METRO GROUP OF HOSPITALS
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METRO COLLEGE OF HEALTH SCIENCES & RESEARCH
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SOUVENIR CUM SCIENTIFIC ABSTRACTS

AI Health Fusion-2025

An International Conference on

AI Frontier in Health Sciences: Unveiling New Possibilities & Challenges

at Constitution Club of India, New Delhi

29th March 2025 | Hybrid Mode

Organized by

Metro College of Health Sciences & Research

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International Conference on AI Frontier in Health Sciences: Unveiling New Possibilities & Challenges

Editor

Dr. Akhil Sharma
Director
PRS Educational Trust, Greater Noida

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Dr. (Prof.) Purshotam Lal

Padma Bhushan, Padma Vibhushan & Dr. B C Roy National Awardee Director- Interventional Cardiology, Chairman-Metro Group of Hospitals

MESSAGE

I would like to extend my warmest welcome to the **International Conference on AI Frontier in Health Sciences: Unveiling New Possibilities and Challenges**. This conference will serve as a pivotal platform for experts from diverse fields to explore the transformative role of artificial intelligence (AI) in healthcare profession.

AI has revolutionized healthcare by enhancing diagnosis and treatment decisions through machine learning for structured data and advanced deep learning and Natural Language Processing (NLP) for unstructured data. Its impact is particularly significant in key medical fields such as oncology, neurology, and cardiology, where AI-driven advancements are improving patient care and clinical outcomes.

I hope this conference would be a successful event, featuring insightful presentations and interactive discussions on the latest breakthroughs in AI-assisted rehabilitation. Recently, AI is playing an increasingly vital role in cardiology, especially in nuclear cardiology, where its applications are rapidly expanding. A key area of focus is the evaluation of training and testing protocols for emerging AI methodologies to ensure their clinical feasibility. AI has demonstrated immense potential in enhancing image reconstruction, reducing radiation exposure, and improving overall image quality. By integrating clinical, stress, and imaging data with machine learning, AI can refine the detection of obstructive coronary artery disease (CAD) and enhance risk prediction.

AI holds great potential, but addressing key challenges can enhance its effectiveness. Improving data quality and diversity may lead to more accurate and fair outcomes. Strengthening privacy and regulatory compliance can build trust among clinicians and patients. Seamless AI models integration into existing systems can improve workflow efficiency. Finally, professional training and support may foster acceptance among healthcare providers.

I extend my best wishes to all attendees, speakers, and participants contributing in this conference. I am confident that the knowledge exchange and the collaborations during this event will propel us toward a more innovative and sustainable future in healthcare.

Once again, I look forward to welcome you on this grand event.

Best Regards,

Dr. Purshotam Lal
Chairman–Metro Group of Hospitals
Chief Patron

Dr. Sameer Gupta

Senior Interventional Cardiologist, Group Head–Cardiac Cath Labs Director – Metro Group of Hospitals

MESSAGE

I am pleased to express my delight and enthusiasm for the International Conference on *"AI Frontier in Health Sciences: Unveiling New Possibilities and Challenges*," which is being held on 29 March 2025, organized by Metro College of Health Sciences and Research, in collaboration with the P.R.S Educational Trust.

This conference is expected to mark a significant milestone in our relentless pursuit of knowledge and innovation, focusing on one of the most transformative fields of the modern era-Artificial Intelligence in the realm of Health Sciences.

As we stand at the intersection of cutting-edge technology and healthcare, this conference seeks to explore how AI is shaping the future of medical research, diagnostics, treatments, and patient care. The conference would be a platform for distinguished professionals, experts, and thought leaders from across the globe to share their insights, research findings, and visions on the vast potentials and emerging challenges that AI presents in healthcare.

I am proud to greet the conference's attendees on behalf of MCHSR and offer my congratulations and best wishes for success to everyone involved in the event. I expect that this conference will inspire engaging discussions, and ignite a passion for innovation that will carry forward into the future of AI in Health Sciences.

The goal of the organizing team should be to make this an internationally acclaimed conference, facilitating scientific collaboration among global experts in the field.

Best Regards,

Dr. Sameer Gupta

Chief Patron

Dr. Sonia Lal Gupta

Senior Consultant- Neurology, Director-Metro Group of Hospitals Managing Director-Metro College of Health Sciences and Research, Greater Noida

MESSAGE

It gives me immense pleasure to witness the successful organization of the International Conference on "AI Frontier in Health Sciences: Unveiling New Possibilities and Challenges" by Metro College of Health Sciences and Research, in association with the P.R.S Educational Trust. As the Managing Director of the college, I am thrilled to see how far we have come in just 8 years and how our institution is now at the forefront of addressing one of the most pressing challenges of our time.

AI in health fusion integrates advanced machine learning, data analytics, and healthcare to create more efficient, personalized medical solutions. By combining vast datasets, including genetic, clinical, and environmental factors, AI enhances diagnostics, predicts disease progression, and tailors treatments to individual patients. This fusion allows for earlier detection of conditions like cancer, cardiovascular diseases, and neurological disorders through more accurate imaging analysis and predictive models. AI also accelerates drug discovery by simulating molecular interactions and identifying potential treatments faster than traditional methods. Moreover, AI-powered robotics and decision-support systems are helpful in improving surgical precision and minimizing errors.

As Sr. consultant neurologist and Managing Director of Metro College of Health Sciences and Research, I am extremely proud of the efforts put in by the organizing team in organizing this conference. The successful convening of a diverse group of healthcare professionals, researchers, and industry leaders to address this critical issue is a testament to the unwavering dedication and hard work of the team.

I extend my sincere best wishes to the organizers, speakers, guests, and participants for the success of this upcoming conference. I look forward to fostering continued collaboration in addressing the challenges.

Best Regards,

Dr Sonia Lal Gupta

Chief Patron

Dr. Sahil Lal

Director – Metro Group of Hospitals

MESSAGE

It is my pleasure and privilege to welcome you at International Conference, "AI Frontier in Health Sciences: Unveiling New Possibilities & Challenges," being held on 29th March 2025 at Constitution Club of India, organized by Metro College of Health Sciences and Research, in collaboration with the PRS Educational Trust. The Constitution Club of India is situated at the heart of New Delhi and was established to foster social connections and offer the usual amenities of club life for the benefit of the members of the Indian Constituent Assembly. Over time, it has successfully evolved into a prestigious forum, facilitating interaction among past and present Members of Parliament.

Artificial Intelligence is revolutionizing health science, merging technology with human expertise to enhance patient care, diagnostics, and treatment. AI-driven innovations in medical imaging, predictive analytics, robotic surgery, and personalized medicine are reshaping the way we understand and manage health. From early disease detection to virtual health assistants and AI-powered drug discovery, the fusion of AI with healthcare is improving efficiency, accuracy, and accessibility.

This remarkable integration not only empowers medical professionals but also ensures better outcomes for patients worldwide. As we embrace AI Health Fusion, we step into an era of smarter, data-driven healthcare solutions that prioritize precision and innovation. Artificial Intelligence (AI) is set to revolutionize the healthcare industry, offering immense opportunities for young doctors to enhance patient care, improve efficiency, and drive medical innovation. The future of AI in medicine is promising, with AI-powered tools increasingly being integrated into clinical practice, diagnostics, treatment planning, and patient management.

I am proud to greet the conference's attendees on behalf of MCHSR and offer my best wishes for success of the event.

I look forward to meeting you all at the conference.

Best regards,

Dr. Sahil Lal

Chief Patron

Dr. Akhil Sharma
Director, P.R.S. Educational Trust

MESSAGE

It is with great pleasure that I extend my warmest greetings to all the distinguished participants, researchers, and experts gathered for the International Conference on *"AI Frontier in Health Sciences: Unveiling New Possibilities & Challenges."*

Artificial Intelligence is revolutionizing the landscape of healthcare, offering unprecedented opportunities to enhance diagnostics, treatment strategies, and patient care. As we stand at the crossroads of innovation and practical application, this conference serves as a platform to explore AI's transformative potential while addressing the ethical, technical, and regulatory challenges it brings.

I commend the organizers, speakers, and contributors for their dedication to fostering meaningful discussions and advancing the field of AI in health sciences. May this conference ignite new ideas, inspire collaborations and pave the way for groundbreaking advancements in healthcare technology.

Wishing you all a fruitful and insightful conference.

Best regards,

Dr. Akhil Sharma
Director, P.R.S. Educational Trust

Ms. Akanksha Sharma
Deputy Director, P.R.S. Educational Trust

MESSAGE

It is an honor to welcome all participants, presenters, and experts of the International Conference on "*AI Frontier in Health Sciences: Unveiling New Possibilities & Challenges*."

As we continue to witness the rapid evolution of Artificial Intelligence, its applications in health sciences are opening new avenues for innovation, improving diagnostics, treatment protocols, and overall patient outcomes. This conference presents an invaluable opportunity to delve into the latest advancements in AI technology, exchange ideas and address the critical challenges that accompany its integration into healthcare systems.

The P.R.S. Educational Trust is committed to supporting initiatives that foster knowledge exchange and collaboration in this dynamic field, and we are excited to be part of this transformative journey.

I look forward to the stimulating discussions and advancements that will emerge from this conference, and I am confident that together we can drive meaningful change in health sciences.

Best regards,

Ms. Akanksha Sharma
Deputy Director, P.R.S. Educational Trust

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MCHSR/AI/2025/001

PHARMACOLOGICAL AND TOXICOLOGICAL ASSESSMENT OF HERBAL PLANT EXTRACT IN EXPERIMENTAL RAT MODELS

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The present study evaluates the pharmacological and toxicological effects of herbal plant extract in experimental rat models. The extract was assessed for its anti-inflammatory, antioxidant, and hepatoprotective activities. The results showed that the extract exhibited significant anti-inflammatory and antioxidant activities. The extract also showed hepatoprotective activity against carbon tetrachloride-induced liver damage. The study suggests that the herbal plant extract may be useful in the treatment of inflammatory and oxidative stress-related disorders. The extract was found to be safe up to a dose of 200 mg/kg. However, higher doses showed toxicity. The LD50 of the extract was found to be 500 mg/kg. The study provides evidence for the traditional use of the herbal plant in medicine. The results of the study are promising and warrant further investigation. The herbal plant extract may provide a new approach to the treatment of inflammatory and oxidative stress-related disorders. Further studies are needed to confirm the efficacy and safety of the extract in humans.

Key-Words: Pharmacological Assessment, Toxicological Assessment, Herbal Plant Extract, Experimental Rat Models, Anti-inflammatory Activity

DIABETES MELLITUS: A GROWING PUBLIC HEALTH CHALLENGE

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Major public health issues include diabetes. In contrast to western countries where just two or three percent of the population is affected, diabetes mellitus now affects a far larger number of people in many developing countries. With an estimated 33 million individuals suffering from diabetes in India alone. It is a significant twentieth-century epidemic. Diabetes is a chronic condition that is linked to obesity, hypertension, ageing, and the buildup of toxic substances in the vascular endothelium that can lead to the development of microangiopathies or microvascular problems. Peripheral neuropathy, nephropathy, and retinopathy are examples of these consequences, which lead to higher morbidity and early mortality. Many factors, including genetic predisposition and ethnicity, affect how common these issues are in different groups. In addition to these issues, cardiovascular alterations are also happening. Slow nerve conduction and pain, numbness, and tingling in the limbs are symptoms of peripheral neuropathy (PN). Up to 50% of diabetic people might develop neuropathy, and between 10% and 20% of diabetic patients can experience painful neuropathy. Increased urine protein, renal function loss, excessive extracellular matrix protein deposition in the mesangium, and clear cytoplasm of the proximal tubular epithelial cells as a result of excessive glycogen reabsorption are all symptoms of diabetic nephropathy. For effective management and the prevention of diabetes-related problems, evaluation of diabetes and its complications is crucial.

Keywords: Diabetes mellitus, Neuropathy, complications, morbidity, nephropathy, retinopathy.

MCHSR/AI/2025/003

FROM DIAGNOSTIC TRIAL TO DIGITAL TWINS: A NEW FRONTIER IN UVEITIS CARE

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A digital twin is a virtual replica of a real-world object, system, or process that's constantly updated with live data from sensors, simulations and is often used in healthcare, they model biological systems, such as organs or entire patients, to personalize care and predict outcomes. As far as digital twins are concerned with uveitis, digital twins can model the eye's response to uveitis, helping to test treatments and develop personalized therapies.Uveitis, an inflammatory eye disorder, is an ophthalmic emergency that requires urgent control of the inflammation to prevent vision impairment globally. Traditional treatment approaches often rely on empirical strategies, leading to variability in therapeutic outcomes. However, traditional delivery of medication in uveitis management offers safety concerns, limited targeting abilities and less prior to patient compliance. To conquer these challenges, the use of AI driven digital twins is in vogue. It includes genetic information, biomarkers, eye scans, OCT (Optical Coherence Tomography) images of fundus and retinal part of an eye. Digital twins are preferred now-a-days as it can simulate how uveitis treatment progresses with different treatments before giving the therapeutics to the patient.Digital twins offer multiple advantages such as to provide real-time patient data, assess immune responsiveness, predict the optimum dose, reduces side effects and prognosticate the pros and cons of the treatment. As artificial intelligence and digital healthcare are headway, digital twins could modernize uveitis treatment and several other disorders, making it more effective, personalized and detailed in a precise manner. This swaps from diagnostic trial to data-driven intelligent healthcare. Also, it represents a notable bound towards following-generation personalized healthcare.

Keywords: Uveitis, Digital twins, Artificial intelligence, Personalized healthcare.

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MOLECULAR DOCKING: A COMPUTATIONAL REVOLUTION IN DRUG DISCOVERY

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Molecular docking is a computational approach utilized in drug development to forecast how small drug compounds interact with their target proteins. This technique is crucial for determining molecular affinity and activity, making it vital for pharmaceutical formulation. The docking procedure consists of two main elements: scoring functions, which assess binding affinity, and search algorithms, which investigate possible ligand conformations. Scoring functions mathematically evaluate the interactions between ligands and proteins, while search algorithms pinpoint the most favorable binding orientations. Molecular docking is extensively used in lead identification, where computational tools prioritize extensive compound libraries based on predicted binding affinities. It also supports lead optimization by forecasting structural changes that improve a compound's efficacy. In summary, molecular docking serves as a potent instrument in drug discovery, advancing lead selection and refinement. Progress in computational methods continues to enhance docking precision through improved algorithms and scoring techniques.

Keywords: molecular docking, computational techniques, scoring functions, search algorithms, ligand binding.

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COMPUTATIONAL APPROACH FOR PEPTIDE CHAIN LEADS AGAINST TUBERCULOSIS

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Background: *Mycobacterium tuberculosis* is prime-bacteria that causes tuberculosis via droplet infection. It predominantly affects lungs and can further cause chronic lung injury. Although, first-line antitubercular drugs are available for the treatment but possess their own adverse effects which makes the patient suffer more. Multiple drug-resistant tuberculosis is also becoming a challenging situation for clinicians. Antimicrobial peptides (AMPs) are a unique group of shorter to longer chain of peptides that can target and resist the bacterial infection directly with a wide spectrum of activity.

Objective: To assess potential of antimicrobial peptide leads against tuberculosis by computational approach with machine learning models to support their antitubercular activity. Material and Methods: The involved target proteins structures were retrieved from protein data bank database. The antimicrobial peptides were selected through PubChem. The preparation of ligand and protein, generation of receptor grid, docking of ligand and protein were carried out by computational approach. The high dock score results were further analyzed by machine learning models.

Results: The peptide chain leads were accessed for docking with multiple tuberculosis targets. The high dock score peptides were further studied for certain their chemical, pharmacokinetics and toxicological effects via different computational evaluators. The shortlisted peptides were undertaken for machine learning models and calculations in order to get the best antitubercular active peptides. Several machine learning tools were also used to predict the solubility of various peptides, based on their molecular properties.

Conclusion: The results supported antimicrobial peptides potential for antitubercular activity in comparison to reference first line antitubercular drugs.

Keywords: Computational approach, Peptides; Antimicrobial peptides; Multiple Drug-resistant tuberculosis; Chronic lung injury

IN SILICO ADMET AND MOLECULAR DOCKING STUDIES OF NOVEL CHALCONE DERIVATIVES AS POTENTIAL EGFR-TARGETING ANTI-CANCER AGENTS

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Introduction: Endothelial growth factor receptor (EGFR) plays important role in Cancer, making it an effective anticancer activity. Chalcone derivatives, known for their wide range of pharmacological properties. They also have demonstrated potential of anti-cancer properties. In this research, a range of novel chalcone derivatives were developed to focus on EGFR, with the goal of improving their anti- cancer activity. The presence of heteroatoms such as nitrogen or oxygen in their structure might enhance interactions with EGFR thereby boosting their pharmacological activity.

Methodology: SwissADME and pkCSM software were used to estimate the chalcone derivatives absorption, distribution, metabolism, excretion, and toxicity (ADMET) characteristics in order to evaluate their potential as therapeutic possibilities. The Molinspiration software was computed for bioactivity score to predict the new derivatives of pharmacological potential. Molecular docking study was performed on EGFR by Autodock software to assess the chalcone derivatives potential as anti- cancer agents. Finally, the results were visualized using discovery studio to analyze the compounds binding affinity and mode of interaction with EGFR.

Result: According to ADMET analysis, several new chalcone compounds have strong pharmacokinetic characteristics, such as reduced toxicity and good oral bioavailability. The derivatives were all suitable for oral administration after passing Lipinski's rule of Five. The findings of molecular docking showed that the chalcone derivatives had favorable interaction energies and a significant binding affinity for EGFR. Chalcones potential as powerful VEGFR inhibitors was indicated by their binding interactions with EGFR, highlighting their potential as anti-cancer agents that target EGFR.

Keywords: Chalcone derivatives, EGFR, anti-cancer agents, *in-silico* studies, molecular docking, ADMET.

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ADVANCEMENT OF DETECTING EPILEPSY CONCERNING BIOMARKERS

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Recent advances in the detection of epilepsy using biomarkers have made significant improvements in diagnosis, treatment, and care. Key developments comprise genetic biomarkers, which demonstrate that improvements in genetic testing have found mutations associated to epilepsy, facilitating early diagnosis and tailored therapies, particularly in hereditary types such as Dravet syndrome. Neuroimaging methods such as high-resolution MRI, functional MRI, and magnetoencephalography provide more specific insights into brain disorders, assisting in seizure diagnosis and surgery planning. EEG represents the benchmark, but new machine learning algorithms use EEG data to detect minor biomarkers and anticipate seizures, allowing for prompt treatment. Metabolic and inflammation Seizure frequency and neuronal damage may be tracked using biomarkers present in cerebrospinal fluid and blood, such as neurofilament light chain and BDNF. Wearable technology and AI-powered algorithms are currently being researched to track biomarkers in real time, with the potential to identify seizures prior to they arise. Genetic information and biomarkers are directing the development of more tailored treatment approaches, maximizing anti-epileptic medication options depending on an individual's genetic profile. While many biomarkers currently remain in the research stage, their ability to enhance early diagnosis, tailor medications, and anticipate seizures bodes well for the coming years of epilepsy management.

Keywords: Biomarkers, Dravet syndrome, Electroencephalography, Epilepsy, Magnetoencephalography

MCHSR/AI/2025/008

AI & ML DRIVEN PHARMACEUTICALS: BRIDGING PRECISION, ACCESSIBILITY, AND PATIENT-CENTRIC CARE

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The integration of artificial intelligence (AI) into pharmaceutical sciences leads to aredefining drug delivery system and with orally disintegrating film (ODFs) emerging as a promising fusion for enhancing patient adherence and therapeutic outcomes. There are many transformative roles of AI in optimizing formulation design, manufacturing, and deployment, while addressing the opportunities at the intersection of pharmacy practice with recent technologies. ODFs, which is known for their rapid disintegration and ease of administration, however few areas like inconsistent dissolution rates, poor palatability, choice of polymer and dose of drugs can be further enhance by AI-driven approaches, such as machine learning (ML) and generative models, can help in predicting optimal polymer-excipient combinations for mechanical stability and rapid dissolution. Furthermore, neural networks can assist drug-loading protocols for poorly soluble APIs and reinforcement learning can help in optimizing solvent casting parameters to minimize production defects. The personalization is a key feature of AI-ODF synergy. Algorithms of AI analyze the data specific to patient and then facilitate dose customization via 3D-printed ODFs, customized as per patient condition. AI further help to improve palatability by predicting flavour-excipient interactions, critical for pediatric adherence. The combination of AI and Pharmaceutics promises on-demand patient centric formulation in pharmacies, precise dosing, optimized formulation and sustainable excipient discovery. By embracing AI as a collaborative tool, pharmacists can lead a paradigm shift toward accessible, personalized, and ethically grounded drug delivery.

Keywords: Artificial intelligence, orally disintegrating films, personalized medicine, drug delivery, pharmacy innovation.

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FORMULATION AND EVALUTION OF TRANSDERMAL NANO INVASOMES GEL

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Transdermal nano invasomes gel represents an innovative advancement in drug delivery, addressing the challenges of low skin permeability associated with conventional transdermal systems. Invasomes, lipid-based vesicles augmented with ethanol and terpenes, enhance drug permeation by fluidizing lipid bilayers and disrupting the stratum corneum. Incorporating nanotechnology further optimizes these vesicles into nano-sized carriers (typically 100-300 nm), improving their ability to traverse skin barriers via hair follicles and intercellular pathways. Formulated as a gel, this system offers dual benefits: the viscoelasticity of the gel ensures localized application and sustained release, while the nano invasomes facilitate efficient drug loading and deep tissue penetration. Recent studies highlight techniques such as thin-film hydration and sonication for vesicle synthesis, with characterization via dynamic light scattering, electron microscopy, and differential scanning calorimetry confirming stability and nanostructure. *In vitro* and *ex vivo* models demonstrate superior permeation profiles and bioavailability compared to traditional formulations, particularly for hydrophobic and macromolecular drugs. Applications span chronic pain management, hormonal therapies, and dermatological treatments, capitalizing on non-invasive administration, bypassed first-pass metabolism, and enhanced patient compliance. With ongoing research focused on scalability and clinical validation, transdermal nano invasomes gel emerges as a promising platform for targeted, controlled, and patient-friendly drug delivery.

Keywords: Nano Invasomes, Transdermal drug delivery, Skin penetration.

SYNTHESIS, IN SILICO EVALUATION, AND QSAR ANALYSIS OF PARA-COUMARIC ACID DERIVATIVES AS POTENTIAL ANTIDIABETIC AGENTS

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Introduction: Diabetes Mellitus remains a significant global health challenge, contributing to considerable morbidity and mortality. Despite the availability of various treatments, the search for new, effective, and safe antidiabetic agents continues. Para-coumaric acid, a naturally occurring phenolic compound, has shown promising antidiabetic properties. This study aims to design and evaluate novel derivatives of para-coumaric acid as potential antidiabetic agents.

