.Computational models and artificial intelligence (AI) are being used to supplement these approaches, helping to analyze large datasets from electrophysiology and neuroimaging. Machine learning algorithms provide predictive insights into brain function and dysfunction by assisting in the identification of patterns within complex neural data. Understanding neurodevelopmental disorders, neurodegenerative diseases, and psychiatric issues has advanced as a result of this mix of experimental and computational methodologies. Current neuroscience research also emphasizes neuroplasticity, seeking to understand the brain's adaptive changes in response to injury or learning. These advances not only deepen our understanding of the brain but also hold promise for clinical applications, including precision medicine approaches to mental health, targeted therapies for neurodegenerative diseases, and brain-computer interfaces. As technology and methodology continue to advance, neuroscience is positioned to unlock new dimensions of human cognition, behavior, and neurological health.

Keywords: neuroscience, computational model, behavior

Progression in Neurosciences

*Shraddha Pandey, Prof. Dr. Manju Pandey, Zahid Hussain,
Institute of pharmacy ,shri ramswaroop memorial university ,Lucknow-Deva, Barabanki Road, 225003
Shraddhapandey.pharmacy@srmu.ac.in

Abstract

Current developments in human neuroscience demonstrate the potential to expand our understanding of the neural basis of memory development. The growing field of neuroscience is a critical area of exploration. As more and more people become interested in how the body's most imperfect system works, updates are becoming more frequent. New technologies, such as optogenetics, allow the brain to be studied in greater detail and complexity. Greater collaborations and open research have given new researchers access to neural data, thus improving and liberating the scientific process. These efforts have produced large datasets detailing the many ways machine learning and other analytical tools can be used to explain the relationship between the brain. As the brain initiative demonstrates, financial institutions are realizing how investing in the neuroscience of decision making can transform knowledge in ways that directly benefit society, from medical innovations to brain computer development and beyond.

Keywords: Innovation, Neuroscience, Clinical treatment, Optogenetics

Current advances in neurotechnology's with extensive promise for neuroscience research

Shraddha pandey*, Dr. Shikha srivastava, Shivangi sharma, Apurwa singh, Pragti singh
Institute of pharmacy ,Shri ramswaroop memorial university ,lucknow-deva, barabanki road, 225003
Shraddhapandey.pharmacy@srmu.ac.in

Abstract

The curiosity to uncover the fundamental processes and mechanisms of the human mind epitomize the central drive of modern neuroscience research. Activities that help achieve this goal rely on advanced techniques and engineering techniques that interact and support neural pathways, from single cells in small networks to the connectivity of the entire brain. Recent research has laid the foundation for many new technologies that facilitate work in this particular state. This review focuses on the level of development of the technology, which has the potential to be disseminated to the neuroscience community in the near future. A brief overview of current and emerging technologies in the field of technology for the fundamental elements of the technology, some of which focus on opportunities related to electrical, optical, and microfluidic neural interfaces, some of which are very versatile. Existing examples of the use of these techniques in neuroscience research demonstrate their effectiveness. The continued development of this research area is supported by the strengthening of the engineering sciences accompanying these platforms, research collaborations, and their impact on quality issues in the treatment of neurological diseases.

Keywords: Multimodal, neuroscience, technology, neurological disorder

Evaluation of antiulcer activity of *flacourtia jangomas* leaves extract on experimental animal

Richa Yadav
R.k pharmacy college kashipur,Surai, Sathiaon Azamgarh
yricha2272002@gmail.com

Abstract

To prepare the extract of the leaves part of the Flacourtia jangomas using ethanolic extract to explore the antiulcer activity using complete Pylorus ligation model & induced the ulcer in Albino rats. TLC was done on the extract after initial phytochemical analysis. Albino rats were topically applied ethanolic extract of leaves of plant investigated for ulcer healing and anti- ulcer activity in normal and ulcer applied rats and compared their effect with standard drug ranitidine for ulcer healing and anti-ulcer effect for 6-hour study. Various parameters gastric volume, free acidity, total acidity, Ul, b.w. & pH were recorded on day in 6 hr. Thereafter complete ligation, animals were anesthetized with the anaesthesia ketamine and sacrificed. The various parameters of UI studied, gastric volume, free acidity, total acidity, pH & histopathological examination of stomach tissue. The FJEE are taken in which gives better therapeutic response in ulcer healing. The ethanolic extract (FJEE) of leaves part of Flacourtia jangomas was studied and it was discovered to indicate significant healing and antiulcer activity in rats. The study reveals the ulcer healing and antiulcer activity of plant leaf part of Flacourtia jangomas is complete ulcer healing and antiulcer model. The extracts seem promising for the development of phytomedicine for antiulcer effect and study provides future research in screening the extract constituents responsible for the ulcer healing and antiulcer activity.