Methodology: Five new para-coumaric acid derivatives (Cn1-Cn5) were synthesized through an amination reaction involving para-coumaric acid and appropriately substituted amines. Their drug-likeness and antidiabetic potential were assessed using in silico studies. Molecular docking simulations, performed using PyRx, evaluated the binding affinity of these derivatives to alpha-amylase, a key enzyme in diabetes management. Additionally, the pkCSM software was utilized to predict pharmacokinetic properties, including absorption, distribution, metabolism, excretion, and toxicity (ADMET). Further toxicity assessments were conducted using the ProTox software. A quantitative structure-activity relationship (QSAR) analysis was carried out to identify key chemical descriptors linked to antidiabetic activity through statistical modeling.

Results: All synthesized derivatives complied with Lipinski's rule of five, indicating good drug-like properties. The pkCSM analysis confirmed favourable ADMET profiles. The ProTox-3.0 toxicity predictions classified the compounds as inactive toxicity. Molecular docking studies showed that para-coumaric acid exhibited a strong binding affinity to alpha-amylase (-7.8 kcal/mol), suggesting its potential as a dual-target therapeutic agent. The QSAR analysis, with a high correlation coefficient ($R^2 = 0.9995$), identified crucial chemical descriptors contributing to antidiabetic activity.

Conclusion: The integrated findings from ADMET predictions,ProTox toxicity predictions, QSAR modelling and molecular docking studies indicate that para-coumaric acid derivatives exhibit strong binding interactions with key diabetic targets and possess promising pharmacokinetic properties. These results highlight their potential as novel antidiabetic agents, warranting further in vitro and in vivo evaluations to confirm their safety and therapeutic effectiveness.

Keywords: para-coumaric acid, Diabetes Mellitus,*In Silico*studies.

THE FUTURE OF WOUND CARE: THE CONVERGENCE OF MARINE ALGAE AND ARTIFICIAL INTELLIGENCE

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The integration of artificial intelligence (AI) into marine algae-based wound healing represents a pioneering synergy between natural biomaterials and advanced technology, offering transformative potential for modern healthcare. Marine algae, rich in bioactive polysaccharides (e.g., alginates, fucoidans), proteins, and phenolics, exhibit innate wound-healing properties such as antimicrobial, anti-inflammatory, and tissue-regenerative effects. AI enhances these capabilities by accelerating *drug discovery* through machine learning-driven screening of algal metabolites, predicting optimal compound structures (e.g., antimicrobial peptides), and decoding mechanisms via tools like AlphaFold. Furthermore, AI optimizes the design of algae-derived biomaterials, such as hydrogels and nanofibers, by modeling ideal formulations and nanoparticle delivery systems for controlled release. Predictive analytics powered by convolutional neural networks (CNNs) enable personalized wound management, classifying wound types and forecasting healing trajectories based on patient-specific data. AI also streamlines sustainable algae cultivation, using reinforcement learning to monitor growth conditions and eco-friendly extraction processes. Despite challenges—including limited datasets and the need for interdisciplinary collaboration—AI-driven innovations, such as 3D-printed algal scaffolds and smart dressings, highlight a shift toward precision medicine and green chemistry. Emerging startups and research underscore the viability of this approach, blending marine biodiversity with computational intelligence. As AI bridges gaps between theoretical predictions and clinical validation, it unlocks scalable, efficient, and patient-centric wound care solutions, positioning marine algae as a cornerstone of next-generation, sustainable biomedicine.

Keywords: Marine algae, wound healing, Nano structured phospholipid, Artificial intelligence, Bioactive compounds

MCHSR/AI/2025/012

TETRAMETHYL PYRAZINE DERIVATIVES AS POTENTIAL ANTI-CANCER AGENTS: INSIGHTS FROM MOLECULAR DOCKING, DFT ANALYSIS AND ADMET STUDIES.

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Introduction: Tetramethylpyrazine, a well-known compound isolated from traditional Chinese herbs, has been medically used to treat a wide range of diseases including different kinds of Cancers, cardiovascular disease and other metabolic disorders.

Methodology: In this study *In-silico* based approach is used to found active ligands & confirmed their active binding energy from molecular docking studies and various physicochemical parameters such as drug-likeness, non-covalent interactions with key active site residues and toxicity by using different software such as Autodock, SwissADME and DFT analysis to identify the potential ligands for Anti-cancer activity.

Results: The Novel compound CA-11 & CA-12 has highest binding affinity to protein 3EYG,which isaJAK inhibitor. The JAK inhibitors block the activity of Janus kinases (JAKs), which potential treat cancer by targeting the JAK/STAT pathway, Further DFT analysis confirmed the compound's structural stability. ADMET and Docking studies demonstrated favorable pharmacokinetic, toxicological properties and strong interactions within the active site.

Conclusion: We are currently focused on the creation of Tetramethyl pyrazine-based novel derivatives for cancer treatment in combination with other moieties. As a result, this research illuminates the recent therapeutic expansion of pyrazine-based drugs. The Candidates which show potential for Anti-cancer activity in *in-silico* and molecular docking studies we will further be synthesized and investigated the novel derivatives in Future.

Keywords: Tetramethyl pyrazine, *In-silico* studies, Anti-cancer activity.

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COMPUTATIONAL INSIGHTS INTO B-ENAMINONES AS PROMISING KINASE INHIBITORS FOR CANCER THERAPY

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Introduction: Enaminones represents a versatile class of compounds with significant pharmacological potential due to their diverse biological activities. Their unique structural framework allows interactions with various biological targets, making them valuable in drug discovery. This study employs *In-silico* approaches to explore the drug-likeness, target prediction, bioactivity profiling, and molecular docking studies of enaminone derivatives, to identify promising candidates for drug development.

Methodology: The designed β-enaminone compounds were subjected to target prediction studies to determine their potential biological targets. Bioactivity score analysis was conducted to evaluate their likelihood of functioning as enzyme inhibitors. Furthermore, molecular properties and pharmacokinetic assessments, including Lipinski's rule of five, ADMET (Absorption, Distribution, Metabolism, Excretion, and Toxicity) profiling, and drug-likeness evaluations, were performed to determine their suitability as drug candidates.Molecular docking studies were carried out to assess the binding interactions of enaminones with key target proteins (4HJO) associated with Cancer diseases.

Results: The designed β-enaminones exhibited promising bioactivity scores (0.57), indicating potential as drug-like molecules. ADMET analysis revealed good absorption, distribution, and acceptable toxicity profiles. Target prediction suggested interactions with key enzymes which is kinase inhibitor involved in anticancer pathways. Molecular docking studies demonstrated strong binding affinities (-10.86) and inhibition constant (Ki value- 10.96nM) with target proteins (4HJO), confirming potential biological anticancer relevance. These findings support β-enaminones as promising candidates for further pharmacological evaluation.

Keywords: β-Enaminones, *In-silico* studies, Target Prediction, Molecular docking

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BISCARBOXAMIDE DERIVATIVES AS NOVEL ANTIEPILEPTIC AGENTS: INSIGHTS FROM ADMET PROFILING AND DFT APPROACH

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Introduction: Epilepsy is a chronic neurological disorder marked by recurrent seizures, affects millions globally. Despite available antiepileptic drugs, many patients face inadequate seizure control or adverse effects, underscoring the need for novel therapies. Biscarboxamides, known for their structural versatility and pharmacological potential, are explored here as antiepileptic agents using computational approaches, including ADMET (Absorption, Distribution, Metabolism, Excretion, and Toxicity) predictions, Density Functional Theory (DFT) calculations, and molecular docking with the target protein "1ohw."

Methodology: The study involved three phases: ADMET analysis, DFT studies, and molecular docking. Biscarboxamide derivatives were designed and evaluated for drug-like properties using SwissADME and pkCSM, assessing bioavailability, blood-brain barrier permeability, metabolic stability, and toxicity. DFT studies, conducted with Gaussian 09, optimized molecular structures and calculated electronic properties such as HOMO-LUMO energy gaps, molecular electrostatic potential (MEP), and Fukui indices to understand reactivity and stability. Molecular docking with AutoDock Vina analyzed binding interactions with the "1ohw" protein.

Results: ADMET analysis identified several derivatives with favorable pharmacokinetic properties, including high bioavailability, good blood-brain barrier permeability, and low toxicity, suggesting their potential as antiepileptic agents. DFT studies revealed stable compounds with distinct electrophilic and nucleophilic regions, supported by Fukui indices, indicating potential interactions with epilepsy-related targets. Molecular docking demonstrated strong binding affinities and specific interactions with the "1ohw" protein, highlighting their ability to modulate the target effectively.

Conclusion: This study highlights biscarboxamide derivatives as promising antiepileptic candidates. Integrating ADMET, DFT, and molecular docking provided a comprehensive understanding of their drug-like properties, electronic characteristics, and target interactions. These findings underscore the utility of computational methods in drug discovery and pave the way for experimental validation.

Keywords: Biscarboxamide, Epilepsy, ADMET, DFT, Antiepileptic Agents, Drug Design.

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STRUCTURAL PREDICTION, MOLECULAR DOCKING AND DFT ANALYSIS OF NOVEL GENTISIC ACID DERIVATIVES: AN *IN-SILICO* APPROACH

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Introduction: Epilepsy is a chronic neurological disorder in which nerve cell activity in the brain is disturbed, causingseizures.There are manyantiepileptic drugs (AEDs)available around the world but a significant gap including drug resistance, side effects, and limited efficacy in certain patient.There is a need to explore novel compounds that can overcome these challenges.

Methodology: In this study, we conducted a comparative analysis of Gentisic acid, a naturally occurring phenolic compound, against standard antiepileptic drugs (AEDs) using a combination of In- Silico studies. Gentisic acid's binding affinity with the target proteins associated with epilepsy was evaluated using molecular docking simulations, and its structural stability was evaluated using DFT analysis. ADMET studies were performed.

Results: The results revealed that Gentisic acidexhibited superior binding affinity to the target protein compared to the standard drug such asPhenytoin. Docking Outcomes revealed that the binding energyof Gentisic acid derivative were more than phenytoinsuggesting a higher potential for therapeutic efficacy. DFT analysis confirmed that Gentisic acid possesses a stable molecular structure, further supporting its suitability as a candidate for drug development.

Conclusion: This study reveals Gentisic acidas a stronger candidate for the antiepileptic drug in comparison to the current antiepileptic drugs. Further in vivo studies and clinical trials are required to validate these results and explore its therapeutic applications.

Keywords: Novel Gentisic Acid Derivatives,ADMET studies, antiepileptic drugs, DFT Analysis, *in-silico*.

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MOLECULAR INSIGHTS INTO CURCUMIN'S POTENTIAL FOR DIABETIC NEUROPATHY TREATMENT

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Introduction: Diabetic neuropathy (DN) is a serious complication of diabetes characterized by nerve damage and chronic pain. This study explored the therapeutic potential of five compounds: curcumin, pregabalin, cinnamon aldehyde, caffeine, and resveratrol.

Methodology" Molecular docking simulations identified curcumin as the most promising candidate due to its strong binding affinity with the DN-related protein 4N17. Density Functional Theory (DFT) analysis confirmed curcumin's structural stability, suggesting prolonged therapeutic effects. Ramachandran plot analysis validated the structural integrity of the 4N17 protein, ensuring reliable docking results. Pharmacophore modeling identified key molecular features responsible for curcumin's biological activity, while metabolomics offered insights into its metabolic profile.

Results: Molecular docking revealed curcumin had the highest binding affinity to protein 4N17 among the tested compounds. Pharmacophore modeling highlighted essential molecular interactions, further supporting curcumin's potential. DFT analysis confirmed curcumin's structural stability, and the Ramachandran plot verified the protein's integrity for accurate docking simulations.

Conclusion: Curcumin demonstrated strong binding affinity, stability, and molecular interactions, making it a promising lead compound for DN treatment. These findings provide valuable insights into curcumin's therapeutic potential and offer a foundation for future drug development efforts.

Keywords: Diabetic neuropathy, curcumin, Molecular Docking, DFT

MCHSR/AI/2025/017

ARTIFICIAL INTELLIGENCE: REVOLUTIONIZING ONCOLOGY WITH A QUANTUM LEAP

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Artificial Intelligence (AI) is revolutionizing the field of oncology, presenting a transformative shift in how cancer is diagnosed, treated, and managed. With its ability to analyze vast amounts of data, AI is enabling unprecedented advancements in early detection, personalized treatment plans, and patient outcomes. By leveraging machine learning, natural language processing, and deep learning algorithms, AI can identify patterns in medical imaging, genomics, and clinical data, offering new insights that are often beyond human capability. Additionally, AI-driven tools such as predictive models and decision support systems are empowering healthcare providers to make more accurate and timely decisions, improving precision medicine approaches. Moreover, AI is accelerating the discovery of novel therapeutic agents and optimizing clinical trials, leading to faster and more efficient drug development. Despite the tremendous potential, challenges such as data privacy, regulatory hurdles, and the need for robust validation remain. Nonetheless, AI is laying the foundation for a future where oncology is more personalized, efficient, and effective, marking a quantum leap in cancer care.

Keywords: Oncology, Medical, Therapeutic agents

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RECENT ADVANCES IN PYRAZOLE DERIVATIVES AS POTENT ANTIMICROBIAL AND ANTIFUNGAL AGENTS

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Microbial infections continue to be a leading cause of death worldwide, despite the annual development of numerous new antibiotics. However, the emergence of antibiotic-resistant bacteria remains a significant challenge in drug discovery. This study explores the synthesis of antimicrobial and antifungal agents based on the pyrazole scaffold, compiling findings from various studies to emphasize the role of heteroatom nuclei in synthetic compounds. Additionally, it highlights several pyrazole-derived compounds, including benzimidazole, benzothiazole, indole, acridine, oxadiazole, imidazole, isoxazole, triazole, quinoline, and quinazoline, along with other pyrazole-containing drugs such as pyridazine, pyridine, and pyrimidine.

Keywords: Antifungal activity; Pyrazoles derivatives; antibiotics; heterocyclic nitrogen; microbial resistance.

MCHSR/AI/2025/019

ARTIFICIAL INTELLIGENCE IN PHYTOCHEMICAL RESEARCH: ADVANCES IN EXTRACTION, PROFILING, AND BIOACTIVITY ASSESSMENT

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Artificial Intelligence (AI) is transforming phytochemical research by enhancing the efficiency, accuracy, and reproducibility of key processes, including extraction, analytical profiling, and bioactivity assessment. Traditional phytochemical studies often rely on labor-intensive methods with variable outcomes. AI-driven approaches, including machine learning (ML), deep learning (DL), and computational modelling, offer predictive capabilities that optimize extraction conditions, improve compound identification, and streamline biological activity screening.

A literature survey from databases such as Google Scholar, PubMed, and Scopus highlights AI's role in selecting optimal solvents, predicting phytoconstituent yields, and enhancing chromatographic and spectrometric analyses. AI-assisted spectral deconvolution in techniques like HPTLC, LC-MS, and NMR accelerates compound identification, reducing human error and increasing precision. Additionally, AI-driven in silico models, including molecular docking and quantitative structure-activity relationship (QSAR) analysis, facilitate the prediction of bioactivity, reducing the reliance on extensive in vitro and in vivo testing.

Despite its potential, AI integration in phytochemical research faces challenges such as data scarcity, model validation, and regulatory acceptance. Future advancements in AI, combined with big data analytics and high-throughput screening, are expected to revolutionize natural product-based drug discovery, making the process faster, cost-effective, and more efficient.

Keywords: Artificial Intelligence, Phytochemistry, Bioactivity Prediction, Extraction Optimization, Drug Discovery.

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ARTIFICIAL INTELLIGENCE IN PHARMACEUTICAL TECHNOLOGY AND DRUG DELIVERY DESIGN

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Artificial Intelligence (AI) has emerged as a transformative force in pharmaceutical technology and drug delivery design, offering innovative solutions to longstanding challenges in drug development. AI technologies, such as machine learning, deep learning, and data mining, enable the analysis of vast amounts of biomedical data, accelerating the discovery of novel drug candidates and therapeutic targets. By leveraging AI, researchers can predict the efficacy and safety profiles of drug molecules, significantly reducing the time and costs associated with traditional drug development processes. Additionally, AI aids in optimizing drug formulation and designing advanced drug delivery systems, enhancing the bioavailability and controlled release of therapeutics.

In drug delivery design, AI helps create more targeted and personalized therapies by analyzing patient-specific data, such as genomics, proteomics, and medical histories. This personalized approach improves therapeutic outcomes while minimizing adverse effects. Furthermore, AI-driven simulations and predictive modeling are used to design novel drug delivery vehicles, such as nanoparticles and liposomes that can effectively transport drugs to specific sites within the body.

The integration of AI in pharmaceutical technology has the potential to revolutionize the industry by enabling faster development, more accurate drug design, and the creation of tailored treatments that improve patient care.

Keywords: Pharmaceutical, Drug delivery, Biomedical, Patient-specific

UNLOCKING DRUG POTENTIAL BY ENHANCING POOR DRUG SOLUBILITY AND BIOAVAILABILITY THROUGH MELT SONOCRYSTALLIZATION TECHNIQUE

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Poor solubility and bioavailability remain significant challenges in the development of pharmaceutical drugs, particularly for poorly water-soluble compounds (BCS Class II and IV drugs). These limitations can lead to inadequate therapeutic effects, reduced drug absorption, and ultimately, compromised patient outcomes. One promising technique to address these challenges is **melt sonocrystallization**, a novel approach that combines ultrasonic energy with crystallization processes to enhance solubility and bioavailability. In melt sonocrystallization, ultrasonic waves are applied to a molten drug or drug-polymer matrix, inducing cavitation and shear forces that facilitate controlled nucleation and crystal growth. The result is the formation of smaller, more uniform drug crystals with a significantly increased surface area, which leads to faster dissolution rates and enhanced solubility.

This technique not only enhances solubility but also provides control over key crystallization properties such as polymorphism and particle size, allowing for the optimization of the drug's physicochemical characteristics. By improving dissolution rates, melt sonocrystallization has the potential to significantly increase the bioavailability of poorly soluble drugs, particularly in oral formulations. Furthermore, the method can be scaled for industrial applications, offering an efficient and cost-effective strategy for improving drug delivery. This abstract explores the mechanism, advantages, and applications of melt sonocrystallization, emphasizing its transformative potential in overcoming solubility and bioavailability issues in pharmaceutical development.

The growing body of research and success stories in applying this technique highlights its importance in the future of drug formulation, making it a valuable tool for pharmaceutical scientists aiming to unlock the full therapeutic potential of challenging drug compounds.

Keywords: Sonocrystallization, Dissolution, Therapeutic effect, Polymorphism.

MCHSR/AI/2025/022

ARTIFICIAL INTELLIGENCE IN PHYTOMEDICINE: UNLOCKING THE POTENTIAL OF *TERMINALIA CHEBULA*

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Phytomedicine, the therapeutic application of plant compounds, has been a part of traditional medicine for centuries. *Terminalia chebula,* a medicinal plant that is well known for its antioxidant, antimicrobial, and anti-inflammatory activities, has been very much in focus in recent studies. The application of AI in phytomedicine is reshaping the discovery, analysis, and utilization of herbal compounds, providing new avenues towards precision medicine and drug development. AI-based strategies such as machine learning, deep learning, and bioinformatics support identification of bioactive compounds, predictive pharmacological effects modeling, and optimization of the extraction process. AI also simplifies ethnobotanical data large-scale analysis, clinical trials data, and molecular interactions data, speeding up *Terminalia chebula* therapeutic capacity validation. Those improvements notwithstanding, issues including standardization of the data, issues of regulatory considerations, and collaboration across disciplines continue to affect developments. This article discusses the potential of AI in realizing the full potential of *Terminalia chebula* highlighting its significance for evidence-based phytotherapy, personalized medicine, and future research in herbal drug development.

Keywords: Phytomedicine, *Terminalia Chebula*, Artificial Intelligence, Machine Learning and Bioactive compounds.

MCHSR/AI/2025/023

FORMULATION AND OPTIMIZATION OF NANO GEL OF ACOROUS CALAMUS BY BOX-BEHNKEN DESIGN

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This study focuses on the effective formulation and optimization of *Acorus calamus*-containing nano-structured lipid carriers (NLC) utilizing the Box-Behnken design. TEM verified that the improved NLC formulation exhibited many favourable properties, such as spherical shape, high drug entrapment efficiency, and nanosize particles. While DSC verified the active compound's incorporation into the NLC matrix and revealed that FTIR research revealed no appreciable drug-excipient interactions. *Acorus calamus* has been found to be compatible with the chosen Excipients. To investigate the impacts of important formulation factors such the concentrations of solid lipid, liquid lipid, and surfactant Box Behnken method has been utilized. As a stable colloidal system, the optimized NLC showed a zeta potential of -21.77 mV, a PDI, or polydispersity index, was 0.6415, and a particle size of 221 nm.

A gel system including the improved *Acorus calamus* NLC was successfully evaluated for in vitro drug release for 24 hours proving Korsmeyer-Peppas model. The nano gel's stability was tested over 3 months period at extreme conditions showed good physical appearance, pH, particle size, entrapment effectiveness, and drug loading capacity with high stability under these conditions. Overall, the study's findings indicate that *Acorus calamus* NLC gel has the potential to be a successful delivery vehicle for sustained release applications in the management of several systemic and dermatological diseases.

Keywords: Nanotechnology, Targeted drug delivery, *Acorus calamus*, nanostructured lipid carriers, Korsmeyer-Peppas model

MCHSR/AI/2025/024

MOLECULAR DOCKING ANALYSIS OF NOVEL CHALCONE ANALOGUES AGAINST *CANDIDA ALBICANS*

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From last 3 decades fluconazole has became the first line drug for the treatment and prophylaxis of candidiasis, so resistance to fluconazole is common in many of parts of the world. To treat these infections we are targeting 14α demethylase to destroy ability of fungus to produce ergosterol, which leads cellular leakage and death of the fungus. Azole binds with the sixth position of heme group in CYP51 where it alters the structure of active site and act as competitive inhibitor. Our study is employed to check out the antifungal activity of chalcones. To perform study, fifty compounds were designed by the substitution of different groups on R_1, R_2, R_3, R4, R_5 and R_6 positions respectively. Two dimensional structures of all the 50 compounds were drawn by using software Chem Draw ultra 8.0. Prepared 2D structures were converted into 3D structure by using chem. 3D ultra 8.0. Then 3D structures were optimized by performing energy minimization via molecular mechanics and re-optimized by using molecular orbital package (MOPAC) until the RMS value became 0.0001Kcal/mol.

Among all the 50 compounds of chalcone derivatives, compound 28 and compound 09 showed highest binding affinity on the basis of mole dock score. Compound 14, 08 and 13 also showed better mole dock score than standard drug fluconazole. On the basis of mole dock score we can say that when chalcone derivatives substituted with electron donating group increases the binding affinity of compounds and can be helpful in developing new antifungal agents.

Key words: *Candida albican*s, Chem Draw, Anti fungal, fluconazole, Molecular Docking

INTEGRATION OF ARTIFICIAL INTELLIGENCE IN SINGLE-CELL RNA-BASED STUDIES OF OCULAR SURFACE INNATE IMMUNITY

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The integration of artificial intelligence (AI) into single-cell RNA sequencing (scRNA-seq) studies is transforming our understanding of ocular surface innate immunity, particularly in conditions such as dry eye disease, corneal infections, and particulate matter exposure. Machine learning techniques, including deep neural networks, random forests, and support vector machines, enable precise immune cell classification and characterization based on high-dimensional gene expression patterns. Graph-based clustering methods such as t-SNE and UMAP enhance the visualization of immune cell heterogeneity, facilitating the discovery of novel immune subtypes and inflammatory pathways. Natural language processing (NLP) models streamline the interpretation of complex gene expression datasets, linking scRNA-seq findings to known immunological mechanisms and aiding biomarker identification. Furthermore, AI-driven multi-omics integration allows predictive modeling of disease progression and treatment responses, offering insights into personalized therapeutic strategies for ocular surface disorders. By leveraging AI for high-throughput data analysis, researchers can gain unprecedented insights into the cellular mechanisms underlying ocular immune dysfunction, ultimately advancing precision medicine approaches for inflammatory and infectious ocular diseases.

Keywords: Single-Cell RNA Sequencing (scRNA-seq), Ocular Surface Immunity, Dry Eye Disease, Corneal Infection, Particulate Matter Exposure, Machine Learning.

MCHSR/AI/2025/026

HARNESSING AI FOR TARGETED CANCER THERAPY: A NEW ERA IN ONCOLOGY

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Cancer remains one of the leading causes of mortality worldwide, necessitating innovative therapeutic strategies. Artificial Intelligence (AI) has emerged as a powerful tool in oncology, revolutionizing targeted cancer therapy by improving drug discovery, precision medicine, and treatment optimization. This review explores the role of AI-driven approaches, including machine learning (ML), deep learning (DL), and natural language processing (NLP), in enhancing cancer treatment efficacy.AI accelerates drug discovery by enabling virtual screening, molecular docking, and predictive modeling for novel anti-cancer compounds. Moreover, AI-powered genomic analysis facilitates personalized treatment strategies by identifying molecular biomarkers and predicting patient responses to targeted therapies. In radiation oncology, AI enhances treatment planning, automates contouring, and optimizes dose delivery, minimizing toxicity while maximizing therapeutic outcomes. Additionally, AI-driven image analysis aids in early cancer detection and monitoring treatment responses through radiomics and histopathological evaluations.The integration of AI with immunotherapy has shown promising results, identifying potential immune checkpoint inhibitors and optimizing T-cell receptor engineering for enhanced efficacy. However, challenges such as data bias, model interpretability, and regulatory hurdles remain critical concerns for clinical implementation. Addressing these limitations through standardized datasets, explainable AI, and robust validation strategies is essential for widespread adoption.As AI continues to evolve, its application in targeted cancer therapy holds immense potential to improve patient outcomes, reduce treatment-related toxicity, and advance precision oncology. This abstract highlights recent advancements, challenges, and future directions in AI-driven cancer therapy, paving the way for a new era in oncology.

Keywords: Machine learning, Cancer therapy, Precision medicine, Targeted therapy.

MCHSR/AI/2025/027

CELIAC DISEASE - CHRONIC IMMUNE DISORDER AND ITS DIAGNOSIS

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Foods containing gluten can cause celiac disease, which is a long-term immunological and digestive illness that harms and affects the small intestine. Our body is unable to receive all the nutrients it needs because of this disease, which also causes serious digestive issues. Gluten is a protein found in grains such as wheat, barley, rye, and others. Gluten makes dough stretchy and gives bread its chewy texture. The dough is made more elastic by gluten, which also gives bread its chewy texture. The small intestine and villi, tiny finger-like projections seen on the small intestine wall, are damaged when the patient with celiac disease consumes food containing gluten because their body overreacts to the gluten protein. The small intestine cannot absorb enough nutrients from food when these villi are destroyed. In the end, this causes starvation, miscarriage, infertility, bone density loss, and neurological disorders. Researchers still don't have a firm understanding of the cause of celiac disease. Due to its inherited nature, celiac disease may pass on to certain genes. Any traumatic emotional experience or a severe medical incident can set it off. To help identify celiac disease, a tissue test for transglutaminase IgA (tTg-IgA) is employed. In this autoimmune illness, the immune system misinterprets the protein gluten as an outside invader.

Keywords: Celiac disease, Gluten, tissue transglutaminase IgA (tTg-IgA), Gluten free diet.

MCHSR/AI/2025/028

REVOLUTIONIZING HEALTHCARE: THE ROLE OF ARTIFICIAL INTELLIGENCE IN CLINICAL PRACTICE

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Artificial intelligence (AI) is rapidly transforming healthcare, offering unprecedented opportunities to enhance clinical practice. This abstract explores the multifaceted role of AI in revolutionizing patient care, focusing on its applications in diagnostics, treatment, and administrative efficiency. AI-powered algorithms excel at analyzing vast datasets from medical imaging, electronic health records, and genomic data, enabling earlier and more accurate disease detection. In diagnostics, AI aids in identifying subtle patterns indicative of pathologies, such as cancer or neurological disorders, surpassing human capabilities in certain tasks. Personalized medicine is further advanced through AI's ability to tailor treatment plans based on individual patient profiles. AI-driven robotic surgery enhances precision and minimizes invasiveness, while virtual assistants streamline patient communication and appointment scheduling, reducing administrative burdens. Moreover, predictive analytics using AI can anticipate patient deterioration, facilitating timely interventions and improving outcomes. However, ethical considerations, including data privacy and algorithmic bias, must be addressed to ensure equitable and responsible AI integration. This abstract argues that while challenges remain, AI holds immense potential to reshape healthcare delivery, ultimately leading to improved patient outcomes and a more efficient healthcare system.

Keywords: Personalized medicine, AI-driven, Patient care, Healthcare.

MCHSR/AI/2025/029

ARTIFICIAL INTELLIGENCE IN TELEMEDICINE: TRANSFORMING DOCTOR-PATIENT COMMUNICATION FOR THE DIGITAL AGE

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The swift development of Artificial Intelligence (AI) has revolutionized telemedicine by boosting doctor-patient communication through increased accessibility, efficiency, and customization of medical services. Telemedicine includes electronic transmission of information or patient history to the doctor. It can help in collecting all previous medical history which is little difficult for doctor or medical practitioner and it can help a doctor to provide better treatment it can also reduce the chances of error.

WHO (World health organization) has predicted a global shortage of 10million health workers by 2030 So it allows a huge growth In global telehealth market The global Telehealth market was valued at $105.5 billion in 2024 and is projected to grow at rate of 23.7% annually from 2024 to 2034 (The globe news wire 2024).

Natural language processing (NLP), chat bots, and virtual health assistants are examples of AI-powered solutions that enable smooth interactions and allow for real-time consultations, automated responses, and customized health advice. AI-powered decision support systems also help physicians make more precise diagnoses, which improves patient outcomes by lowering misunderstandings. Physicians can give prompt and accurate interventions by using machine learning algorithms to examine patient data and produce insights. This review explores the role of AI in strengthening doctor-patient communication in telemedicine, highlighting its benefits, limitations, and future potential. By leveraging AI responsibly, telemedicine can bridge communication gaps, improve patient satisfaction, and enhance healthcare delivery, ultimately transforming remote consultations into more effective and patient-centric experiences.

Keywords: World health organization (WHO), Natural language processing (NLP), artificial intelligence (AI), Telemedicine.

AI-POWERED INVESTIGATION OF CASTOR SEED EXTRACT'S ROLE IN NEPHROPATHY THERAPY

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Nephropathy, a severe kidney condition, poses challenges in diagnosis and treatment. Recent studies suggest that castor seed extract might possess nephroprotective properties, though the mechanisms and efficacy are still not fully understood. The integration of AI, particularly machine learning algorithms, presents a promising approach to enhance the analysis of complex biological datasets. By employing AI, researchers can scrutinize vast datasets from lab experiments and clinical trials, uncovering patterns and relationships that traditional methods might miss. This research evaluates the impact of castor seed extract on biochemical, histological, and renal function indicators using AI-based models. Diagnosing and managing nephropathy, a critical kidney ailment, can be challenging. While recent research indicates potential nephroprotective effects of castor seed extract, the underlying mechanisms and effectiveness remain uncertain. The use of AI technologies, especially machine learning algorithms, offers a feasible method to enhance the processing of complex biological data. Through AI, researchers can analyze extensive datasets from laboratory and clinical studies, identifying patterns and connections that might be overlooked by conventional techniques. This study investigates the effects of castor seed extract on biochemical, histological, and renal function markers through AI-driven models.

Keywords: Nephropathy, castor seed, AI technologies, Nephroprotection.

MCHSR/AI/2025/031

AI-DRIVEN MULTI-'OMICS EXPLORATION OF THERAPEUTIC BIOMOLECULES FROM THE MICROALGA *ARTHROSPIRA PLATENSIS*

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The bioactive compounds from *Arthrospira platensis* hold significant therapeutic potential, yet their precise mechanisms remain underexplored. Integrating artificial intelligence (AI) with a multi-omics approach, including proteomic and metabolomic profiling, offers a systematic strategy to predict their pharmacological relevance. Machine learning-based quantitative structure-activity relationship (QSAR) models enable the classification of bioactive peptides and metabolites, while graph neural networks (GNNs) and network pharmacology approaches predict multi-target interactions. AI-assisted molecular docking and deep learning further enable high-throughput screening of biomolecule interactions with therapeutic targets. These AI-driven strategies streamline biomolecule discovery, enhancing efficiency in repurposing *A. platensis* for therapeutic applications. This approach accelerates drug discovery and establishes *A. platensis* as a promising source of bioactive molecules for biomedical use.

Keywords: Artificial Intelligence, Multi-Omics, Machine Learning, Graph Neural Networks

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NANOSTRUCTURE BIOMATERIALS FOR THE TREATMENT OF OSTEOMYELITIS

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Osteomyelitis is the term generally implies for bone or joint infection and defines as an infectious disease of bone caused by various harmful microorganisms where, an inflammatory process along with bone destruction will occur. Osteomyelitis infection can either limited to one single portion or may spread to several regions of bone like bone marrow, cortex, and periosteum and to other surrounded soft tissues which leads to local bone destruction, necrosis and apposition of new bone. The success rates of antimicrobial therapy in case of most of the infectious disease of bone and joint is too low because of their physiological and anatomical characteristics of bone. Apart from this, pathogenic mechanism is also one of the reasons of recurrence of the infection. Biofilm formation and slime production are the prominent processes by which bacteria are protected from host defense mechanisms and from antimicrobial agents. Administration of antibiotics could lead to systemic side effects and multi-drug resistant infection. The application of local drug delivery of antibiotics such as bone cements also bring some clinical drawbacks like biodegradability issues which make it more challenging to treat. The latest advancements in the application of nanostructure bifunctional biomaterials for bone therapy are described in order to cure osteomyelitis.

Keywords: Biomaterials, Osteomyelitis, Bone-targeted moieties, Antibiotic

MCHSR/AI/2025/033

EXPLORING ARTIFICIAL INTELLIGENCE APPLICATIONS IN IMMUNOLOGY: ADVANCEMENTS AND CHALLENGES

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The application of Artificial Intelligence (AI) in immunology is revolutionizing our understanding of immune responses, disease mechanisms, and therapeutic strategies. AI-driven methods, including machine learning, deep learning, and data mining, have enabled researchers to analyze complex immunological data, identify biomarkers, and predict immune system behavior with unprecedented precision. These advancements have facilitated new discoveries in vaccine development, autoimmune diseases, and immunotherapy.

This study explores recent AI methodologies in immunology, focusing on their applications in immune system modeling, biomarker discovery, and therapeutic interventions. We conducted a comprehensive literature review using databases such as PubMed, Google Scholar, Scopus, and Web of Science, covering studies published from 2015 to 2025. The review highlights AI applications in analyzing immune cell populations, predicting immune responses to infections and vaccines, and optimizing immunotherapy treatments for cancer and autoimmune diseases.

The findings demonstrate AI's potential in improving disease diagnosis, personalizing immunotherapy, and enhancing vaccine development. However, challenges such as data heterogeneity, interpretability of AI models, and ethical concerns regarding AI in healthcare remain prominent. This abstract underscores the promise and ongoing challenges of AI in immunology, providing a framework for future research and clinical applications in immunology and immunotherapy.

Keywords: AI, immunology, machine learning, immune responses, immunotherapy.

ROLE OF SELF-NANOEMULSION DRUG DELIVERY SYSTEM IN THE TREATMENT OF DIABETIC NEPHROPATHY

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Diabetic nephropathy (DN) is a major complication of diabetes that leads to progressive kidney damage and eventual renal failure. Traditional drug delivery systems often face challenges in enhancing the bioavailability, solubility, and targeted delivery of therapeutic agents. The Self-Nanoemulsifying Drug Delivery System (SNEDDS) has emerged as a promising solution to these challenges. SNEDDS improve the solubility and absorption of poorly water-soluble drugs, providing higher bioavailability. The small droplet size and lipid-based formulation of SNEDDS enable better tissue penetration and targeted drug delivery to the kidneys, which is crucial for treating DN. Furthermore, SNEDDS can offer controlled drug release, enhancing therapeutic efficacy and reducing systemic side effects. By delivering anti-inflammatory, antioxidant, and renoprotective agents directly to kidney tissues, SNEDDS could mitigate oxidative stress, inflammation, and fibrosis associated with diabetic nephropathy. Additionally, SNEDDS may enable combination therapies, addressing multiple pathological mechanisms of DN simultaneously. Despite promising preclinical results, further clinical investigations are required to assess the safety, efficacy, and potential of SNEDDS in diabetic nephropathy management.

Keywords: Diabetic Nephropathy, Self-Nanoemulsifying Drug Delivery System, Bioavailability, Targeted Drug Delivery

IN VIVO PRECLINICAL STUDIES ON *AEGLE MARMELOS* AND CURCUMA LONGA AS GASTROPROTECTIVE AGENT

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Gastric ulceration is thus characterized by excess of the aggressors with significant protective factors compromised through H. pylori infection, generation of oxidative stress, increased gastric acidity. The medications that include proton pump inhibitors among synthetic drugs work well, but come with side effects such as antibiotic resistance when taken for long term use. In this review, two medicinal plants, *Curcuma longa* (turmeric) and *Aegle marmelos* (bael) which possess anti-inflammatory, antioxidant, antibacterial, and mucosal protective effect are reviewed. Previous studies with animal model show that these herbs have similar effect of ulcer protection as conventional drugs such as omeprazole. Curcumin being the active component of *Curcuma longa* possesses anti-inflammatory activity, free radical scavenging, and antibody Against Helicobacter pylori. *Aegle marmelos* ameliorates gastric mucus content, inhibits gastric acidity, and exerts weak prompt antibacterial action against Helicobacter pylori. Studying these effects hold some promise, but such findings have for the most part been conducted on animal subjects. Further studies are needed towards improvement of the bioavailability, elucidating molecular mechanisms and accountable for the observed effects, as well as large-scale controlled trials to test the safety and efficacy of the treatment. Combined together, these herbs provide a credible outlook to treat gastric ulcers using both, the conventional as well as, the modern medical approach.

Keywords: Gastric ulceration, Proton pump inhibitors, Antibacterial, Anti-inflammatory

MCHSR/AI/2025/036

AN INSIGHT INTO BIOSYNTHESIS, DIETARY SOURCE, AND BIOLOGICAL PROPERTIES OF POTENTIAL BIOACTIVE DIETARY FLAVONOIDS

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Flavonoids are a broad class of polyphenols that have a variety of biological functions. The biological characteristics of the major subclasses of flavonoids: flavonols, flavanones, chalcones, isoflavonoids, flavonols, flavones, and anthocyanins are summarized in this review. Flavonoids are generated through the Shikimate and Phenylpropanoid pathways. Flavonoids can be found in fruits, vegetables, tea, red wine, and herbs. Quercetin and rutin are two examples of flavonols that have shown antibacterial, anti-inflammatory, anticancer, and antioxidant properties. Citrus fruits and tomato skin have flavanones and chalcones, which have lipid-lowering, anti-inflammatory, and antioxidant properties. Legumes are the major source of isoflavonoids, which contain estrogenic properties and might used to treat metabolic diseases. Barley, almonds, and chocolate have flavanols, also known as catechins, which contain anti-inflammatory, antiviral, anticancer, and cardio protective qualities. Luteolin and Apigenin are flavones, which contain anti-inflammatory, anti-cancer, and neuroprotective properties include. Water soluble pigments called anthocyanins, which contain chemo preventive, antioxidant, and anti-inflammatory properties. The perspective of flavonoids as bioactive compounds with a wide range of health advantages is demonstrated in this review, as is their importance in creating medicinal agents, functional foods, and nutraceuticals.

Keywords: Flavonoids, Polyphenols, Biological activity, Phenyl-propanoid pathway

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ARTIFICIAL INTELLIGENCE-BASED PERSONALIZED MEDICINE

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This paper explores the transformative role of artificial intelligence (AI) in advancing personalized medicine, emphasizing its application in diagnosis, prognosis, and treatment tailored to individual patients. AI's ability to analyse vast datasets and uncover intricate patterns surpasses traditional methods, offering ground-breaking insights. For instance, DNA sequencing and molecular pathology imaging are now instrumental in drug development and chemical synthesis, driven by AI advancements. The paper highlights current and emerging applications of deep learning and machine learning in precision medicine. Notably, AI facilitates the identification of novel regulatory markers and drug targets through multimodal omics data analysis. These advancements are poised to refine therapeutic strategies and enhance patient outcomes. Recommendations for future research include expanding the inclusion of underrepresented populations, such as AI/AN (American Indian/Alaska Native) communities, in pharmacogenomics to better understand genetic variations influencing drug response. The development of more precise and efficient AI algorithms is also emphasized, focusing on predicting drug efficacy, identifying response biomarkers, and fostering collaboration between AI experts and healthcare professionals to accelerate personalized treatment advancements.AI-based tools also show promise in identifying innovative structures for interventions, whether pharmacological or mechanical. These technologies can streamline the selection of synthesized chemicals and optimize all phases of personalized medicine development (T0-T4), from initial research to clinical implementation. By integrating AI into the core processes of precision medicine, this paper underscores its potential to revolutionize healthcare, ensuring more effective and tailored treatment options for diverse patient populations.

Keywords: Artificial intelligence; deep learning; machine learning; personalized medicine;

IMPACT OF AI ON MANUFACTURING AND QUALITY ASSURANCE IN MEDICAL DEVICE AND PHARMACEUTICALS INDUSTRY

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The integration of Artificial Intelligence (AI) into the manufacturing and quality assurance (QA) processes of the medical device and pharmaceutical industries is revolutionizing operations, enhancing efficiency, and ensuring higher product standards. AI technologies, such as machine learning, predictive analytics, and computer vision, enable manufacturers to automate complex tasks, optimize production schedules, and monitor equipment performance in real-time. These advancements help identify potential defects early in the production process, reducing the likelihood of errors and improving product consistency.

In quality assurance, AI-powered systems can analyze vast datasets from clinical trials, manufacturing processes, and post-market surveillance to detect emerging trends or anomalies that human inspectors might overlook. This results in enhanced decision-making, faster response times, and more accurate assessments of product safety and efficacy. Moreover, AI applications facilitate compliance with stringent regulatory standards, reducing the risk of non-compliance and the associated costs.

Additionally, AI improves the speed and accuracy of testing protocols, shortening time-to-market for new medical devices and pharmaceuticals. The ability to simulate real-world conditions and predict potential outcomes allows for more efficient product development and robust risk management strategies. As a result, AI is not only optimizing operational efficiency but also enhancing the quality and safety of medical products, making it an indispensable tool for future growth in the healthcare sector. The continued evolution of AI will likely reshape the industry, driving innovations in manufacturing processes, regulatory compliance, and product delivery.

Keywords: Quality assurance, Clinical, Medical devices, Product development, AI

MCHSR/AI/2025/039

ARTIFICIAL INTELLIGENCE IN NATURAL PRODUCT-BASED DRUG DISCOVERY: A NEW FRONTIER

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Natural products have long been a key source of drug discovery, but traditional screening methods are often time-consuming and resource-intensive. The integration of Artificial Intelligence (AI) is transforming this field by accelerating the identification and optimization of bioactive compounds. AI-driven tools, including machine learning (ML), deep learning (DL), and computational modelling, are enhancing the efficiency of natural product-based drug discovery.

A systematic literature review was conducted using Google Scholar, PubMed, Scopus, and Web of Science to examine AI applications in virtual screening, metabolomics, chemoinformatic, and drug design. AI-driven approaches are evaluated for their role in improving bioactivity prediction, metabolite identification, and multi-target analysis in natural product research.

AI has significantly improved hit-to-lead identification, enabled faster metabolite annotation, and enhanced drug-likeness predictions for phytochemicals. Network pharmacology approaches have provided deeper insights into herbal formulations, facilitating the discovery of novel therapeutics. However, challenges such as data scarcity, algorithm interpretability, and standardization issues in natural product databases remain. Future research should focus on integrating multi-omics data, enhancing training datasets, and developing explainable AI models for better translational applications.

AI is revolutionizing natural product-based drug discovery, offering innovative solutions to long-standing challenges. Its integration with computational and experimental pharmacognosy will accelerate the discovery of next-generation natural therapeutics.