Keywords: Flacourtia jangomas, ulcer healing, antiulcer activity, Pylorus ligation model, ethanolic extract of Flacourtia jangomas (FJEE)

Alpha-Synuclein in Neurodegeneration: Mechanisms, Functions, and Therapeutic Implications

Vidhan Chand Bala*[1], Sunil Kumar Tiwari[1], Amit Kumar[1], Dinesh Kumar[1], Anesh Sagar[1], **Robinsh Kumar[2], Mukesh Kumar Singh[1]**

[1] School of Pharmaceutical Sciences, IFTM University, Lodhipur Rajput, Moradabad, 244102, Uttar Pradesh, India.

[2] Departments of Pharmaceutics L.B.S.S Degree College, Gohawar, Noorpur (246734), Bijnor, Uttar Pradesh, India.

vidhanchandbala07@gmail.com

Abstracts

A Lead character in the pathophysiology of Parkinson's disease (PD) and related synucleinopathies is alpha-synuclein (α-syn). α-syn is concerned in modifiable neurotransmitter release, synaptic activity, and neuroplasticity, while its precise character is still unidentified. Although it usually exists as a monomer, α-syn can, in several situations, form fibrils and oligomers. It's critical to preserve stability among the construction, aggregation, and elimination of α-syn since any deviations could direct to toxicity and abnormal accumulation. Familial Parkinson's disease is related with mutations or multiplications of the SNCA gene that amplify the expression of α-syn or its tendency to assemble. To preserve α-syn equilibrium, mechanisms like autophagy, chaperone binding, and proteolysis are essential. α-syn toxicity may be exacerbated in dementia with Lewy bodies (DLB) and intermittent Parkinson's disease (PD) due to impaired autophagy. Different conformations may result from the protein's interactions with ligands, barriers, or other types of proteins, which may have an impact on its physiological and pathological functions. For the development of tailored therapeutic methods, it is important to explain the molecular processes influencing α-syn conformational states and the structural base of its toxicity. While the injurious impact of α-syn fibrils and oligomers leads to neurodegeneration in synucleinopathies, oxidative stress can degenerate α-syn aggregation. Treatments for Parkinson's disease (PD) and comparable disability may be developed by focused on α-syn and the pathways that are connected to it.

Key Points: Neurodegeneration, synucleinopathies, neuroplasticity, lewy bodies, oxidative stress, alpha-synuclein

Neuroinflammation and Neurodegeneration: A Complex Interplay in Age-Related Neural Disorders,

Tanzeela Siddiqui, Ayeza Sarwar Kalam, Divyadarshan Lohani, Asim Rahman ,Rufaida Wasim*
Department of Pharmacology, Faculty of Pharmacy, Lucknow, Integral University., India-226026
rufaidaw@iul.ac.in

Abstract

The rising prevalence of neurodegenerative diseases (ND), particularly in elderly populations, presents a significant healthcare challenge. This article examines the critical relationship between neuroinflammation and neurodegeneration, focusing on major disorders such as Alzheimer's disease (AD), Parkinson's disease (PD), and Multiple Sclerosis (MS). Recent evidence suggests that neuroinflammatory processes play a pivotal role in the pathogenesis of these conditions, extending beyond the traditional understanding of misfolded protein aggregates. The inflammatory response involves both innate and adaptive immunity, mediated through complex interactions between microglia, astrocytes, and peripheral immune cells. Inflammatory mediators, including pro-inflammatory cytokines (IL-1β, IL-6, TNF-α), chemokines (CCL2, CCL5), and other factors such as matrix metalloproteinases and reactive oxygen species (ROS), contribute to a self-perpetuating cycle of neuroinflammation and neuronal damage. Notably, compromising blood-brain barrier integrity allows peripheral immune cells and inflammatory mediators to infiltrate the central nervous system, potentially exacerbating neurodegeneration. This is particularly relevant in conditions such as AD, where patients show increased vulnerability to cognitive decline. While inflammation appears crucial in both disease onset and progression, therapeutic application of anti-inflammatory agents has shown limited success, highlighting the complexity of these disorders. This abstract summarizes the current understanding of neuroinflammatory mechanisms in neurodegeneration, examines the roles of various cellular and molecular players, and discusses the implications for potential therapeutic strategies. Understanding these mechanisms is crucial for developing effective interventions for neurodegenerative diseases, which are projected to affect over 135 million people globally by 2050.