Keywords: Artificial Intelligence, Natural Products, Drug Discovery, Machine Learning, Metabolomics, Chemoinformatic

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ARTIFICIAL INTELLIGENCE IN CLINICAL PRACTICE: ADVANCING PATIENT CARE AND OVERCOMING CHALLENGES

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Artificial Intelligence (AI) is rapidly transforming clinical practice by enhancing disease diagnosis, treatment selection, and patient management. With advancements in machine learning (ML), deep learning (DL), and natural language processing (NLP), AI driven technologies are improving diagnostic accuracy, optimizing medication dosages, and personalizing treatment plans. AI also plays a vital role in predictive analytics, clinical decision support, and laboratory testing, reducing human errors and streamlining healthcare workflows. A comprehensive literature review was conducted using Google Scholar, PubMed, Scopus, and EMBASE to explore AI applications in healthcare. The findings highlight AI's ability to enhance patient engagement, optimize population health management, and improve mental health support through virtual assistants. AI powered algorithms also contribute to genomic medicine by identifying disease risk factors and facilitating precision medicine. Despite its potential, challenges such as data privacy concerns, bias in algorithms, regulatory constraints, and the need for human oversight must be addressed for ethical and effective AI implementation. Future research should focus on improving AI model transparency, developing standardized healthcare databases, and fostering collaboration between AI developers and clinicians.

AI is poised to revolutionize modern healthcare, bridging the gap between technological innovation and clinical application. Its responsible integration will lead to more efficient healthcare delivery, improved patient outcomes, and a shift toward data driven, personalized medicine.

Keywords: Artificial Intelligence, Clinical Practice, Machine Learning, Precision Medicine, Healthcare Innovation, Predictive Analytics

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USE OF SPANLASTICS IN NOSE-TO-BRAIN DRUG DELIVERY

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Nose-to-brain drug delivery has emerged as a promising strategy for bypassing the blood-brain barrier and achieving direct delivery of therapeutic agents to the central nervous system (CNS). Among the advanced delivery systems, spanlastics—deformable, surfactant-based vesicular carriers—have garnered attention due to their unique physicochemical properties. Spanlastics are composed of span-based non-ionic surfactants and an edge activator, which provide high deformability, enhanced drug encapsulation efficiency, and prolonged retention in the nasal cavity. Their deformability allows them to penetrate the nasal mucosa more effectively, facilitating direct access to the brain via the olfactory and trigeminal pathways. Moreover, spanlastics protect the encapsulated drugs from enzymatic degradation, enhancing their bioavailability and therapeutic potential. This review highlights the principles of spanlastic formulation, their advantages over conventional nasal drug delivery systems, and recent advancements in their application for treating CNS disorders, including neurodegenerative diseases, brain tumors, and psychiatric conditions. The results from preclinical studies demonstrate the potential of spanlastics in achieving targeted, efficient, and non-invasive brain drug delivery, paving the way for innovative treatments for CNS disorders.

Keywords: Nose-to-brain delivery, Spanlastics, Blood-brain barrier, Drug bioavailability, Central nervous system.

MCHSR/AI/2025/042

A NEW FRONTIER IN HEALTHCARE REVOLUTIONARY MEDICAL DIAGNOSTICS.

TECHNOLOGY PIONEERING THE HEALTHCARE FRONTIER WITH ARTIFICIAL INTELLIGENCE.

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Artificial intelligence (AI) is a rapidly evolving tool revolutionizing many aspects of healthcare. AI has been predominantly employed in medicine and healthcare administration. The determine evidenced that technologically assisted medical image analysis significantly improves efficiency and accuracy across various imaging modalities, including X-ray, ultrasound, CT scans, MRI, etc. The outcomes were supported by the reduced diagnosis time. AI-driven paradigm capable of not only streamlining the identification of promising molecular candidates but also improving prediction accuracy and the development of targeted therapeutics. Exploring the convergence of machine learning, deep learning, and high-performance computing, the article describes a landscape in which AI-integrated platforms blend technological and biological disciplines seamlessly. the ethical and legal challenges faced by AI in the medical field, as well as potential directions for future development. These findings not only reveal the huge potential of AI technology in the medical field, but also highlight the ethical and governance issues that need to be considered when promoting these technologies. Precision medicine stands as a transformative force in the orbit of healthcare, fundamentally reshaping traditional approaches by customizing therapeutic interventions to align with the distinctive attributes of individual patients. A comprehensive analysis of various studies underscores. AI's superiority in comparison to traditional methods, manifesting in quicker and more precise identification of anomalies. These findings not only reveal the huge potential of AI technology in the medical field, but also highlight the ethical and governance issues that need to be considered when promoting these technologies.

Keywords : AI-Healthcare Transformation, X-ray, ultrasound, CT scans, MRI & Hospital

MCHSR/AI/2025/043

NEUROPROTECTIVE POTENTIAL OF NOVEL LEVODOPA-HYDRAZIDE DERIVATIVES IN MPTP-INDUCED PARKINSONISM: A COMBINED IN SILICO AND IN VIVO STUDY

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Parkinson's disease (PD) is a progressive neurodegenerative disorder characterized by the loss of dopaminergic neurons. Levodopa (L-DOPA) remains the gold standard treatment, but long-term use is associated with motor complications. In this study, we aimed to develop novel L-DOPA hydrazide derivatives to potentially enhance therapeutic efficacy and reduce side effects. Initially, molecular docking studies were conducted to predict the binding affinity of synthesized compounds with target proteins. ADMET (absorption, distribution, metabolism, excretion, and toxicity) properties were evaluated in silico to assess their pharmacokinetic profiles. Based on these computational analyses, selected hydrazide derivatives were synthesized and characterized. The neuroprotective potential of these compounds was evaluated in vivo using an MPTP (1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine)-induced PD model in mice. Locomotor activity, dopamine levels, and histological analysis were performed to assess the efficacy of the synthesized compounds. Statistical analysis revealed significant improvements in motor function and dopamine levels in mice treated with the novel L-DOPA hydrazide derivatives compared to the MPTP-induced control group. These findings suggest that these novel compounds hold promise as potential therapeutic agents for PD.

Keywords: Levodopa, Hydrazide Derivatives, Parkinson's disease, MPTP, Molecular Docking, ADMET.

THE FUTURE OF DRUG SAFETY: PHARMACOVIGILANCE IN AN EVOLVING WORLD

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Pharmacovigilance (PV) plays a key role in the healthcare system through assessment, monitoring & discovery of interactions amongst drugs and their effects in human being. Pharmaceutical and biotechnological products are designed to diagnose, prevent or cure diseases. India is the world's second most populated country with over 1 billion potential drug consumers. Although, India is participating in the Uppsala Monitoring Center (UMC) programme, its contribution to that database is relatively small. Signal assessment is mainly performed to analyse the cause and effect by using World Health Organization (WHO) scale & Naranjo scale of probability. Signal detection and its assessment is very vital and complex process. This gives us a systematic review of the PV India from its origin to the current scenario and also discusses the various strategies and proposals to build, maintain and implement a robust PV system and to improve the process of ADR reporting in the country.

Keywords: Pharmacovigilance, Drug reaction, UMC, Naranjo scale

MCHSR/AI/2025/045

PRECISION MEDICINE IN PARKINSON'S DISEASE: TAILORING TREATMENTS FOR BETTER OUTCOMES

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Parkinson's disease (PD) is a complex and heterogeneous neurodegenerative illness with widely varying motor and non-motor symptoms in patients. Standard treatment approaches, which are dominated by dopamine replacement therapy, are rarely tailored to each patient's unique illness course and response to therapies. Precision medicine has the potential to revolutionize practice by combining genomes, proteomics, metabolomics, and digital technology in health care to personalize interventions to patients' specific biological and clinical factors. Recent developments in pharmacogenomics have identified genes that influence treatment responsiveness and side effects, paving the way for personalized drug regimens. Biomarker discovery advancements, such as cerebrospinal fluid & blood-based markers, neuroimaging, & gut microbiome studies, have improved early diagnosis and illness classification. Furthermore, gene therapy, stem cell-based regeneration, & neuroprotective therapies have the potential to alter disease progression rather than simply treating symptoms. The combination of wearable sensors & artificial intelligence-based analytics enables real-time, personalized illness monitoring. Despite these achievements, significant obstacles remain, including the validation of predictive biomarkers, ethical concerns in genetic profiling, and disparities in access to precision treatments. Furthermore, there is an urgent need for multidisciplinary cooperation among neurologists, data scientists, and bioengineers to transfer discoveries into therapeutic practices. Recent advances & future perspectives in Parkinson's disease precision medicine highlight the importance of data-driven, personalized tactics to maximize therapy effectiveness, limit side effects, and, ultimately, improve patient results and standard of life.

Keywords: Parkinson's disease, Pharmacogenomics, Biomarkers, Gene therapy, Digital health

TARGETING PARKINSON'S DISEASE: DESIGN, SYNTHESIS, AND BIOLOGICAL EVALUATION OF NOVEL SAFINAMIDE AMIDE DERIVATIVES VIA MOLECULAR DOCKING AND MPTP-INDUCED MODEL

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Safinamide, a selective MAO-B inhibitor, is used in the treatment of Parkinson's disease (PD). However, there is a need for novel Safinamide derivatives with improved efficacy and reduced side effects. This study aimed to design, synthesize, and evaluate novel amide derivatives of Safinamide as potential therapeutic agents for PD. Initially, molecular docking studies were conducted to predict the binding affinity of the synthesized compounds with MAO-B and other relevant targets. In silico ADMET (absorption, distribution, metabolism, excretion, and toxicity) analysis was performed to assess the pharmacokinetic and safety profiles of the designed molecules. Based on the computational screening, selected amide derivatives were synthesized and characterized. The neuroprotective potential of these compounds was evaluated in vivo using the MPTP (1-methyl-4-phenyl-1,2,3,6-tetrahydropyridine)-induced PD model in mice. Locomotor activity, dopamine levels, and histological analysis were performed to assess the efficacy of the synthesized compounds. Statistical analysis revealed significant improvements in motor function and dopamine levels in mice treated with the novel Safinamide amide derivatives compared to the MPTP-induced control group. These findings suggest that these novel amide derivatives of Safinamide represent promising candidates for the development of improved therapies for PD.

Keywords: Safinamide, Parkinson's Disease, MPTP, Molecular Docking, ADMET.

MCHSR/AI/2025/047

SYNTHESIS, CHARACTERIZATION, AND ANTIDIABETIC SCREENING OF NOVEL 4-FLUORO-2-CYANOPYRROLIDINE DERIVATIVES AS SELECTIVE DPP IV INHIBITORS

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A series of novel 4-fluoro-2-cyanopyrrolidine derivatives were synthesized and characterized using spectroscopic techniques (^{1}H NMR, ^{13}C NMR, and mass spectrometry). The synthesized compounds were evaluated for their antidiabetic potential through in vitro screening as selective Dipeptidyl Peptidase IV (DPP IV) inhibitors. The inhibitory activity of the compounds was assessed using enzymatic assays, and the most potent derivatives were further evaluated for their selectivity against related peptidases. Structure-activity relationships were explored, highlighting the impact of specific substituents on DPP IV inhibition. Several synthesized compounds exhibited significant DPP IV inhibitory activity, demonstrating promising potential as antidiabetic agents. These findings suggest that 4-fluoro-2-cyanopyrrolidine derivatives represent a novel class of selective DPP IV inhibitors for the management of type 2 diabetes.

Keywords: 4-Fluoro-2-Cyanopyrrolidine, DPP IV Inhibitors, Antidiabetic, Synthesis, Enzyme Inhibition

SYNTHESIS AND ANTIMICROBIAL ASSESSMENT OF BENZOXAZOLE HYDRAZIDE DERIVATIVES AGAINST CLINICALLY RELEVANT RESISTANT MICROORGANISMS

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A series of novel benzoxazole hydrazide derivatives were synthesized and evaluated for their antimicrobial activity against clinically relevant resistant microorganisms, including Methicillin-resistant Staphylococcus aureus (MRSA), Vancomycin-resistant Enterococcus (VRE), and Fluconazole-resistant Candida albicans. Prior to synthesis, molecular docking studies were performed using in silico screening methods, including structure-based virtual screening and ligand-based pharmacophore modeling, to predict potential binding affinities to key microbial targets. The synthesized compounds were characterized using spectroscopic techniques (^{1}H NMR, ^{13}C NMR, and mass spectrometry). Antimicrobial activity was assessed using broth microdilution assays, determining minimum inhibitory concentrations (MICs). Ciprofloxacin and Fluconazole were used as standard drugs for comparative analysis of antibacterial and antifungal activity, respectively. Several derivatives demonstrated significant antimicrobial activity against the tested resistant strains, surpassing the activity of the standard drugs in some cases. These findings suggest that benzoxazole hydrazide derivatives represent promising candidates for the development of novel antimicrobial agents to combat drug resistance.

Keywords: Benzoxazole Hydrazide, Antimicrobial Activity, Drug Resistance, Molecular Docking

MCHSR/AI/2025/049

SYNTHESIS, CHARACTERIZATION AND EVALUATION OF COUMARYL - PROPIONIC ACID DERIVATIVES AS POTENTIAL ANTI-ATHEROTHROMBOSIS AGENT

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Since heterocyclic molecules make up the majority of therapeutic medicines, the most productive field for drug development has been heterocyclic chemistry. This information led to the design of the current study, which aimed to create and assess a number of new coumaryl-propionic acid derivatives for use as anticoagulants, thrombolytics, hypolipidemic agents, and inhibitors of platelet aggregation compound warfarin as the appropriate benchmark for comparison. Using atorvastatin and warfarin as the appropriate standards for comparison, these synthetic compounds were evaluated in vivo on Wistar rats for hypolipidemic and anticoagulant activities (bleeding time, clotting time, and prothrombine time).
To sum up, we are happy to share a practical synthesis technique for the title compounds and positive results for their anticoagulant, thrombolytic, hypolipidemic, and platelet aggregation inhibitory properties. In certain activities, a few molecules had exceptional performance above the norm, whereas the remaining molecules exhibited little or no activity.

Keywords: Prothrombine time; Platelet aggregation; Clotlysisand, Hypolipidemic activities.

TARGETING ANGIOGENESIS: SYNTHESIS AND BIOLOGICAL EVALUATION OF NOVEL INDAZOLE AMIDE AND HYDRAZIDE DERIVATIVES VIA CAM ASSAY

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The abstract shows the potential of novel indazole amide and hydrazide derivatives as anti-angiogenic agents. Given the pivotal role of angiogenesis in pathological processes such as oncogenesis and ocular neovascularization, the development of effective anti-angiogenic therapeutics is of significant clinical relevance. A structure-based drug design approach was implemented, commencing with in silico molecular docking studies to elucidate potential binding interactions of the target compounds with key angiogenic mediators, specifically vascular endothelial growth factor receptor (VEGFR) and matrix metalloproteinases (MMPs). Subsequent in silico absorption, distribution, metabolism, excretion, and toxicity (ADMET) profiling was conducted to predict the pharmacokinetic and safety attributes of the designed molecules. The indazole heterocyclic scaffold, selected for its established pharmacological versatility, served as the core structure for the synthesized derivatives. Selected compounds, identified through computational screening, were synthesized and chemically characterized. In vitro anti-angiogenic efficacy was evaluated utilizing the chorioallantoic membrane (CAM) assay. Quantitative analysis of vascular density demonstrated a statistically significant reduction in angiogenesis in CAMs exposed to the synthesized indazole derivatives compared to vehicle controls. These findings provide evidence for the anti-angiogenic potential of novel indazole amide and hydrazide derivatives and underscore the utility of integrated computational and experimental methodologies in the identification of targeted therapeutic agents.

Keywords: Indazole, Hydrazide Derivatives, Anti-Angiogenesis, Molecular Docking, ADMET.

MCHSR/AI/2025/051

STRATEGICAL MANAGEMENT OF PEPTIC ULCER

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Peptic ulcer is a common global problem today. The normal stomach mucosa maintains balance between the protective and aggressive factor, when this balance is lost the gastric lesion in the stomach is developed. Although many conventional drugs are available to treat ulcers, most of these drugs have adverse reactions when used over long term. Natural products have gained powerful attention due to its effective role in chemotherapeutic agents and chronic disease prevention, including gastric ulcer.As conventional drug delivery systems do not remain in the stomach for prolonged periods, they are unable to deliver the antibiotics to the site of infection in effective concentrations and in fully active forms. Therefore, it is necessary to design drug delivery systems that not only alleviate the shortcomings of conventional delivery vehicles but also deliver the antimicrobials to the infected cell lines. The basic strategy adopted in this study involved the formulation of dosage form that provides local effect using herbal drug to cure gastric ulcer.

Keywords: Natural products, Conventional drug delivery, Peptic ulcer, Antimicrobials, Chemotherapeutic agents.

MCHSR/AI/2025/052

ANTIOXIDANT ACTIVITY OF AQUEOUS LEAF EXTRACT OF *ABUTILON INDICUM*

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Antioxidant activity of aqueous leaf extract of *Abutilon indicum* was investigated for its free radical scavenging activity by determining the nitric oxide and superoxide radical scavenging activity. The antioxidant activity was determined using the 1,1-diphenyl-2-picrylhydrazyl (DPPH) free radical-scavenging activity. The aqueous leaf extract of *Abutilon indicum* contained the highest concentrations of flavonoids, and ascorbic acid. The aqueous leaf extract of *Abutilon indicum* showed a higher DPPH radical-scavenging activity with the lowest 50% inhibitory concentration (IC_{50}). We conclude that the aqueous leaf extract of *Abutilon indicum* investigated in this study are useful sources of natural antioxidants, which confer significant protection against free radical damage. Maximum scavenging of nitric oxide and superoxide radical found were 26.44 % and 46. 82 % respectively at 250 µg/ml concentration.

Keywords: Abutilon indicum, antioxidant, free radical, nitric oxide

MCHSR/AI/2025/053

AI IN INFECTIOUS DISEASE DRUG DEVELOPMENT: LESSONS FROM COVID-19

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Artificial Intelligence (AI) has revolutionized drug discovery, particularly in infectious disease research. The Covid-19 pandemic accelerated AI adoption for rapid drug repurposing, vaccine development, and predictive modeling. Machine learning algorithms analyzed vast biomedical datasets to identify potential antiviral compounds, while deep learning models improved protein structure prediction (e.g., Alpha Fold). AI-driven virtual screening enhanced drug candidate selection, reducing time and costs. Natural Language Processing facilitated literature mining for existing treatments, expediting repurposing efforts. AI also optimized clinical trial designs, improving patient recruitment and monitoring. However, challenges such as data bias, model transparency, and regulatory hurdles remain. Lessons from Covid-19 highlight AI's potential to transform future infectious disease drug development, emphasizing the need for better data sharing, interdisciplinary collaboration, and ethical AI integration. This study explores AI applications in infectious disease therapeutics, showcasing its role in accelerating drug discovery and pandemic preparedness.

Keywords: Drug discovery, Biomedical datasets, Pandemic, Machine learning.

LIPID VESICLES USED FOR DELIVERY OF SKIN CARE PRODUCT

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Cosmetics are regarded as the fastest growing segment of the personal care industry and the use has risen drastically over the years. Cosmetics formulations now have expanded from skin to body to hair and a number of topical cosmetic treatments for conditions such as photoaging, hyperpigmentation, wrinkles, and hair damage, hair loss have come into widespread use. In last few decades, a number of approaches have been developed to improve the limited drug permeability through stratum corneum. One promising approach is the use of lipid vesicles as they not only facilitate drug delivery across skin but also avoid the drawbacks of conventional skin formulations. Ethosomes are currently the most studied lipid vesicles in the nanomedicine field. Ethosomes would highlight their unique composition containing a high concentration of ethanol within a phospholipid bilayer. The focus on the development of these vesicles should be directed to determining the ideal composition, with low toxicity, biocompatibility and which remains stable for long periods. This abstract focuses on making lipid vesicles used for skin drug delivery.

Keywords: Ethosomes, Nanomedicine, Cosmetics, Toxicity, Drug Delivery

ETHOSOMES: A NOVEL APPROACH FOR THE DELIVERY OF DRUG

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Background: Ethosomes are the modern lipid based vesicular transporters developed to increase transdermal drug delivery.These are the modified form of ethosomes which contain additional penetration enhancers,to allow enhanced drug penetration and bioavailabity.These are sufficient to deliver both hydrophilic and lipophilic drug due to their flexible and elastic nature, by overcoming the limitations of conventional drug delivery system

Objective: This poster examines the formulation, preparation techniques, and therapeutic applications of ethosomes while addressing challenges and future directions.

Methodology: Various research papers from pubmed, ScienceDirect, and recent journal publications were reviewed to analyze the composition and method of preparations and advancement in ethosomes-based drug delivery systems.

Result: Research had shown that ethosomes provide higher drug entrapment efficiency, enhanced permeability, and improved bioavailability with respect to conventional vesicular systems. These carriers have been applied in cosmeceuticals (anti ageing formulations),Targeted therapy (cancer drug delivery),Pain management(arthritis treatment),Cardiovascular therapy(hypertension),Dermatology(anti inflammatory drugs).

Conclusion: Ethosomes provide improved stability,permeability and efficient drug delivery.Challenges such as large scale production and formulation stability require further research.This poster highlights the potential of ethosomes as revolutionary and effective drug delivery system.

Keywords: Ethosomes, Transdermal drug delivery, Permeability, Bioavailability

DESIGN, DEVELOPMENT, AND EVALUATION OF CHITOSAN-BASED DRY POWDER INHALATION FORMULATIONS INCORPORATING ANTIFUNGAL AGENTS FOR PULMONARY FUNGAL INFECTIONS

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Pulmonary fungal infections pose a significant threat to individuals with compromised immune systems, necessitating effective and targeted therapeutic interventions. This study aims to design, develop, and evaluate chitosan-based dry powder inhalation (DPI) formulations incorporating antifungal agents for the treatment of pulmonary fungal infections.

Objectives

1. Develop and optimize chitosan-based DPI formulations using antifungal agents.

2. Evaluate the physicochemical properties, in vitro drug release, and aerosolization performance of the formulated DPIs.

3. Assess the in vitro antifungal efficacy and cytotoxicity of the optimized DPI formulations.

Methods: Chitosan-based DPI formulations will be prepared using a spray-drying technique, and their physicochemical properties will be characterized. In vitro drug release and aerosolization performance will be evaluated using a Next Generation Impactor (NGI). The antifungal efficacy and cytotoxicity of the optimized DPI formulations will be assessed using in vitro assays

Expected Outcomes: The study aims to develop and evaluate chitosan-based DPI formulations that demonstrate improved antifungal efficacy, reduced cytotoxicity, and enhanced aerosolization performance. The optimized DPI formulations are expected to provide a promising therapeutic approach for the treatment of pulmonary fungal infections.

Keywords: Antifungal, DPI formulation, Chitosan, Therapeutic, Drug release.

FORMULATION AND EVALUATION OF BECLOMETHASONE DIPROPIONATE LOADED EMULGEL FOR THE TREATMENT OF TOPICAL DISORDERS

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For a topical formulation to be effective, it must facilitate optimal drug penetration into the skin, which typically has a pH range of 4 to 5.6. Beclomethasone dipropionate is an inflammatory drug and is used topically in conditions like edema and psoriasis. It is a lipophilic drug. Emulgels are emulsions, either of the oil-in-water or water-in-oil type, which are gelled by mixing with a gelling agent. Emulsion itself is a controlled release system where entrapped drug particles in internal phase passes through the external phase to the skin and slowly get absorbed. The objective of investigation is to formulate a emulgel drug delivery system of beclomethasone dipropionate for the treatment of topical disorders using carbopol 940 as gelling agent. The composition of formulation consist of span 20 and liquid paraffin as oil phase, tween 20, propylene glycol and water as aqueous phase. The IR spe tra of drug and excipients doesn't shows The formulated preparations were assessed for their physical appearance, pH, spreadability, drug content, swelling index, phase separation, in vitro drug release and scanning electron microscope. The formulated emulgels showed good physical characteristics including, easy application and removal, good spreadability, pH ranging from 6.68 ± 0.05 to 4.74 ± 0.06. The percent drug content was found to be 98.35%. The in vitro drug release studies shows that formulation F1 shows highest release. The observed results were therefore highly encouraging towards safe and effective topical drug delivery system.

Keywords: Emulgels, Beclomethasone, Drug penetration, Gelling agent, Drug content

DEVELOPMENT AND CHARACTERIZATION OF SOLID LIPID NANOPARTICLEOFDICLOFENACSODIUMINTHETREATMENTOF OCULAR PAIN AFTER PHOTOREFRACTIVE KERATECTOMY

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The aim of this study was to prepare and evaluate incorporating solid lipid nanoparticles (SLNs) of diclofenac sodium for systemic delivery of the active after ocular application. Diclofenac sodium loaded solid lipid nanoparticles (SLNs) have been successfully developed using a microemulsion technique. Three different formulations were prepared It was found that variation in the amount of ingredients had profound effects on the diclofenac sodium loading capacity, the mean particle size, and size distribution of charge, morphology, and drug- lipid compatibility. At optimized process conditions, diclofenac sodium loaded SLNs showed spherical particles with a mean particle size of 450 nm and 60% diclofenacsodium incorporation efficacy was achieved. The SLNs were evaluated for in vitro drug release, *ex-vivo* permeation studies. The SLN sustained the drug release for 6 h in vitro. The results suggest enhancement in ocular delivery of diclofenac sodium with incorporating SLNs.

Keywords: Solid lipid-nanoparticles, Diclofenac sodium, Ocular delivery, Analgesic activity.

POTENTIAL FOR WOUND HEALING IN ALBINO RATS USING IN VIVO ASSAYS FOR POLYHERBAL FORMULATIONS

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Ayurveda holds that a single herb is not enough to have the desired therapeutic effect. It has a stronger therapeutic effect and less toxicity when modified as a multiple plant combination in a certain ratio. The purpose of this study is to assess the polyherbal formulation's ability to heal wounds as well as its pharmacological activity in vivo in Swiss albino rats**.** To investigate wound healing, complete skin defects were created in the dorsal region of rats. Histopathological analysis in-vivo (excision and burn) tests were used to evaluate the polyherbal formulation's efficacy.Ketamine hydrochloride (20 mg/kg intramuscular) was employed as an anesthetizing agent, while silver sulfadiazine served as the standard medication for this project's experimental study. Both keratinocytes and fibroblasts were significantly mobilized at the site of injury when 2 µg/ml and 4 µg/ml formulations were used. When it came to in vitro activity, the polyherbal formulation had a greater impact on biochemical measurements such hydroxyproline, collagen, and hexosamine turnover than the untreated group. On days 0, 3, 6, and 9, a polyherbal formulation comprising herbal extract was administered to the wound region; this was determined to be more significant. Last day's burn wound area was 26.30 ± 0.5, but the surgically created wound area was 13.666 ± 0.8. Finally, on the basis of above results, we can conclude that polyherbal formulation may be a breakthrough for the treatment of wound healing in future.

Keywords: Burnwound, Epithelization, Excised wound, Hexosamine, Scar formation, Wound healing.

SELF-NANOEMULSIFYING DRUG DELIVERY SYSTEM (SNEDDS) FOR HEPATOPROTECTIVE DRUG DELIVERY

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Liver diseases pose a significant global health challenge, often requiring therapeutic interventions with bioactive compounds that suffer from poor aqueous solubility and bioavailability. The Self-Nanoemulsifying Drug Delivery System (SNEDDS) has emerged as a promising approach for enhancing the solubility, absorption, and hepatoprotective efficacy of such drugs. SNEDDS is a lipid-based formulation comprising oils, surfactants, and co-surfactants that spontaneously form nanoemulsions in the gastrointestinal tract, promoting improved drug dissolution and systemic absorption. This study explores the formulation strategies of SNEDDS for hepatoprotective agents, focusing on optimizing nanoemulsion properties such as droplet size, zeta potential, and drug release kinetics. By facilitating lymphatic transport and reducing first-pass metabolism, SNEDDS offers a novel strategy to enhance the therapeutic potential of hepatoprotective drugs, including herbal bioactives and synthetic molecules. The findings suggest that SNEDDS-based formulations can significantly improve liver-targeted drug delivery, offering a promising platform for treating hepatic disorders.

Keywords: SNEDDS, Hepatoprotective, Liver diseases, Bioavailability, Nanoemulsion

MCHSR/AI/2025/061

FORMULATION AND EVALUATION OF 10 HERBAL REMEDIRS WITH ANTI-INFLAMMATORY ACTIVITIES USED IN EDEMA

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Herbal remedies are more acceptable in the view that they are safe with fewer side effects than the synthetic ones. Herbal formulations have more demanded in the market. The objective of the study is to formulate and evaluate a topical herbal formulation.Edema is a condition characterized by the accumulation of excess fluid in the tissues, leading to swelling, and is often associated with inflammation. Herbal remedies have been widely used for their anti-inflammatory effects in managing edema. This paper presents an overview of 10 herbal remedies with anti-inflammatory properties used for treating edema. These herbs have shown promise in traditional medicine and modern research for their ability to reduce swelling, alleviate pain, and improve circulation.on for the anti-inflammatory activity used in edema.10 herbal gel formulation were prepared using 1.5 % of gelling agents, carbapol 934, carbapol 900 and they were evaluated for physical appearance ,viscosity, PH, Extrudibality, Spredibility, in vitro diffusion profile. The stability study for the herbal gel formation was done as the ICH guidelines formulated gel homogeneously stable complied with the guidelines.No edema was observed in the skin irritation test confirming non toxic and safe.

Keywords- Herbal gel, Treatment, Anti-inflammatory, Edema

CHITOSAN NANOPARTICLES AND AI: A SYNERGISTIC APPROACH FOR DIABETES MELLITUS TREATMENT

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Diabetes mellitus is a long-term endocrine and metabolic disorder in which the body fails to regulate blood glucose levels due to insufficient insulin production or insulin resistance. This condition poses significant health risks and requires effective treatment strategies to maintain glucose homeostasis. Among emerging therapeutic solutions, chitosan, a natural carbohydrate biopolymer, has drawn considerable interest due to its excellent biocompatibility and biodegradability. Notably, its derivatives exhibit anti-diabetic properties, enhancing glucose uptake, improving lipid metabolism, and mitigating insulin resistance without causing adverse effects.

Chitosan nanoparticles (CNPs) serve as an efficient drug delivery system, offering controlled and targeted release of anti-diabetic medications. Modern drug delivery methods, such as oral, subcutaneous, and nasal routes, are gradually replacing traditional injectable treatments, making diabetes management more convenient and effective. Some nano-drug formulations closely mimic the body's natural insulin secretion, thereby reducing the likelihood of hypoglycemia and optimizing therapeutic outcomes.

The integration of artificial intelligence (AI) into chitosan-based nanomedicine is revolutionizing diabetes treatment. AI-driven models analyze patient-specific data, including glucose fluctuations, lifestyle habits, and genetic factors, to personalize drug delivery for maximum efficacy. Additionally, machine learning algorithms support real-time monitoring, predict treatment responses, and refine nanoparticle formulations. AI also enhances large-scale production and quality control, ensuring reliable and standardized treatment options. The combined potential of AI and chitosan nanoparticles marks a significant step toward more adaptive, targeted, and patient-centric diabetes care.

Keywords: Diabetes Mellitus, Chitosan Nanoparticles (CNPs), Drug Delivery System, Artificial Intelligence (AI)

TRANSETHOSOMES: A REVOLUTIONARY STRATEGY FOR ENHANCED DRUG DELIVERY

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Background - Transethosomes are the modern lipid based vesicular transporters developed to increase transdermal drug delivery.These are the modified form of ethosomes which contain additional penetration enhancers,to allow enhanced drug penetration and bioavailabity.These are sufficient to deliver both hydrophilic and lipophilic drug due to their flexible and elastic nature, by overcoming the limitations of conventional drug delivery system

Objective- This review examines the formulation, preparation techniques, and therapeutic applications of transethosomes while addressing challenges and future directions.

Methodology – Various research papers from pubmed, ScienceDirect, and recent journal publications were reviewed to analyze the composition and method of preparations and advancement in transethosomes-based drug delivery systems.

Result – Research had shown that transethosomes provide higher drug entrapment efficiency, enhanced permeability, and improved bioavailability with respect to conventional vesicular systems. These carriers have been applied in cosmeceuticals (anti ageing formulations),Targeted therapy (cancer drug delivery),Pain management(arthritis treatment),Cardiovascular therapy(hypertension),Dermatology(anti inflammatory drugs).

Conclusion – Transethosomes provide improved stability, permeability and efficient drug delivery. Challenges such as large scale production and formulation stability require further research. This review highlights the potential of transethosomes as revolutionary and effective drug delivery system.

Key words - Transethosomes, Transdermal drug delivery, Permeability, Bioavailability

A COMPARATIVE STUDY ON KNOWLEDGE ABOUT MEDICAL DEVICE ADVERSE EVENT AMONG MEDICAL PRACTITIONERS AND COMMUNITY PHARMACISTS

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Medical devices can be any instruments, apparatus, appliances, implants, machines, or other similar articles intended to be used for medical purposes, such as diagnosis, treatment, or prevention of diseases. Medical device adverse event (MDAEs) is defined as any unintended or noxious effect caused by medical devices. All over world various measures are undertaken to provide better patient safety to improve the standard of medical devices. The ultimate objective of the concept is to ensure patient safety as well as make proper guidance for both manufacturers and expert authorities. Materiovigilance Program of India (MvPI) was launched by the Drug Controller General of India at the Indian Pharmacopoeia commission (IPC) in Ghaziabad in 2015. The main purpose of the study was to assess the knowledge and create awareness among the stakeholders by monitoring adverse events associated with medical devices to generate best practices for patient safety and to identify the factors responsible for underreporting MDAEs. This was a questionnaire-based survey which was carried out among registered medical practitioners and the community Pharmacists who were practicing. The questionnaire was administered to over 150 subjects selected randomly and has statistically validated. From the distributed questionnaire we selected fully furnished forms of 50 doctors and 50 pharmacists who work in various sectors. Only 34% of doctors and 38% pharmacists are aware of the ongoing MVPI program. Lack of knowledge and awareness about the materiovigilance program were common reasons for under reporting. To improve the knowledge of medical practitioners and pharmacists on materiovigilance, IPC must conduct more workshops and seminars on materiovigilance in all the medical sectors and the importance of reporting the adverse events related to medical devices.

Keywords: Materiovigilance, Questionnaire, Doctors, Community Pharmacist, Adverse Events

INVASOMES IN ACTION: MECHANISTIC INSIGHTS AND FUTURE DIRECTIONS

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Vesicular delivery systems have the potential to overcome these shortcomings due to properties such as high biocompatibility, simplicity of surface modification and suitability as controlled delivery vehicles. However, incorporating these systems into environmentally responsive dispersants such as hydrogels, ionic liquids and deep eutectic solvents may further enhance therapeutic prowess of these delivery systems. Consequently, improved vesicular drug delivery can be achieved by considering combining some of these formulation approaches. The key goal of an invasome-based delivery system is not only to strengthen the efficacy and safety of the drug but also to dramatically increase patient conformity and the therapeutic value to a significant extent. The delivery of drugs via the skin membrane in advanced drug delivery systems is a fascinating fact. Many pharmaceutical studies have shown that plentiful drug molecules are less soluble, have less bioavailability and stability, have less penetration, etc. Therefore, a new form of dosage with exceptional characteristics like invasomes can be created.

Key words: Invasome, controlled delivery, biocompatibility, bioavailability.

EXPLORING THE THERAPEUTIC POTENTIAL OF *BUTEA MONOSPERMA* IN DIABETES MELLITUS MANAGEMENT

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Butea monosperma, commonly known as the Flame of the Forest, is a medicinal plant traditionally used in various Ayurvedic treatments. Its potential therapeutic role in managing diabetes mellitus has attracted significant research attention. Diabetes mellitus is a chronic metabolic disorder characterized by insulin resistance or insufficient insulin production, leading to high blood sugar levels. The plant's bioactive compounds, including flavonoids, alkaloids, and phenolic acids, have shown promising anti-hyperglycemic, anti-inflammatory, and antioxidant properties, which are believed to contribute to its effectiveness in managing diabetes.

In vitro and in vivo studies have demonstrated that Butea monosperma extracts can significantly reduce blood glucose levels, improve insulin sensitivity, and enhance pancreatic beta-cell function. Additionally, the plant's compounds are thought to reduce oxidative stress and inflammation, two critical factors involved in the pathogenesis of diabetes. Recent studies have highlighted its potential to mitigate complications such as diabetic neuropathy and nephropathy through its antioxidant and anti-inflammatory mechanisms.

Furthermore, Butea monosperma's role in modulating key enzymes involved in carbohydrate metabolism, such as alpha-amylase and alpha-glucosidase, further supports its potential as an adjunctive therapy for diabetes management. Although more clinical trials are needed to confirm its efficacy and safety, the current evidence suggests that Butea monosperma holds considerable promise as a natural therapeutic agent in the management of diabetes mellitus.

Keywords: Butea monosperma, diabetes mellitus, anti-hyperglycemic, insulin sensitivity

GENE TARGETED THERAPY IN MALE BREAST CANCER DIFFER FROM FEMALE

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Male breast cancer is a rare condition, often under-researched compared to its female counterpart, leading to limited understanding and targeted treatments. Symptoms such as observable mass, lymph nodes enlargement mammography, ultrasound to identification the regional lymph nodes. The definitive diagnosis is made by biopsy. This study explores the potential of gene-targeted therapies as a personalized approach to managing male breast cancer. By examining genetic mutations commonly associated with male breast cancer, such as BRCA1, BRCA2, and HER2, we investigate their roles in disease progression and treatment responsiveness. These therapies focus on restraining tumor progression while preserving healthy tissue, marking a significant advance in personalized medicine. Strategies such as monoclonal antibodies, antibody-drug conjugates, and tyrosine kinase inhibitors (TKIs) are central to tailoring treatments based on an individual's genetic profile.Prevention strategies emphasize maintaining a healthy weight, managing hormone levels, and limiting alcohol intake to mitigate risks. Additionally, early genetic screening and proactive management for individuals with hereditary predispositions offer critical pathways to reducing incidence. The etiology of male breast cancer is closely linked to genetic mutations like BRCA1 and BRCA2, as well as risk factors including aging, hormonal imbalances, family history, and environmental exposures like radiation. This study highlights the importance of gene-targeted therapies in improving the treatment and outcomes of male breast cancer. By using personalized medicine, this approach can offer better survival rates and quality of life for male breast cancer patients, advancing the field of cancer care.

Keywords: Male breast cancer, Gene targeted therapy, personalized medicine.

MCHSR/AI/2025/068

AI-POWERED EARLY DETECTION OF SPECIFIC DISEASE, E.G., LUNG CANCER] FROM MEDICAL IMAGES: FOCUS ON THE AI ALGORITHM, DATASET, AND PERFORMANCE METRICS.

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Lung cancer is a leading cause of cancer-related deaths worldwide. Early detection is crucial for improving treatment outcomes. This study presents an AI-powered approach for detecting lung cancer from medical images using deep learning algorithms. We utilized a dataset of 10,000 chest CT scans, curated from various sources, and developed a convolutional neural network (CNN) to identify lung nodules and predict cancer risk. Our model achieved a sensitivity of 92.1%, specificity of 95.5%, and AUC-ROC of 0.97. These results demonstrate the potential of AI-powered early detection of lung cancer from medical images, enabling timely interventions and improving patient outcomes.

Keywords: Lung cancer, artificial intelligence, machine learning, deep learning,

AI FOR OPTIMIZING CLINICAL TRIAL DESIGN AND PATIENT SELECTION

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Clinical trials are the backbone of medical research, but they often face challenges related to inefficient design, inadequate patient selection, and high failure rates. Artificial intelligence (AI) has the potential to revolutionize clinical trial design and patient selection by leveraging machine learning algorithms, natural language processing, and data analytics. This abstract presents a novel AI-driven approach for optimizing clinical trial design and patient selection.

Keywords: Artificial intelligence (AI), Machine learning (ML), Clinical trial design, Patient selection

MCHSR/AI/2025/070

NEUTRACEUTICAL: A PROMSIMG FRONTIER FOR MENTAL HEALTH

Arya Mishra

Graphic Era Hill University

Neutraceutical are nourishing components that are biologically active and have the potential to sustain optimal health and benefits. They are an amalgam of pharmaceutical and nutrition, human health and endurance are greatly impacted by these products, particularly for the upcoming development in therapy. Neutraceutical have come into prominence for their safety profile, therapeutic effectiveness and beneficial nutritional properties. Neutraceutical work on various diseases like chronic diseases, neurological diseases, non-communicable diseases, lifestyle disease.

Awareness of Neutraceutical and their potential as potent therapeutic supplement has grown significantly over the past ten years. Since it is now recognized as a component of complementary and alternative medicine (CAM), Neutraceutical medicine has been added as a new subfield of CAM .Neutraceutical dynamic action both (nutritional medicinal) has made them more popular than medications among the general populations and healthcare professionals.

All the diseases that occur in human body eventually affect the mental health of human and cause misbalance in their cardiac rhythm which cause a jet leg condition. Neurological diseases are one of the major healthcare issues worldwide. Posed lifestyle changes are associated with a drastically increased risk of chronic illness and diseases, posing a substantial healthcare and financial burden to society globallyan association between food habits and the individual lifestyle with neurodegeneration has been manifested, thereby proposing the role of Neutraceutical as prophylactic treatment for neurological interventions. Current improvement will show the most adequate and prominent Neutraceutical and suggested concise mechanisms involving autophagy regulation, anti- inflammatory, antioxidant, mitochondrial homeostasis, and others. Disease like Parkinson’s, Alzheimer, depression and psychosis others are neurogenerative disease.

Keywords: Nutraceuticals, Mental health, Disease, Lifestyle

MCHSR/AI/2025/071

THE STUDY ON EXCIPIENT SYSTEMS FOR OPTIMIZING COMPRESSION TABLETING PROCESSES

Harshit sanadhya

With regards to modern scale tablet creation, co-dealt with excipients can possibly increment utility while diminishing the downsides of traditional excipients. A grouping of co-dealt with excipients that might have the option to meet the prerequisites of direct-pressure dispersible tablet plans was the main thrust behind the resulting study.
Notwithstanding different types of dose, tablets are the most widely recognized and notable.
Their straightforwardness, simplicity of association, security, and reasonableness permit them to give a few advantages. Despite the fact that there are various difficulties, the least complex strategy for assembling tablets is by means of direct strain. Among these worries are difficulties with the material's homogeneity and mass shift, as well likewise with the tablets' crumbling, breakdown, and in general hardness. The methodology with the most clear lucidity is immediate strain. Current times have seen an expansion in the utilization of "co-dealt with excipients," which are combinations of normally treated excipients like fillers, latches, disintegrants, lubes, and others. Different methods, including as sprinkle drying, wet granulation, melt granulation, dry granulation, and co-crystallization, are utilized to deliver these blends. Recorded as a hard copy this survey, we took extraordinary consideration to review the techniques in general, co-dealt with excipients, and excipients that are monetarily open or frequently utilized in the creation of these merchandise.

Keywords: Crystallization, Disintegrants, Granulation, Tablet

MCHSR/AI/2025/072

AI IN HPLC SYSTEMS: TRANSFORMING ANALYTICAL CHEMISTRY

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Artificial Intelligence (AI) is revolutionizing High-Performance Liquid Chromatography (HPLC) by optimizing workflows, enhancing precision, and enabling real-time decisionmaking. Machine learning algorithms are now integrated into HPLC systems for peak detection, retention time prediction, and anomaly identification, significantly reducing manual intervention and improving data reproducibility. AI-driven automation in method development allows for adaptive solvent optimization and column selection, accelerating analytical processes across pharmaceutical, environmental, and clinical research.

Additionally, real-time AI-based diagnostics monitor system performance, identifying errors and inefficiencies before they compromise results. By leveraging deep learning for spectral pattern recognition and predictive analytics, AI enhances chromatographic accuracy, leading to faster, cost-effective, and high-throughput analyses. As AI continues to evolve, its integration into HPLC promises a paradigm shift toward self-optimizing analytical systems, empowering scientists with unprecedented efficiency and insight.

Keywords: Artificial Intelligence (AI), High-Performance Liquid Chromatography (HPLC), Machine Learning

MCHSR/AI/2025/073

ARTIFICIAL INTELLIGENCE AND NANOMEDICINE: SHAPING THE FUTURE OF TARGETED BREAST CANCER TREATMENT

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Background: Breast cancer remains one of the most significant health challenges worldwide, contributing to a substantial mortality rate among women. The complexity of tumor heterogeneity and resistance to conventional therapies has accelerated the demand for innovative and targeted treatment strategies.

Aim: This study aims to explore the synergistic potential of AI and nanomedicine in targeted breast cancer therapy. AI-driven algorithms, including machine learning and neural networks, facilitate the rapid analysis of complex data, enabling the prediction and optimization of therapeutic outcomes.

Materials and Methods: Utilizing AI methodologies such as support vector machines (SVM) and neural networks, the study integrates data-driven models for predicting treatment responses. Nanotechnology applications involve designing nanoparticles, drug encapsulation, and site-specific delivery, optimizing drug biodistribution and minimizing adverse effects.

Results: The integration of AI with nanomedicine has demonstrated remarkable potential in overcoming traditional therapeutic barriers, enabling personalized treatment plans and real-time monitoring of tumor dynamics.

Conclusion: AI and nanomedicine hold immense promise in transforming breast cancer treatment. While challenges related to technical integration and regulatory approval persist, ongoing research and advancements may pave the way for more precise, efficient, and personalized therapeutic strategies.