Keywords: Blood-brain barrier, Cytokines, Immune response, Microglia, Neural disorders .Protein aggregates

Modern Approaches in Neurodegenerative Diseases: A Comprehensive Review

Akash Kumar Verma, Brijesh Sharma*
Mangalatyan University Beswan, Aligarh, Uttar Pradesh,202145, India
brijesh.sharma1961@mangalatyan.edu.in

Abstract

Neurological disorders are a leading cause of both physical and cognitive disability worldwide, currently affecting approximately 15% of the global population. Neurodegenerative diseases (NDs) are chronic and progressively debilitating conditions characterized by the gradual degeneration or death of neurons within the central nervous system (CNS), severely impairing cognitive, emotional, behavioural, and motor functions. This review explores promising developments in machine learning applications for the prevention and treatment of neurodegenerative and depressive disorders, areas that remain at the forefront of neurophysiological, genetic, and multidisciplinary medical research. Despite decades of investigation, innovative approaches to assessing, particularly preclinically, and addressing neurodegenerative diseases and depressive disorders are still urgently needed. The diagnosis and pathophysiology of neurodegenerative diseases are complex, with cognitive impairment posing a significant therapeutic challenge. Cognitive functioning is fundamental to an individual's interaction with the external environment and can influence the development of mental health disorders. Notably, the practical, goal-oriented nature of modern physiotherapy parallels cognitive behavioral therapy approaches, highlighting a philosophical and methodological convergence in treating cognitive and behavioural symptoms associated with neurodegeneration. A significant number of neurodegenerative diseases are driven by abnormal aggregation of proteins such as tau, alpha-synuclein, TDP-43, and amyloid-beta, which form amyloid plaques and other pathogenic structures. Understanding these proteinopathies is critical for developing effective therapeutics. This review synthesizes current research on these modern approaches, offering a comprehensive analysis of advancements in diagnosis, treatment, and rehabilitation strategies for neurodegenerative diseases.

Keywords: Neurodegenerative diseases (NDs), Machine learning in neurodegeneration, Central nervous system (CNS), and Neurophysiology.

Antianxiety Potential of Alkaloidal Fraction of *Ziziphus mauritiana* aerial parts

Sukirti Upadhyay*, Prashant Upadhyay
School of Pharmaceutical Sciences, IFTM University, Moradabad
sukirtiupadhyay@gmail.com

Abstract

Ziziphus mauritiana belonging to the family Rhamnaceae also known as “ber” in India. It is medicinally used for antidiarrhoeal potential.*Ziziphus mauritiana* is rich in flavonoidal and alkaloidal content. The aerial part of *Ziziphus mauritiana* is macerated in ethyl alcohol for seven days with continuous shaking and then it was concentrated in a vacuum. The yield was 2.5% w/v. Then the extract was subjected to isolation of alkaloidal fraction. Then alkaloidal fraction was detoxified by boiling in milk, then the purified fraction was administered to Wistar albino rats for evaluation of antianxiety activity. The models used were the Elevated plus maze test, light and dark test, and rotarod test results were compared with the standard drug Diazepam. The alkaloidal fraction of aerial parts of *Ziziphus mauritiana* shows excellent antianxiety activity as compared to the standard drug Diazepam. Thus this is concluded that the purified alkaloidal fraction of *Ziziphus mauritiana* possesses antianxiety potential**.**

Key words: *Ziziphus mauritiana*, aerial parts, anxiety.