Keywords: Artificial Intelligence, Nanomedicine, Breast Cancer, Targeted Therapy

MCHSR/AI/2025/074

AI-DRIVEN DRUG DISCOVERY AND DRUG REPURPOSING

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Artificial Intelligence (AI) has emerged as a transformative force in drug discovery and repurposing, offering innovative solutions to the challenges of traditional pharmaceutical research. AI-driven methodologies, including machine learning (ML), deep learning (DL), and natural language processing (NLP), accelerate drug candidate identification, reduce costs, and enhance precision.

Drug repurposing through AI leverages vast biomedical datasets to identify new therapeutic potentials of existing drugs. Advanced deep learning models predict drug-target interactions, assess off-target effects, and facilitate AI-powered virtual screening, significantly shortening the timeline for discovering novel applications of approved drugs. Notable successes include AI-assisted repositioning of drugs for COVID-19 and rare diseases.

In de novo drug discovery, AI models employ generative algorithms to design novel molecular structures with optimized binding affinities. AI-driven screening tools predict pharmacokinetics and toxicity early in the development process, enhancing drug safety and efficacy. The integration of quantum computing with AI further refines computational chemistry, enabling precise drug design. AI technologies, including deep learning, NLP, molecular docking, and generative adversarial networks (GANs), facilitate efficient drug discovery processes. However, challenges such as data quality, bias, interpretability, and regulatory concerns persist. Overcoming these hurdles requires further integration of AI with multi-omics data, ethical considerations, and robust regulatory frameworks.

Keywords: NLP, Therapeutic, Drug discovery, Biomedical

TRANSFORMING HEALTH SCIENCES WITH AI: EXPLORING NEW POSSIBILITIES AND OVERCOMING OBSTACLES

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The integration of Artificial Intelligence (AI) into health sciences is revolutionizing the way we approach diagnosis, treatment, and patient care. AI technologies, such as machine learning, natural language processing, and predictive analytics, are unlocking new possibilities for more personalized, efficient, and precise healthcare. These advancements have the potential to transform medical research, streamline clinical workflows, and enhance decision-making in real-time. However, the rapid evolution of AI also brings forth significant challenges, including concerns about data privacy, algorithmic biases, and the ethical implications of AI-driven decisions. This paper explores the promising potential of AI in health sciences while addressing the obstacles that hinder its full-scale implementation. It discusses how AI can be harnessed to improve patient outcomes, optimize healthcare delivery, and support the future of medical innovation, while emphasizing the need for rigorous oversight and careful consideration of its societal impacts.

Keywords: AI, Health Sciences, Machine Learning, Healthcare, Data Privacy, Medical Innovation.

PREPARATION AND CHARACTERIZATION OF TASTE MASKED FAMOTIDINE ION EXCHANGE RESINATES IN THE SOLID STATEFOR PATIENTS WITH HYPERACIDITY

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This study focuses on masking the bitter taste of Famotidine through complexation with Carbomer, a non-conventional ion-exchange resin. Famotidine, a crystalline compound with an inherently bitter taste, was characterized using various analytical techniques, including FTIR, DSC and XRD. The prepared drug-resin complex was formulated into orally disintegrating tablets using suitable excipients. Post-formulation evaluations confirmed uniformity in tablet properties such as weight variation, hardness, and drug content. In vitro release studies demonstrated a significant improvement in drug release compared to a commercially available formulation. Taste-masking assessments indicated that the Carbomer complex effectively eliminated the bitterness of Famotidine. Pharmacokinetic analysis further suggested enhanced bioavailability, improved systemic exposure, and faster absorption for the Carbopol complex compared to marketed formulations. The result highlighted the potential of this formulation in improving therapeutic efficacy and patient compliance, particularly in the treatment of conditions such as peptic ulcers and GERD.

Keywords: Famotidine, taste masking, Carbopol complex, ion exchange resin.

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THE NATURAL APPROACH TO ALZHEIMER'S TREATMENT: EXPLORING HERBS AND SUPPLEMENTS

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Alzheimer's disease is a foremost neurodegenerative disease which resorted to symptom control in conventional treatments. Alzheimer's disease is the most common form of dementia, and it also places a heavy financial strain on families and raises healthcare costs. There is presently no medication that can stop or decrease the course of AD, despite research efforts. Cholinesterase inhibitors are now the most often used drugs, however they only work to alleviate symptoms. Numerous factors contribute to Alzheimer's disease (AD), such as excessive beta-amyloid (Aβ) plaque accumulation outside of cells, intracellular hyperphosphorylation of tau (τ) proteins that accumulate as neurofibrillary tangles, oxidative stress (OS), which is mainly brought on by mitochondrial dysfunction, and environmental and genetic factors. The use of herbal remedies and nutritional supplements as natural AD treatments is growing in popularity. In nature, bioactive compounds are present in almost limitless amounts. Several natural compounds have anticholinesterase function, while additional molecules can be used as leader compounds in the production of new drugs. In particular, it has been shown that several natural compounds contain anti-inflammatory, antioxidant, anti-amyloidogenic, and anti-cholinesterase properties. These substances include triterpenes, alkaloids, anthocyanins, flavonoids, gingerols, and tannins. It also covers safety concerns and potential drug interactions with prescription medications, as well as dietary and lifestyle modifications that are crucial for treating AD. This article provides a summary of AD pathogenesis and treatment goals. It also goes over the information that is now available on several plants and isolated natural components that are utilised to stop or lessen AD symptoms.

Keywords: Alzheimer's disease (AD), Beta-amyloid (Aβ), Tau (τ), herbal remedies, dietary supplements,natural approaches.

"A REVIEW ON VARIOUS METHODINVOLVE IN SOLUBILITY ENHANCEMENT OF BCS CLASS II DRUG"

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BCS (Biopharmaceutics Classification System) Class II drugs, characterized by low solubility and high permeability, face significant bioavailability challenges due to their limited dissolution rates. To address this, diverse solubility enhancement strategies have been developed, focusing on optimizing drug dissolution and absorption. Particle size reduction techniques, such as micronization and nanosuspensions, increase surface area and dissolution velocity (e.g., paclitaxel nanocrystals). Solid dispersions, particularly amorphous systems using hydrophilic polymers (e.g., itraconazole in Sporanox®), disrupt crystalline structures to enhance solubility. Lipid-based systems like self-emulsifying formulations (SEDDS) and cyclodextrin inclusion complexes leverage solubilization via lipid matrices or host-guest interactions (e.g., ritonavir in Norvir®). Advanced approaches such as co-crystallization, salt formation, and nanotechnology (liposomes, polymeric nanoparticles) further improve drug solubility and stability. Emerging innovations like 3D printing and supercritical fluid technology enable tailored drug delivery systems with rapid disintegration and controlled release. However, challenges persist, including physical stability of amorphous systems, scalability of nanotechnologies, and recrystallization risks. The selection of an optimal technique hinges on drug physicochemical properties (e.g., log P, melting point), target release profiles, and regulatory considerations. Recent trends integrate machine learning for predictive formulation design and hybrid systems using co-processed excipients. By synergizing traditional and cutting-edge methods, these strategies enhance bioavailability and therapeutic outcomes for BCS Class II drugs, paving the way for patient-centric and commercially viable formulations in modern pharmacotherapy

Keywords: Nano particles, solubility, bioavailability, crystallization, solid dispersion, control release.

ARTIFICIAL INTELLIGENCE-DRIVEN ADVANCEMENTS IN NANOTECHNOLOGY FOR HEALTHCARE INNOVATION

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Background: Nanotechnology has revolutionized various fields, especially medicine, by enabling precise drug delivery, diagnostics, and imaging. The integration of Artificial Intelligence (AI) enhances the discovery, design, and application of nanomaterials, making treatments more efficient and personalized. AI-driven nanorobots and smart nanoparticles are advancing cancer therapy, drug discovery, and medical imaging.

Aim: This study aims to explore how AI enhances nanotechnology, particularly in novel nanomaterial development, nanorobotics, drug delivery, diagnostics, cancer therapy, and drug discovery.

Material and Method: A comprehensive review of AI-driven nanotechnology applications was conducted. Various nanomaterials, including nanoparticles, nanocarriers, and nanorobots, were analyzed for their role in healthcare. AI algorithms and machine learning models used for drug targeting, medical imaging, and diagnostics were also examined.

Result: AI significantly improves the efficiency of nanomaterials by optimizing their design and functionality. AI-powered nanorobots enable precise drug delivery, while AI-assisted imaging enhances disease detection. The combination of AI and nanotechnology accelerates drug discovery and improves cancer treatment outcomes.

Conclusion: AI is transforming nanotechnology by improving material discovery, enhancing medical applications, and optimizing drug therapies. This synergy paves the way for more precise, efficient, and personalized healthcare solutions.

Keywords: AI, Nanotechnology, Nanorobots, Drug Delivery, Diagnostics, Cancer Therapy, Drug Discovery, Medical Imaging

MCHSR/AI/2025/080

INVESTING THE ROLE OF TUMOR NECROSIS FACTOR ALPHA IN AUTOIMMUNE DISEASE

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Tumor Necrosis Factor (TNF- alpha) is produced and activated by macrophages, T-lymphocytes, and natural killer cells. It is a major regulator of inflammatory responses, and it's involved in the pathogenesis of some inflammatory and autoimmune disease. TNF – alpha exist in two forms soluble and transmembrane form. TNF- alpha facilitates various biological activity through two receptor – TNFR1 and TNFR2. TNF- alpha binds on these two receptors and then transmits molecular signal for biological function such as cell survival, differentiation and proliferation. Excessive activation of TNF- a causes chronic inflammation and eventually lead to development of pathological complication such as autoimmune disease, such as Rheumatoid arthritis, inflammatory bowel disease, psoriatic arthritis , psoriasis , and noninfectious uveitis are mainly induced by abnormal secretion of TNF alpha. To combat the TNF alpha, their inhibitors are successfully developed and applied in clinical treatment of autoimmune disease such as Crohn' disease and rheumatoid arthritis. These are the approved for clinical inhibitors are – Etanercept, infliximab, adalimumab, golimumab and certolizumab. Major side effects include infections (bacterial, fungal, viral, or atypical infections), congestive heart failure NYHA Class III or IV showed poor cardiac outcomes, drug-induced lupus. In this study, we reviewed major occurrences of adverse events and their pathogenesis.

Keywords: TNF- a, Autoimmune disease, Rheumatoid Arthritis, Psoriatic arthritis, Inflammatory bowel disease.

MCHSR/AI/2025/081

ARTIFICIAL INTELLIGENCE (AI) AND VIRTUAL REALITY (VR) IN HEALTHCARE: A NEW ERA OF PRECISION AND IMMERSIVE CARE

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Artificial Intelligence (AI) and Virtual Reality (VR) are revolutionizing healthcare by enhancing diagnostics, treatment, and medical training. AI applications in healthcare are vast, from medical imaging and drug discovery to robotic surgeries and virtual health assistants.AI-powered tools like Deep Mind's AI have outperformed radiologists in breast cancer detection, while IBM Watson Health assists oncologists in personalized cancer treatment. The Da Vinci Surgical System utilizes AI-driven robotics to enhance precision in minimally invasive surgeries. In parallel, VR is transforming medical education, with platforms like Osso VR providing realistic surgical simulations. Snow World VR is being used to help burn patients manage pain by creating immersive distraction environments. Mind Maze applies VR for neurorehabilitation, aiding stroke patients in regaining motor function.

Current trends indicate a growing adoption of AI in predictive analytics, enabling early intervention for chronic diseases like diabetes and cardiovascular conditions. VR is also being integrated into mental health treatments, offering exposure therapy for PTSD and anxiety disorders. However, challenges such as data privacy, regulatory barriers, and integration costs persist. As research progresses, the convergence of AI and VR is expected to enhance patient outcomes, optimize healthcare efficiency, and expand medical accessibility.

If these technologies are implemented responsibly, with proper ethical considerations, security measures, and regulatory frameworks, they can significantly enhance patient outcomes and healthcare efficiency. The synergy of these technologies represents a future where healthcare is more precise, interactive, and patient-centric.

Keywords: Artificial Intelligence, Virtual Reality, Cardiovascular, Neurorehabilitation

INTEGRATING COMPUTER-AIDED DRUG DELIVERY SCIENCES AND VESICULAR DRUG DELIVERY SYSTEM

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The integration of molecular vesicular drug delivery systems with computer-aided drug delivery sciences marks a significant advancement in modern pharmaceutical research.While developing a vesicular system, considering the composition, particle size, drug loading, and drug release(kinetics) profile of the vesicle concerningthe target site and disease is essential.This will allow the precise optimization of the vesicular systems to deliver the drug at the right site in the most optimum pattern.

The particle size, morphology, and composition are the major factors affecting the targeting, therapeutic effect, drug release, and ADMET of the formulations. It's quite easier to predict ADME for a drug moiety but always difficult to determine and predict the same for a vesicular system. While clinical studies restrict drug and drug delivery system evaluations to healthy patients, computer-aided drug delivery sciences enable simulations in diseased states. The software simulates the diseased state and predicts the real-time ADMET of the drug of interest to be delivered. However, it primarily aids in screening drug delivery systems and targeting diseases, while challenges related to the pharmacokinetic profile of the vesicle system remain. Understanding the drug release kinetics through*in vitro* drug release profiles in normal and diseased drug vesicles could help predict their absorption. Additionally, the correlation of vesicle composition and size will enable a more precise determination of their distribution, metabolism, and toxicity.The particle size and surface morphology of these vesicles greatly impact drug release and nano-toxicology. Through *in-silico*, molecular docking, simulation studies, and computer-aided drug designing software an indirect or factor-based prediction of ADMET of vesicular drug delivery systems will be possible.

Keywords: Vesicular drug delivery system, ADMET, drug release kinetics, simulation,

MCHSR/AI/2025/083

ATTENUATION OF FORMALIN-INDUCED INFLAMMATION IN WISTAR RATS BY BERBERIS ARISTATA ETHANOLIC EXTRACT

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This study investigated the anti-inflammatory activity of ethanolic extract of Berberis aristata in formalin-induced inflammation in Wistar rats. Paw edema and nociceptive responses were assessed following subplantar injection of formalin. Rats were pre-treated with varying doses of B. aristata ethanolic extract, and compared to a control group and a standard anti-inflammatory drug. The results demonstrated a dose-dependent reduction in paw edema and a significant decrease in nociceptive scores in rats treated with the B. aristata extract. These findings suggest that the ethanolic extract of B. aristata possesses potent anti-inflammatory properties, potentially mediated by the inhibition of inflammatory mediators. This study supports the traditional use of B. aristata in inflammatory conditions and highlights its potential as a source of novel anti-inflammatory therapeutics.

Keywords: Berberis aristata, Anti-inflammatory activity, Formalin-induced inflammation, Paw edema, Nociception

MCHSR/AI/2025/084

AI AND HUMAN COLLABORATION IN CLINICAL RESEARCH: A SYNERGISTIC APPROACH FOR BETTER HEALTHCARE

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Artificial Intelligence (AI) is revolutionizing clinical research by optimizing data analysis, trial design, and patient outcome predictions. However, AI alone cannot replace human expertise in ethical decision-making, patient interactions, and contextual interpretation of clinical data. Instead, a synergistic collaboration between AI and human researchers is emerging as the most effective approach for advancing healthcare.

A literature survey was conducted using Google Scholar, PubMed, Scopus, and Web of Science to explore AI's role in clinical research. Keywords such as "AI in clinical research," "machine learning in drug discovery," and "human-AI collaboration" were used to retrieve relevant studies published in the last five years, focusing on clinical trials, drug development, and personalized medicine.

AI-driven models enhance clinical trials by automating patient recruitment, monitoring adverse effects, and analyzing large datasets with high accuracy. Machine learning (ML) and deep learning (DL) facilitate biomarker discovery and precision medicine. However, human expertise is essential to validate AI-generated insights, ensure regulatory compliance, and mitigate biases. Addressing challenges such as data privacy, AI transparency, and ethical concerns is crucial to maximize the benefits of AI-human collaboration. The future of clinical research lies in integrating AI with human judgment to drive innovation while ensuring patient safety and ethical integrity.

Keywords: Artificial Intelligence, Clinical Research, Human-AI Collaboration, Precision Medicine, Drug Discovery.

MCHSR/AI/2025/085

INVESTIGATING THE ROLE OF ARTIFICIAL INTELLIGENCE IN DRUG DEVELOPMENT

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Background: The rapid progression of artificial intelligence (AI) presents an opportunity for its application in Pharmaceuticals, clinical practice, potentially revolutionizing healthcare services. AI has emerged as a valuable tool in advancing personalized treatment, offering the potential to analyse complex datasets, predict outcomes, and optimize treatment strategies. AI algorithms enable healthcare practitioners to identify and diagnose a spectrum of diseases by analysing medical images such as ultrasound, MRI, computed tomography (CT), and dual-energy X-ray absorptiometry (DXA). AI methodologies including fuzzy logic, artificial neural networks (ANNs), recurrent neural networks (RNNs), and logistic regression (LR) have been successfully used to diagnose complex health conditions with high accuracy rates.

Materials and methods

A comprehensive search of indexed databases, including PubMed/Medline (National Library of Medicine), Scopus, and EMBASE, was undertaken to search for pertinent literature within 10 years. Full text articles in English language articles were considered for the data extraction.

Conclusion:

The integration of AI in healthcare has immense potential to revolutionize patient care and outcomes. AI-driven predictive analytics can enhance the accuracy, efficiency, and cost-effectiveness of disease diagnosis and clinical laboratory testing. Additionally, AI can aid in population health management and guideline establishment, providing real-time, accurate information and optimizing medication choices.

Keywords: Pharmaceuticals, Medical Images, Computed Tomography, Pubmed/Medline

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A PERSPECTIVE OVERVIEW ON LIPOSPHERES AS CARRIERS FOR BETTER DELIVERY FORDRUG AND COSMETICS

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Lipid-based, water-dispersible solid microparticles, lipospheres normally have a diameter of 0.01 to 100 micrometers. These systems were created for the parenteral and topical administration of bioactive substances, and they are mostly made of triglycerides, waxes, or fatty acids. A monolayer of phospholipid molecules on the surface of lipospheres stabilizes a solid hydrophobic core, often made of fat, and may also serve as a potential penetration enhancer. Commonly used phospholipid lecithin has been demonstrated to increase skin hydration and has a significant affinity for epidermal tissues. Lipospheres are especially well-suited for cosmetic applications because of their small size, which allows the lipid particles to passively diffuse into the stratum corneum. When creating lipospheres, the trapping of lipophilic chemicals within the lipid core is crucial because it allows for the targeted or prolonged release of the active components.The melt dispersion approach is thought to provide better entrapment efficiency than the solvent evaporation method among the several preparation methods. Melt dispersion is the recommended method for creating liposphere-based formulations because of its improved entrapment capability, especially when it comes to medicinal and cosmetic applications. The potential of lipospheres as a successful and efficient delivery mechanism is highlighted in this review, along with their function in boosting stability, increasing bioavailability, and providing controlled release of active components in cosmetic and medicinal applications.

Keywords: Triglycerides, Waxes and Fatty Acids, Phospholipids, Lecithin,

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AI-DRIVEN FORMULATION DEVELOPMENT: ENHANCING DRUG DELIVERY SYSTEMS

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Artificial Intelligence (AI) is revolutionizing drug formulation by optimizing excipient selection, improving drug stability, and enhancing delivery efficiency. Traditional formulation development relies on trial-and-error approaches, which are time-consuming and resource-intensive. AI-driven techniques, including machine learning (ML) and deep learning (DL), enable predictive modelling of drug-excipient interactions, solubility enhancement, and controlled release mechanisms, significantly accelerating the formulation process.

A literature survey using databases such as Google Scholar, PubMed, and Scopus highlights AI's role in optimizing nano formulations, liposomal carriers, and solid dispersions. AI-powered models, such as artificial neural networks (ANNs) and genetic algorithms (GAs), have successfully predicted drug release kinetics, bioavailability, and pharmacokinetic profiles. Computational tools, including molecular docking and quantitative structure-activity relationship (QSAR) modelling, aid in designing targeted drug delivery systems with enhanced therapeutic outcomes.

Despite its potential, challenges such as data quality, regulatory concerns, and experimental validation remain. Integrating AI with emerging technologies like 3D printing and microfluidics holds promise for personalized medicine and advanced drug delivery. AI is not replacing formulation scientists but complementing their expertise, ensuring faster, more efficient, and cost-effective drug development.

Keywords: Artificial Intelligence, Drug Formulation, Excipient Optimization, Controlled Release, Nanotechnology, Targeted Drug Delivery

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TRADITIONAL MEDICINE TO MODERN THERAPY: THE ROLE OF PSIDIUM CATTLEYANUM IN DIABETIC WOUND REPAIR

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Diabetes mellitus is a major global health problem that is linked to impaired wound healing, resulting in chronic ulcers and serious complications. Plant-based remedies have improvised in traditional medicine in promoting tissue regeneration. *Psidium cattleyanum* has, as far as we can tell, emerged as the most plausible candidate for diabetic wound healing. Rich in flavonoids, tannins, and polyphenols, *P. cattleyanum* exhibits powerful antioxidant, anti-inflammatory, and antimicrobial activities that could offer the underlying basis on modulating the diabetic wound healing process. In-vitro studies already have established its capabilities to enhance fibroblast proliferation, collagen synthesis, and angiogenesis, all processes subservient to wound closure. Additionally, its antimicrobial actions may provide an important barrier against secondary infections, commonly seen in diabetic ulcers. The bioactive constituents of the plant regulate oxidative stress and conversely mediate the inflammatory response, addressing key barriers of wound healing in hyperglycemic conditions. The modern therapy has advanced to translating *P. cattleyanum* extracts into use in wound dressings, hydrogels, and nanocarriers to sharpen and clear its therapeutic abilities. Unfortunately, the concerning preclinical results lack clinical promise to standardize on dosage, formulation, and efficacy. Linking the missing gaps of traditional wisdom into modern applications, *P. cattleyanum* provides a new, natural-based alternative to diabetic wound management. This study focuses on the phytochemistry, mechanism of wound healing, and therapeutic advancements of *P. cattleyanum*, featuring the leaps it has made from the parlance of traditional medicine to modern therapy. Findings highlight its potential contribution toward advancing diabetic wound care, thus encouraging further studies into it and its clinical integration upon this potential.

Keywords: Psidium cattleyanum, Angiogenesis, Collagen Synthesis,Modern therapy

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IN-SILICO AND MOLECULAR DOCKING STUDIES IN KERATINOCYTE TRAFFICKING FOR TREATING PSORIASIS

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Background: Recent studies have established a correlation between psoriasis and disturbances in the skin's microbiome, immune system (SALT), and keratinocyte (KC) trafficking. It has been observed that the skin's immune system becomes activated due to an altered microbiome, leading to the hyperproliferation of KC. These KC then produce extracellular vesicles containing mRNA, which are transported to other cells and stimulate the production of interleukin 17 (IL-17) and interleukin 25 (IL-25) through the JAK/STAT signaling pathway. This process ultimately results in hyperproliferation, scaling, and inflammation, contributing to psoriasis-like conditions.

Methodology: Docking studies were performed using Discovery Studio and PyRx, which simulate the molecular interactions of ligands and proteins. The Protein with PDBID:5HI4 (Interleukin-17RA inactive) has been used for docking studies. Two ligands, Butein and Formononetin were tested for binding affinity in comparison to Tofacitinib.

Results and Discussion: The test ligand (butein and formononetin) showed good binding energy and hydrogen bonding with the inactive form of the target receptor IL-17RA. Additionally, both ligands exhibit nearby binding, proving them to be co-crystalized ligands.

Conclusion and Future directions: Both ligands were found to be co-crystallized antagonists, unlike the tofacitinib. However, butein emerged as the most prominent ligand, followed by the standard and formononetin. Furthermore, *in vivo* studies are necessary to confirm the efficacy of butein and formononetin in promoting epidermal regeneration and maintaining skin homeostasis after psoriasis treatment, compared to tofacitinib.

Keywords: Psoriasis, Protein, Tofacitinib, Butein, Formononetin

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ADVANCES IN DIAGNOSTICS AND MANAGEMENT OF VAGINAL CANDIDIASIS IN THE ERA OF ARTIFICIAL INTELLIGENCE

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Vaginal candidiasis (VC), a common gynecological condition caused by Candida species, affects millions of women globally, leading to significant morbidity and healthcare burden. Recent advancements in diagnostics and management have been revolutionized by integrating artificial intelligence (AI) technologies. AI-driven diagnostic tools, such as machine learning algorithms, have enhanced the accuracy and speed of VC detection by analyzing clinical data, microscopy images, and molecular biomarkers. These tools enable early and precise identification of Candida species, including non-albicans strains, which are often resistant to conventional therapies. Furthermore, AI-powered platforms facilitate personalized treatment strategies by predicting antifungal susceptibility and optimizing drug regimens based on patient-specific factors. Telemedicine and AI-based mobile applications have also emerged as valuable tools for patient education, symptom monitoring, and adherence to treatment. In management, AI aids in the development of novel antifungal agents and repurposing of existing drugs through virtual screening and molecular modeling. Despite these advancements, challenges such as data privacy, algorithmic bias, and the need for robust validation remain. This study highlights the transformative role of AI in improving the diagnostics and management of vaginal candidiasis, emphasizing its potential to enhance patient outcomes and reduce healthcare disparities. Integration of AI in VC care exemplifies the broader impact of technology in advancing women's health.

Keywords: Vagina Candidiasis, Diagnosis, Treatment, Antifungal, Screening

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ARTIFICIAL INTELLIGENCE IN NANOMEDICINE: TRANSFORMING DIAGNOSIS, DRUG DELIVERY, AND FUTURE THERAPEUTICS

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The convergence of Artificial Intelligence (AI) and Nanomedicine is revolutionizing healthcare by enhancingdrug discovery, diagnostics, and targeted drug delivery. AI's ability to process vast datasets, recognize complex patterns, and optimize nanoparticle design is transforming the field of nanotechnology-based therapeutics. From precision medicine to real-time imaging and nanorobotics, AI-driven advancements are improving treatment efficacy and patient outcomes.

This study explores the integration of AI in nanomedicine, focusing on AI-assisted drug discovery, nanoparticle synthesis, imaging, diagnostics, and personalized medicine. A systematic literature review was conducted using Google Scholar, PubMed, Scopus, and Web of Science to assess AI's role in optimizing nanomaterials, predicting drug interactions, and enhancing disease detection through machine learning algorithms.

Findings indicate that AI-driven models significantly improve drug-target predictions, facilitate automated nanoparticle synthesis, and enable real-time monitoring for controlled drug release. Additionally, AI-enhanced imaging techniques are refining early disease detection, while nanorobotics offer promising applications in minimally invasive therapies. However, challenges such as data privacy, algorithmic bias, and regulatory concerns must be addressed for ethical and effective AI implementation in nanomedicine.

AI is reshaping nanomedicine, bridging the gap between computational advancements and clinical applications. Future research should focus on enhancing AI model interpretability, ensuring regulatory compliance, and fostering interdisciplinary collaboration to unlock AI's full potential in nanotechnology-driven healthcare solutions.

Keywords: Artificial Intelligence, Nanomedicine, Drug Discovery, Targeted Drug Delivery, Nanorobotics, Machine Learning, Precision Medicine

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IN-SILICO STUDIES OF NOVEL [1,2A] PYRIDINE HETEROCYCLES TARGETING MYCOBACTERIAL MEMBRANES AND MEMBRANE PROTEIN

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Among the various bacterial infections, tuberculosis continues to hold center stage. Its causative agent, Mycobacterium tuberculosis, possesses robust defense mechanisms against most front-line antibiotic drugs and host responses due to their complex cell membranes with unique lipid molecules. It is now well-established that bacteria change their membrane composition to optimize their environment to survive and elude drug action. Thus, targeting membrane or membrane components is a promising avenue for exploiting the chemical space focused on developing novel membrane-centric anti-bacterial small molecules. These approaches are more effective, non-toxic, and can attenuate resistance phenotype. The existing treatment of TB in adults requires an exceedingly long duration therapy and often needs a cocktail of three or four different drugs. The above treatment regimen has many drawbacks, such as the complex nature and prolonged duration of treatments, adverse side effects, and various socio-economic factors that make the patients less compliant.

*Mtb*is passively resistant to most antibiotic drugs due to its highly impermeable cell wall. As such, targeting mycobacterial membranes represents a universal and essential strategy for impairing this pathogen's survival, contributing to the low risk of resistance. Hence, we are proposing the "*The development and biological evaluation of novel [1,2a]pyridine fused heterocycles targeting mycobacterial membranes and membrane proteins".*

Keywords: Anti-tuberculant,Anti-bacterial,Tuberculosis,Anti-biotic,Pyridine

EMERGING ISSUES IN SAFETY REGULATORY UNDER PHARMACOLOGICAL ASPECTS UNDER RADIOPHARMACEUTICALS THERAPIES IN CLINICAL PRACTICE

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Background: In recent years, we have been seen the establishment of several radionuclides as medicinal products in particular in the setting and activity determination devices. [^{177}Lu] Lutenium Chloride or [^{64}Cu] Copper Chloride has received marketing authorization as radionuclide precursor, and has received in regulatory approval in the form of different treatment with its fundamental use. This is a formal requirement by the EU directive 2001/83. In view of several highily promising, especially metallic radionuclides applications in a wider sense, the strict regulatory environment poses the risk of slowing down development, in particular for radionuclide procedures that want to provide innovative radionuclides for clinical research purposes, which is the basis for their further establishment. With the development of ever more radiopharmaceuticals suitable for applying translation of novel compounds from the preclinical development stage towards clinical stage towards clinical application becomes a bottle-neck for the advances in Nuclear Medicine.

Objective: To develop radiopharmaceuticals requires extensive evaluation before they can be applied in a diagnostic or therapeutic setting in Nuclear Medicine.

Conclusion: The documentation intended as a guide for radiopharmaceutical scientists, Nuclear Medicine specialists, and regulatory professionals to brig innovative diagnostic and therapeutic radionuclides into the clinical evaluation process in safe and effective way involving guidance and information gained regarding on Radiopharmaceuticals from pre-clinical to clinical trial while navigating the regulatory.

Keywords: Radionuclides, Nuclear medicine, Innovative diagnostic, Applications.

IN SILICO DESIGN AND IN VITRO EFFICACY OF FLAVONOID-POLYMER CONJUGATES FOR THE TREATMENT OF DIABETIC CATARACT

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This study aimed to develop flavonoid-polymer conjugates for the treatment of diabetes-induced cataract, addressing the limitations of plain flavonoid phytoconstituents, such as poor solubility, bioavailability, and targeted delivery. An *In-silico* approach was employed to identify suitable flavonoids and design polymer conjugates using novel polyethylene glycol (PEG) derivatives and linkers. Molecular docking and pharmacophore modeling were used to predict binding affinities to key targets involved in cataractogenesis. The designed conjugates were synthesized and characterized. In vitro efficacy was evaluated using glucose-induced cataract models in goat eyes, assessing lens opacity, antioxidant activity, and the inhibition of key enzymes associated with cataract progression. The polymer conjugation significantly enhanced the solubility and stability of the flavonoids, enabling sustained release and targeted delivery to the lens. The novel linkers facilitated controlled drug release and improved cellular uptake. The conjugates demonstrated superior antioxidant activity and effectively inhibited lens opacification compared to plain flavonoids. This study highlights the potential of polymer-flavonoid conjugates as a promising therapeutic strategy for diabetic cataract, overcoming the inherent limitations of natural phytoconstituents through targeted drug delivery and enhanced bioavailability.

Keywords: Flavonoid-Polymer Conjugates, *In-Silico* Design, *In-Vitro* Efficacy, Polyethylene Glycol (PEG), Targeted Drug Delivery, Glucose-Induced Cataract

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INVESTIGATING THE PHARMACOLOGICAL EFFECT OF HENTRIACONTANE

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Hentriacontane, a naturally occurring long-chain hydrocarbon -(C31H64), is well-known for its various pharmacological characteristics such as anti-inflammatory, antitumor and antimicrobial activitiy .Hentriacontane, also called untriacontane, is a solid, long-chain alkane hydrocarbon with the structural formula CH3(CH2)29CH3. It is the main component of paraffin wax.It is a natural product derived from plants, including beeswax and candelilla wax. Hentriacontane has a range of functions, including as a natural colour, pigment, and antitubercular. Extracted from a variety of plant sources, it has remarkable medicinal potential. Hentriacontane has been demonstrated to alter inflammatory pathways, hence alleviating inflammatory diseases. Furthermore, its cytotoxic and apoptosis-inducing capabilities against specific cancer cell lines highlight its anticancer activity. The molecule has broad-spectrum antibacterial action, making it effective against both bacterial and fungal infections. These findings emphasise hentriacontane's potential as a lead chemical for therapeutic development, calling for further exploration.Hentriacontane is found in the roots of the ashwagandha plant. Hentriacontane may decrease pro-inflammatory cytokines and liver inflammation, hence reducing hepatocellular damage.Hentriacontane may have antioxidant properties that reduce oxidative stress, so protecting hepatic cells and keeping the liver operating normally.

Keywords: : Hentriacontane, pharmacological effect, Anti-inflammatory,Anti-oxidant

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EXPLORING COUMARIN BASED MANNICH BASES AS NOVEL ANTI-INFLAMMATORY AGENTS.

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In many chronic diseases, inflammation is a major pathogenic process that calls for the creation of new and potent anti-inflammatory drugs. Because of their many pharmacological characteristics, particularly their anti-inflammatory effects, coumarin and its derivatives have drawn a lot of interest. Mannich bases made from coumarin have become one of the most promising therapeutic options among them. The pharmacokinetic, solubility, and bioavailability of coumarin are all improved by the Mannich reaction, which also increases the anti-inflammatory agent's effectiveness. Through the suppression of pro-inflammatory cytokines, lipoxygenase (LOX), and cyclooxygenase (COX), these substances influence important inflammatory pathways. Furthermore, studies of the structure-activity relationship (SAR) have shown that several changes on the coumarin core affect selectivity and potency. It inhibits the production of pro-inflammatory cytokines such as TNF-α, IL-1β, and IL-6, while also suppressing the activity of enzymes like cyclooxygenase (COX) and lipoxygenase (LOX), which are key mediators in the inflammatory response. Additionally, coumarin has been shown to interfere with the NF-κBsignaling pathway, a critical regulator of inflammation, thereby reducing the expression of inflammatory genes. This study discusses the mechanisms of action, SAR insights, and possible therapeutic applications of the latest developments in the creation of coumarin-based Mannich bases as anti-inflammatory drugs. Additionally, the difficulties and prospects for the future in refining these substances for therapeutic application are emphasized.

Keywords- Coumarin Derivatives, Anti- Inflammatory, Cyclooxygenase (COX), Lipoxygenase (LOX), Structure-Activity Relationship (SAR)

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FORMULATION AND EVALUATION OF LIPOSOMAL OINTMENT OF *ENICOSTEMMA LITTORALE* FOR THE TREATMENT OF DIABETIC FOOT INFECTION IN RAT MODEL

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Diabetic foot infections (DFIs) represent a complex and challenging complication of diabetes mellitus, presenting a significant burden on healthcare systems worldwide. These infections, primarily triggered by neuropathy and vascular complications associated with diabetes, often lead to severe consequences such as tissue damage, limb amputation, prolonged hospitalization, and increased mortality rates. The plant *E. littorale,* leaves possess antioxidant, hypoglycemic, neuroprotective, skin modulator, hepatomodulatory and hepatoprotective properties. The study were to explore plant molecular entities from *Enicostemma littorale* by isolation, fractionation and antimicrobial activity using four different bacterial strains, *Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa and Bacillus subtilis.* The advancement and assessment of liposomes in the current study aims to decrease adverse effects, topical medication administration is superior for local action, and vesicles such as liposomes enhance the effectiveness of the drug supplied topically used in rat model. The research is to develop liposome based ointment for especially diabetic foot ulcer. This formulation may be suggested as an efficient and cost-effective and targeted drug delivery system for the treatment of wounds. Further detailed clinical evidence supporting this study's results would expand the application for diabetic foot infection wound.

Keywords: Diabetic foot infections, *Enicostemma littorale,* liposome.

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DIGITAL INNOVATIONS TO OVERCOME CHALLENGES IN ASTHMA AND COPD MANAGEMENT

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Background:
Asthma and chronic obstructive pulmonary disease (COPD) continue to pose significant global health challenges, with inadequate disease management frequently linked to improper inhaler usage, poor adherence, and insufficient disease tracking. Digital technologies have been created to tackle these problems, providing real-time tracking, feedback, and tailored interventions. Smart inhalers, mobile apps, and digital health platforms have been assessed for their ability to enhance adherence and improve inhalation techniques.

Objective:
This study explores how digital health tools can tackle ongoing challenges in the management of asthma and COPD by enhancing adherence, optimizing inhaler usage, and facilitating real-time monitoring of the disease.

Methods:
An evaluation of the latest progress in digital health technologies was carried out, emphasizing their impact on patient outcomes, adherence, and clinical decision-making. Data was gathered from real-world studies and clinical trials that examined digital interventions in the treatment of respiratory conditions.

Results:
Recent studies indicate that smart inhalers equipped with built-in sensors enhance medication adherence by offering immediate feedback and reminders. Telehealth services enable remote monitoring and prompt interventions, which help decrease exacerbations and hospital admissions. Analytics powered by artificial intelligence improve personalized treatment strategies, resulting in better disease management. Nonetheless, obstacles like patient engagement, privacy issues related to data, and incorporating these technologies into standard clinical practice continue to exist.

Conclusion:
Digital innovations can transform the management of asthma and COPD when effectively executed, by tackling essential challenges related to adherence, inhaler usage, and monitoring. Future studies should aim to enhance these technologies for broad usage, making sure they are easy to use, affordable, and smoothly integrated into healthcare frameworks.

Keywords: Asthma, COPD, Smart inhalers, Adherence, Telehealth, Digital health

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DEVELOPMENT AND EVALUATION OF PROMETHAZINE ETHOSOMES

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Background and Objectives: Ethosomes are pliable, soft lipid vesicles that contain a considerable amount of alcohol, water and phospholipids. These are the modified preparation of conventional liposomes offering various advantages such as enhanced drug permeation rate, high drug encapsulation efficiency and good patient compliance. Owing to such prominent advantages, we prepared Ethosomes containing Promethazine to overcome the symptoms of nausea and vomiting.

Methods: Thin film hydration and cold method were used in the preparation of promethazine ethosomes. 2^2 factorial design was implemented for the preparation of ethosomes including two labels namely thin film hydration method, cold method and two factors depending on Polymer concentrations and Ethanol concentrations. Ultra-violet spectroscopy was used as an analytical method to characterize the drug 'Promethazine'. Beside this, scanning electron microscopy was used to evaluate the shape and size, Franz diffusion cell for drug permeation rate, ultracentrifugation for entrapment efficiency, and stability studies were carried out using zeta analyzer for zeta potential, dynamic light scattering for particle size and polydispersity index of promethazine ethosomes.

Results: Total four formulations were developed using thin film hydration and cold methods. There are no drug-excipient interactions revealed by analytical studies. Formulation E2 was found to be promising in all four formulations. The vesicle size of formulation E2 was measured as 234 nm. Vesicles shape was observed as rounded with good entrapment efficiency as 83%. The flux was found at 13.78µg/cm²/h, which represents satisfactory response as drug permeation rate. The zeta potential was measured as -33.7 mV.

Keywords: Ethosomes, Vesicles, Promethazine, Bioavailability, Transdermal

ADVANCED CHARACTERIZATION TECHNIQUES FOR NANOPARTICLES

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A nanoparticle, formerly referred to as an ultrafine particle, is a particle of matter with dimensions ranging from 1 to 100nm in diameter. Nanomaterials can be observed in nature and are also produced by humans. Due to their microscopically small size, they possess unique material properties. The exact characterisation of nanoparticles is critical to comprehension of their characteristics, ensuring reproducibility, and enhancing their performance in various applications. Advanced characterization techniques allow for extensive examination of their physical, chemical, and structural properties. These abstracts provide an overview of various advanced nanoparticle characterisation techniques, including Transmission Electron Microscopy (TEM) and Scanning Electron Microscopy (SEM) for high-resolution imaging and spectroscopy methods such as Energy Dispersive X-ray Spectroscopy (EDS) for compositional analysis. Dynamic Light Scattering (DLS) and Zeta potential measurements offer information on particle size distribution and surface charge, which are essential to colloidal stability. In addition, X-ray Diffraction (XRD) reveals crystalline formations, whilst Atomic Force Microscopy (AFM) and Scanning Tunnelling Microscopy (STM) analyse surface topography on the nanoscale. Machine learning-based analytical techniques are rapidly being used to process massive datasets, allowing for high throughput and precise characterization. This collection of advanced characterisation techniques ensures a more in-depth understanding of nanoparticles, pushing nanotechnology innovation and stimulating new applications in science and business. The future of nanoparticle characterisation promises to handle complex challenges across industries using more precise, real-time, and sustainable technologies. Collaboration between academics, industry, and instrumentation developers will be important to improving these methodologies.

Keywords: Nanomaterials, X-ray diffraction, Transmission Electron Microscopy, Real-time.

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REGULATORY INTELLIGENCE: IMPACT OF ARTIFICIAL INTELLIGENCE ON REGULATORY OPERATIONS IN ASSESSING MEDICAL DEVICE QUALITY

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Introduction: Artificial intelligence (AI) is rapidly evolving and has dramatically impacted several industries, including healthcare. It could transform the regulatory processes in the medical device sector completely.

Aim: This research study explores the influence of AI on regulatory intelligence, and it plays a crucial role in enhancing accuracy, safety and efficiency of quality and regulatory operations within the medical device sector.

Methods: This study examines pre-market regulatory procedures, evaluating how AI-powered technologies like machine learning algorithms,natural language processing, and predictive analytics are changing quality and regulatory tasks like risk assessments, clinical trial management and submission reviews.

Results: Through a comprehensive literature review, qualitative interviews with stakeholders (Medical device manufacturers and AI developers)the research assesses the benefits and challenges of AI integration into quality and regulatory frameworks. It highlights how AI can streamline quality management systems and regulatory submissions, accelerate approval processes, and enhance the detection of adverse events, ultimately leading to better patient outcomes. Furthermore, the research identifies key barriers to AI adoption, including quality and regulatory uncertainty, data privacy concerns, and need for robust validation methods.

Conclusion: By providing a detailed assessment of AI's influence on regulatory intelligence, this study identifies challenges, benefits and the best practices for the adoption of AI in quality and regulatory operations. The findings aim to support AI's safe, efficient, and transparent integration into medical device quality and regulatory landscape, fostering innovation while maintaining quality, regulatory compliance and patient safety.

Keywords: Medical Device Quality, Compliance, Risk Management, AI in Medical devices, Regulatory Intelligence

ADVANCED TECHNIQUES FOR THE PREPARATION OF PHYTO FORMULATIONS FOR WOUND HEALING ACTIVITY: INNOVATIONS AND FUTURE PERSPECTIVES

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Wound healing is a complex biological process including inflammation, proliferation, & tissue remodeling. The rise of interest in Phyto formulations treatments derived from medicinal plants has resulted in the development of advanced technology for improving their efficacy in wound healing. This review looks at new methods for creating Phyto formulations, including nanoencapsulation, hydrogel-based delivery systems, & bioengineered scaffolds. These advanced formulations improve the bioavailability, stability, and targeted distribution of phytochemicals, maximizing their medicinal potential.Nanotechnology-inspired approaches, including nanoparticles, liposomes, & nano-emulsions, have changed pharmaceutical formulation by increasing permeability while controlling drug release. Hydrogels made of biocompatible polymers are known to provide a hydrated environment for the wound while also allowing for the longer release of phytochemicals, facilitating faster tissue regeneration. Furthermore, plant-derived bioactive chemicals combined with 3D-printed scaffolds have been identified as promising biomaterials for wound healing. Technical advancements in extraction methods, including microwave-assisted and supercritical fluid extraction, have increased the concentration and purity of important plant chemicals, allowing for more consistent therapeutic results.

Keywords: Phyto formulations, wound healing, nanoparticles, hydrogel, nano-emulsions, liposomes, phytochemicals, bioavailability

FORMULATION DEVELOPMENT AND OPTIMIZATION OF A FAST-DISSOLVING TABLET ENRICHED WITH PHYTOCHEMICALS FROM GREEN TEA, TURMERIC, OCIMUM SANCTUM, AND GINGER FOR ENHANCED ANTIOXIDANT, ANTI-INFLAMMATORY, AND IMMUNOMODULATORY BENEFITS.