Advances in Drug Delivery Systems for the Central Nervous System: Overcoming the Blood-Brain Barrier

Vijay Sharma[1], Amit Kumar[2], Navneet Verma[1]
[1]Pharmacy Academy, IFTM University, Moradabad, U.P.
[2]Shri Ramswaroop Memorial University, Lucknow (U.P.)
vijaysrampur@gmail.com

Abstract

A dynamic and selective barrier, the blood-brain barrier (BBB) strictly controls the flow of chemicals from the bloodstream into the central nervous system (CNS). Although the BBB protects the body from dangerous infections and poisons, it also poses a major obstacle to the creation of efficient medications for neurological conditions. Recent developments in drug delivery systems (DDS) that attempt to cross the blood-brain barrier and enable targeted delivery of therapeutic drugs to the brain are the main topic of this study. We investigate a number of tactics, such as chemical approaches like receptor-mediated transcytosis and liposomal encapsulation, physical techniques like focused ultrasound and microbubble-assisted disruption, and the application of nanomaterials like nanoparticles and dendrimers to improve drug permeability. We also look at cutting-edge strategies like brain-targeted viral vectors and intranasal delivery, which completely circumvent the BBB by using different pathways or by using brain-specific targeting ligands. The review also emphasizes the present drawbacks and difficulties of these methods, including the requirement for exact control over drug release, variable targeting efficiency, and toxicity issues. Lastly, we go over the possible therapeutic uses of these sophisticated DDS, such as the management of brain tumors, psychiatric conditions, and neurodegenerative diseases like Parkinson's and Alzheimer's. These new drug delivery techniques present encouraging opportunities for the creation of safer and more efficient therapies for CNS illnesses by bridging the gap between preclinical research and clinical translation.

Keywords: Blood-brain barrier, drug delivery systems, nanoparticles, focused ultrasound, receptor-mediated transport, neurodegenerative diseases, CNS drug delivery.

Neuroprotective Drugs from Sea for the Management of Parkinson's disease

Palak Agrawal
Institute of Pharmacy, Shri Ramswaroop Memorial University, Barabanki, UP, India (225003)
palak.hope2023@gmail.com

Abstract

Neurodegenerative disorders, such as Parkinson's disease, are a major worldwide health concern. It is a progressive neurodegenerative condition that affects the movement of the body. Characterized by the degeneration of dopamine-producing neurons in the substantia nigra of the brain, Parkinson's presents a complex array of motor and non-motor symptoms. The progressive nature of the disease, motor fluctuations, debilitating side effects, limited efficacy in non-motor symptoms, and individual variability in response represent significant challenges in providing optimal care.The pursuit of novel medicinal agents has led to the study of marine biodiversity, which includes a large amount of bioactive chemicals with potential neuroprotective qualities. Bacteria occupy up to 40 % of the biomass of sponges. Marine cyanobacteria produce many compounds with activities like neurotoxic, antiproliferative, anticancer, antibacterial, antiviral, immunomodulatory, and anti-infective. The increased interest in marine-derived bio-compounds can contribute to structural and chemical features not often present in terrestrial items, with numerous bioactive marine-sourced natural molecules demonstrating ten times the bioactivity of terrestrial-sourced molecules. Sea-based sources obtained from different organisms such as bacteria, fungi, sea cucumber, archaea, conus, algae, sponges, and corals have been reported to have a promising role in managing Parkinson's disease following different signaling pathways. The paper concentrates on the neuroprotective properties of sea compounds and underlines their potential utility as future pharmacological candidates to prevent neurological disorders such as Parkinson's disease. It also analyzes their potential to counteract oxidative stress, inflammation, and neuronal death. Furthermore, it discusses the current research trends and future directions in producing marine-derived neuroprotective drugs, highlighting the importance of further preclinical and clinical investigations to transform these promising discoveries into viable therapeutics.

Keywords: Neurodegeneration, marine sources, Parkinson's, neuronal death.

EDITORIAL NOTE

On behalf of our journal, "IJPHI," we extend our sincere gratitude to the entire organizing team and management of the Institute of Pharmacy, Shri Ramswaroop Memorial University, for organizing an international seminar on "Advanced Research Methodology in Neuroscience" with great success. It's a matter of great pride and honor for us that we have reached the remarkable milestone of having more than 100 Abstracts submitted to this seminar.

Our sincere thanks go to the committee members of the organizing institute, the editorial board, and all the participants who joined us with trust and enthusiasm and made this achievement possible.

We look forward to being associated with you in our future endeavors.

Prof. (Dr.) Satya Prakash Singh

Editor in Chief and Professor

Amity Institute of Pharmacy,

Amity University Uttar Pradesh Lucknow Campus