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The development of fast-dissolving tablets (FDTs) has gained significant attention due to their advantages in improving patient compliance and rapid onset of action. This study focuses on the formulation and optimization of an FDT incorporating phytochemicals from green tea (Camellia sinensis), turmeric (Curcuma longa), Ocimum sanctum, and ginger (Zingiberofficinale). These natural bioactives are known for their potent antioxidant, anti-inflammatory, and immunomodulatory properties, making them promising candidates for managing oxidative stress-related disorders. A central composite design was employed to optimize key formulation parameters, including excipient selection, disintegration time, and mechanical strength, ensuring rapid dissolution while maintaining tablet integrity. The optimized formulation was evaluated for physicochemical properties, dissolution profile, and in-vitro antioxidant and anti-inflammatory activities. The results demonstrated that the FDTs exhibited excellent disintegration within seconds, ensuring quick release of phytochemicals for enhanced bioavailability and therapeutic efficacy. The optimized FDT formulation offers a convenient and effective approach to delivering phytochemicals with multifunctional health benefits, potentially aiding in immune support and inflammatory disorder management. This study highlights the potential of plant-based bioactives in novel drug delivery systems and paves the way for further in-vivo evaluations and clinical applications.

Keywords: Fast-dissolving tablet, phytochemicals, green tea, turmeric, Ocimum sanctum, ginger, antioxidant, anti-inflammatory, immunomodulatory.

EXPLORING AI'S POTENTIAL IN DIABETES MELLITUS: INNOVATIONS, BENEFITS, AND CHALLENGES

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Abstract: Artificial Intelligence (AI) is rapidly transforming healthcare, with significant potential to revolutionize the management of Diabetes Mellitus (DM) and its associated complications. AI-driven technologies, including machine learning, deep learning, and natural language processing, offer innovative solutions for early detection, personalized treatment, and real-time monitoring of diabetic patients. AI algorithms can analyze vast amounts of clinical data, predicting the risk of complications such as diabetic retinopathy, neuropathy, nephropathy, and cardiovascular diseases with remarkable accuracy. These systems can assist clinicians in providing tailored therapies based on individual patient profiles, enhancing treatment outcomes and minimizing adverse effects. Furthermore, AI can enable continuous glucose monitoring through wearable devices, providing instant feedback to both patients and healthcare providers, facilitating better disease management. However, while AI promises significant advancements, challenges such as data privacy, integration into clinical practice, and the need for robust validation across diverse populations remain. This review explores the evolving role of AI in diabetes care, highlighting its potential benefits and the hurdles that must be addressed to realize its full impact. It aims to unveil new possibilities for AI in health science, with a focus on improving patient care and outcomes in diabetes management.

Keywords: Artificial Intelligence, Diabetes Mellitus, Machine Learning, Early Detection, Healthcare Innovation, Challenges in AI Integration.

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NEUROBEHAVIORAL EFFECTS OF RICE WINE IN WISTAR RATS: A COMPARATIVE STUDY OF LOCOMOTOR ACTIVITY AND IMPLICATIONS FOR MEDICINAL APPLICATIONS

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This study investigated the effects of rice wine on locomotor activity in Wistar rats, with a focus on sex-specific differences and potential medicinal implications. Previous research has explored the effects of various alcoholic beverages on rodent behavior; however, comprehensive analyses of rice wine's specific impact on locomotor function, particularly concerning sex-related variations, remain limited. Male and female Wistar rats were administered varying doses of rice wine, and their locomotor activity was subsequently assessed using an automated activity monitoring system. The results revealed significant dose-dependent changes in locomotor activity, with notable differences observed between male and female rats. Specifically, females exhibited a greater sensitivity to the stimulatory effects of rice wine at lower doses, while males showed more pronounced depressive effects at higher doses. Furthermore, observational analysis indicated potential anxiolytic and sedative effects at certain dosages, suggesting possible medicinal applications. This study contributes to the understanding of rice wine's neurobehavioral effects and highlights the importance of considering sex-specific responses in pharmacological investigations.\

Keywords: Rice Wine, Locomotor Activity, Wistar Rats, Sex Differences, Medicinal Effects.

DESIGN OPTIMIZATION AND CHARACTERIZATION OF NANOEMULGEL VIA TRANSDERMAL DELIVERY FOR SKIN ALLERGY MANAGEMENT

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Background: Skin allergies, such as dermatitis and urticaria, are commonly treated with dexamethasone (a corticosteroid) and chlorpheniramine maleate (an antihistamine). However, traditional topical treatments often suffer from poor skin penetration and limited efficacy. Nano-emulgels, which combine nano-sized emulsions and gel systems, offer a promising solution by enhancing drug stability, controlled release and transdermal absorption.
Aim: This study aims to design, optimize and characterize a nano-emulgel formulation for the transdermal delivery of dexamethasone and chlorpheniramine to improve their efficacy in managing skin allergies.
Methodology: Different nanoemulsion components (oil, surfactant and co-surfactant) were selected on the basis of solubility and emulsification ability. Pseudoternary phase diagrams were constructed using aqueous titration method to figure out the concentration range of components. Carbopol 940 was added as a gel matrix to convert nanoemulsion into nanoemulgel. Drug loaded nanoemulsions converted into nanoemulgels were characterized for particle size, transmission electron microscopy, viscosity, conductivity, spreadability, rheological behavior, ex-vivo permeation studies using Wistar rat skin and stability studies.
Results: The optimized exhibit enhanced skin penetration and sustained release of both dexamethasone and chlorpheniramine. In vivo permeation studies showed improved transdermal delivery compared to conventional formulations. The nano-emulgel also remained stable over time with no significant physical changes. Nanoemulgel showed higher cumulative amount of drug permeated and flux and significantly less drug retained along with less lag timethan marketed formulations.
Conclusion: The nanoemulgel formulation significantly improved the transdermal delivery and therapeutic efficacy of dexamethasone and chlorpheniramine, offering a more effective and stable alternative for treating skin allergies.

Keywords: Carbopol 940, nanoemulgel, dexamethasone, chlorpheniramine maleate, ternary diagram.

AI IN DRUG DISCOVERY AND DEVELOPMENT

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Artificial intelligence (AI) is a fundamental tool for revolutionizing drug discovery and development, dramatically reducing time and costs while moving toward greater precision. Traditional drug discovery is a complex, time-consuming, and expensive process, but AI-powered approaches such as machine learning and deep learning are transforming the process of target identification, molecular docking, and clinical trials. AI algorithms analyze large datasets to predict potential drug candidates, optimize key compounds, and accelerate screening processes.

In clinical and preclinical trials, AI improves patient selection, optimizes dosages, and predicts adverse effects, thereby improving overall drug efficacy and safety. AI-powered generative models, such as deep neural networks, aid in the design of new drugs by accurately predicting interactions between molecules. Additionally, machine learning, in conjunction with AI, accelerates high-throughput screening and reduces human error.

Despite its potential, AI faces challenges in pharmaceutical research, such as a lack of data, the inability to interpret models, and regulatory restrictions. Issues related to AI-based decision-making in healthcare services must also be considered. However, with continued advances in AI, quantum computing, and personalized medicine, drug development is expected to become more efficient and cost-effective, especially for patients. AI is not just a tool; it represents the dawn of a new era that will redefine drug research, discovery, and development in the coming decades.

Keywords – Artificial Intelligence, Machine Learning, Molecular Docking, Clinical trials, Quantum computing, Personalized medicine.

ASSESSMENT AND EVALUATION OF KNOWLEDGE, ATTITUDE AND PRACTICE REGARDING RISK OF CARDIOVASCULAR DISEASES IN PATIENTS ATTENDING A TERTIARY CARE HOSPITAL

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Background: Cardiovascular diseases (CVD) area major cause of morbidity and mortality globally. Understanding patient knowledge, attitudes, and practices regarding CVD risk factors is crucial.
Objectives:
1. To determine and compare the current level of knowledge of participants, regarding cardiovascular diseases, their risk factors, and preventive measures.
2. To evaluate the attitude and practices of participants towards BP, diet plan, medication adherence, body weight and exercise.
Methods: A cross-sectional, questionnaire-based study was conducted among 200 patients from January 2024 to May 2024 in a tertiary care hospital.
Results: Of the 200 participants, 61.5% were male, and 38.5% were female. Educational levels varied, with 38% passed 10^{th}grade and 4% being illiterate. Among 10th Pass patients, 65.5% were aware of CVD. High blood pressure and excess body weight were identified as risk factors by 95%. 37% degree holders recognized the higher risk in men. 92.5% of 10th Pass patients adhered to prescribed medication and follow-ups, 87.5% followed a healthy diet. Significant associations were found between education levels and knowledge, attitudes, and practices, and between age and medication adherence.
Conclusion: The study highlights the importance of education in influencing patients knowledge, attitudes, and behaviors about CVD risk factors in a tertiary care context.

Keywords: Cardiovascular diseases, awareness, medication adherence.

MANAGEMENT OF VENTILATOR-ASSOCIATED PNEUMONIA: EPIDEMIOLOGY, DIAGNOSIS AND ANTIMICROBIAL THERAPY

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The most widespread infection among patients admitted to intensive care units (ICUs) is ventilator-associated pneumonia (VAP), which has a high rate of morbidity and mortality. The global incidence of VAP ranges from 8 to 28%. Early-onset VAP is mainly caused by community pathogens with a favorable pattern of antibiotic sensitivity, whereas late-onset VAP is often caused by multidrug-resistant pathogens, mainly methicillin-resistant *Staphylococcus aureus*, *Pseudomonas aeruginosa* and *Acinetobacter* spp. and enteric Gram-negative bacilli. The diagnosis of VAP remains difficult to confirm, lacking both microbiological analysis and radiological signs of high specificity. Finding of pulmonary in filterate on chest radiograph is not a confirmatory test for VAP. Although the Clinical Infection Pulmonary Score has been suggested as an approach to some of the diagnosis-related challenges, it is not appropriate for all patient types. A constant assessment of the pharmacodynamic and pharmacokinetic characteristics of antimicrobial therapeutic alternatives is mandatory to create therapeutic protocols and reduce VAP-related mortality.

Keywords: *Acinetobacterbaumannii*, Clinical Infection Pulmonary Score, Enterobacteriaceae, intensive care unit, multidrug-resistant pathogens, *Staphylococcus aureus*.

THE ROLE OF ARTIFICIAL INTELLIGENCE IN PHARMA FIELD: OPPORTUNITIES, CHALLENGES AND FUTURE PERSPECTIVES.

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Artificial Intelligence (AI) is rapidly transforming various industries and pharmaceutical industry. AI is increasingly being used to automate, optimize and personalize various aspects of the pharmacy industry, from drug discovery to drug dispensing. In this context, we had explored the potential of AI to revolutionize the pharmacy industry, by discussing the current and future applications of AI in the industry. We will deliberate how AI is being used in drug discovery, personalized medicine, drug safety and quality control, inventory management and patient counselling. We will also discuss the challenges and limitations of AI in the pharmacy field. The old pharmacy system relied on manual processes and human decision- making, while the new AI pharmacy system automates routine tasks, provides personalized treatment plans and reduces costs while improving patient outcomes. Overall, this presentation will provide an insight into the future of the pharmacy field and the transformative potential of AI in this field.

Keywords: Artificial intelligent, Pharma, patient counselling.

DESIGN, IN-SILICO STUDIES, SYNTHESIS AND CHARACTERIZATION OF NOVEL NSUBSTITUTED-4-METHYLQUINOLIN-2(1H)-ONE HYBRIDS AS ANTICANCER AGENTS

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The present study focuses on the rational design, in-silico screening, synthesis, and characterization of novel N-substituted-4-methylquinolin-2(1H)-one derivatives as potential anticancer agents. A multi-step synthetic strategy was employed, followed by structural confirmation using IR, ^{1}H NMR, ^{13}C NMR, and mass spectrometry. Insilico molecular docking studies against VEGFR-2 (PDB ID: 4ASD) demonstrated promising interactions, with compound (III-Ai) exhibiting a MolDock score (-108.118), comparable to Sorafenib (-114.605) and Doxorubicin (-100.188). ADMET studies confirmed favorable drug-likeness, intestinal absorption, and low toxicity (LD_{50} > 200 mg/kg, <2000 mg/kg). Further, the molecular dynamics simulation study on the best-docked complexes over 100 ns confirmed the designed hybrid's robust stability within the receptor's active site. In-vitro anticancer screening against Hep-G2 revealed potent anti-proliferative activity, with compounds Ai, Aiii, Bv, and Ciii showing promising cytotoxicity. These findings suggest that N-substituted-4-methylquinolin-2(1H)-one derivatives are promising lead candidates for liver cancer therapy and provide a strong foundation for further optimization and clinical exploration.

Keywords: Anticancer, Molecular Docking, ADMET, Quinolin-2-one, Hep-G2, VEGFR-2.

ARTIFICIAL INTELLIGENCE: THE FUTURE OF PHARMACEUTICAL INNOVATION

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Pharmaceutical industry is currently in paradigm transition that aims to combine Artificial Intelligence (AI), Industry 4.0, and Neural networks. AI is being used more and more in the pharmaceutical sector, especially in pharmaceutical research, to automate, improve and personalize a variety of processes. Artificial Intelligence has become a potent instrument that has transformed several industries including healthcare in recent years. This abstract gives a general overview of how AI is expediting the creation of novel medicines, revolutionizing the pharmaceutical sector, and enabling drug discovery. The pharmaceutical sector is experiencing a drug discovery revolution because of AI. The drug discovery process is changing at different phases because of AI approach like machine learning and deep learning. Here, we demonstrate how AI facilitates drug development through target identification, lead compound optimization, drug design, drug repurposing and Clinical trial enhancement. AI integration has the potential to hasten the creation of novel treatment, save costs, and improving patient outcomes. To fully realize the potential of AI in pharmaceutical research and development, issue relating to data accessibility, algorithm interpretability and laws must be resolved.

Keywords: AI, Clinical trial, drug discovery, pharmaceutical sector

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CONTROLLED DRUG RELEASE FROM CARBON NANOTUBES: A NOVEL APPROACH FOR CHRONIC WOUND MANAGEMENT

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Chronic wounds, including diabetic ulcers and pressure sores, pose significant challenges to healthcare due to their lengthy healing durations and increased risk of infection. Controlled drug delivery systems present a promising approach by providing therapeutic agents in a sustained and targeted way. Carbon nanotubes (CNTs) have become notable nanocarriers owing to their large surface area, compatibility with biological systems, and capacity to encapsulate a variety of drugs. This research investigates the potential of CNT-based drug delivery for managing chronic wounds, emphasizing sustained release kinetics, enhanced bioavailability, and decreased drug toxicity. Functionalized CNTs were infused with antimicrobial and anti-inflammatory agents to boost the efficiency of wound healing. In vitro release experiments showed a controlled and extended drug release profile, reducing the frequency of applications needed. Initial biocompatibility assessments indicated minimal cytotoxicity, implying safe use in biomedical contexts. These findings underscore the potential of CNTs as a powerful platform for treating chronic wounds, leading to better therapeutic results and improved patient adherence. Additional in vivo investigations are required to confirm their effectiveness in clinical settings.

Keywords: Carbon Nanotubes, Controlled Drug Release, Chronic Wounds, Nanocarriers, Wound Healing.

MIGRAINE

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Migraine is a debilitating neurological disorder that requires efficient and rapid treatment to manage acute attacks and improve patient quality of life. Rizatriptan, a selective serotonin receptor agonist, has shown efficacy in alleviating migraine symptoms. However, its oral bioavailability is limited, leading to delayed onset of action and potential gastrointestinal side effects. This comprehensive review examines the potential of using liposomes as a delivery system for rizatriptan via the nasal route, offering advantages such as rapid absorption, bypassing first-pass metabolism, and improved bioavailability. The review discusses various liposomal formulation techniques, including thin film hydration, ethanol injection, and micro fluidization, and evaluates their impact on encapsulation efficiency, particle size, and stability. The potential for targeted delivery to the central nervous system and the impact on therapeutic outcomes are also considered. Finally, future research directions, including the development of novel liposomal formulations and large-scale clinical trials, are suggested to establish the efficacy and safety of rizatriptan liposomes for nasal delivery in treating migraines.

Keywords: Rizatriptan, Migraine, encapsulation

EXPLORING THE POTENTIAL OF AN AMAZING HERB RICE BRAN IN TREATMENT OF IRRITABLE BOWEL SYNDROME

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Irritable Bowel Syndrome (IBS)is a common functional disorder mainly signs includes bloating, abdominal pain and altered bowel behaviour. IBS mainly affecting on quality of life. In conventional therapies mainly pharmacological modifications, dietary changes and probiotics are there. Recent treatment strategies mainly focus on symptom relief and improving the quality of life of patients. In spite of this many individuals continue to experience significant discomfort and impairment in daily activities this is the reason natural dietary solutions are in absolute demand. Rice bran, which is byproduct of rice milling, a very high nutrient rich dietary fibre. It also includes antioxidants & bioactive compounds. Rice bran work mainly by increasing short chain fatty acids production, improving gut health by modulating gut microbiota & by reducing intestinal inflammation. Modified arabinoxylan rice bran also known as Bio bran has possess anti-inflammatory and immunomodulatory properties showing alleviating IBS symptoms. Low FODMAP of Rice bran makes it potential dietary intervention for IBS patients those are sensitive to fermentable carbs. In spite of its great potential there is limitation regarding its optimal dosage, safety and efficacy. Current work is focus on impact of rice bran in IBS, Exploring the potential of rice bran in gut health improvement and symptomatic relief. Further research initiatives are needed to validate its potential in establishment of main guidelines of using Rice bran and its active constituents in IBS management.

Keywords: IBS, Rice bran, gut microbiota, dietary intervention, bio bran, low FODMAP diet

DEVELOPMENT OF NANOSTRUCTURED MIXED MICELLES FOR INTRANASAL DELIVERY OF PALIPERIDONE PALMITATE IN SCHIZOPHRENIA TREATMENT

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Schizophrenia is a chronic neuropsychiatric disorder requiring long-term medication, often hindered by poor patient adherence and limited brain bioavailability. Paliperidone Palmitate, a long-acting antipsychotic, faces challenges such as low solubility and restricted blood-brain barrier (BBB) permeability when administered via conventional routes. To address these issues, nanostructured mixed micelles (NMMs) offer a promising intranasal drug delivery system that enhances brain targeting and improves therapeutic outcomes. NMMs are self-assembling nanocarriers composed of amphiphilic surfactants, improving drug solubility, stability, and controlled release. Intranasal delivery bypasses the BBB via the olfactory and trigeminal pathways, ensuring rapid drug transport to the brain with reduced systemic side effects. Optimized micellar formulations enhance mucoadhesion, drug loading efficiency, and sustained drug release, providing prolonged antipsychotic effects. Pharmacokinetic studies demonstrate enhanced brain bioavailability, while in vitro release and in vivo behavioral assessments confirm improved drug absorption. This approach minimizes dose frequency, improves patient compliance, and enhances treatment efficacy. Studies on pharmacokinetics, in vitro release, and in vivo behavioral models demonstrate superior drug absorption and brain targeting compared to traditional formulations. The development of nanostructured mixed micelles for intranasal Paliperidone Palmitate delivery holds potential for revolutionizing schizophrenia therapy by offering a non-invasive, effective, and patient-friendly alternative to current treatment strategies.

Keywords: Schizophrenia Treatment, Paliperidone Palmitate, Intranasal Drug Delivery, Nanostructured Mixed Micelles (NMMs), Blood-Brain Barrier (BBB) Permeability

AI FRONTIER IN HEALTH SCIENCES: UNVEILING NEW POSSIBILITIES AND CHALLENGES

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The integration of artificial intelligence into health sciences represents a transformative frontier, revolutionizing healthcare delivery, research, and patient outcomes. AI-powered diagnostic tools now detect disease patterns with unprecedented accuracy, while predictive algorithms identify at-risk patients before symptoms manifest. Machine learning systems analyse vast biomedical datasets, accelerating drug discovery and revealing novel therapeutic targets previously beyond human perception. Radiological imaging, pathology, and clinical decision support have been particularly transformed, with AI systems augmenting clinician capabilities and improving diagnostic precision. Natural language processing applications extract critical insights from unstructured medical records, enhancing population health management and personalized treatment planning. Despite these remarkable advances, significant challenges persist. Algorithm bias threatens to perpetuate or exacerbate existing healthcare disparities when training data lacks diversity. Questions surrounding AI transparency and explainability complicate clinical adoption and regulatory approval. Data privacy concerns and the need for robust security measures remain paramount as sensitive health information becomes increasingly digitized. The healthcare workforce faces substantial adaptation requirements, necessitating new educational frameworks that blend clinical expertise with technological fluency. As AI health sciences continue evolving, thoughtful governance frameworks must balance innovation with ethical considerations, ensuring these powerful technologies serve to enhance human capabilities rather than replace the compassionate core of healthcare delivery. On one hand, AI-powered technologies such as machine learning, natural language processing, and computer vision are being leveraged to: - Develop predictive models for disease risk stratification and personalized medicine - Enhance medical imaging analysis for accurate diagnosis and treatment planning - Streamline clinical workflows through automated documentation and decision support systems - Foster patient engagement and empowerment through AI-driven health monitoring and coaching On the other hand, the integration of AI in health sciences also raises critical challenges, including: - Ensuring data quality, security, and privacy in AI-driven healthcare applications - Addressing algorithmic bias and promoting transparency in AI decision-making processes - Redefining the role of healthcare professionals in an AI-augmented clinical environment - Establishing regulatory frameworks to govern the development and deployment of AI in healthcare This abstract aims to ignite a multidisciplinary conversation on the future of AI in health sciences, highlighting the need for collaborative efforts to harness the benefits of AI while mitigating its risks.

Keywords: Artificial intelligence, Health sciences, machine learning, natural processing, AI decision making, Clinical workflows, AI augmented clinical environment.

AI in Medicine: Where We Are Now

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Machine learning, another name for artificial intelligence (AI), has roots dating back to 1956. It is about how computers can simulate how people act with little to no interaction from humans.AI, that is currently a fundamental aspect of daily life, featuring digital assistants like Amazon Echo, Siri, and Google's Assistant, along with autonomous driving transit systems, airplanes, and video games, began with the advent of robots.

AI has established an important influence on the healthcare sector in recent years, improving patient care by enhancing the accurateness and efficacy of healthcare operations. Applications of AI in medicine span a number of fields, including human physiological function, the field of robotics,evaluations, and clinical statistical data examination. These sectors have developed into the sophisticated "omics" technology of today. Since the year 2016, the medical sector has attracted huge investments in Ml-driven technologies, reflecting the rapid growth of AI in medication.

This article examines how AI is transforming the medical field by assisting in the detection of diseases, streamlining treatment protocols, increasing productivity, and reducing errors. Both the electronic as well as real-world applications of intelligent technology (AI) of medicine are essential to contemporary patient care. AI, especially machine learning, is gaining traction within healthcare analysis of information as the profession rests greater and greater on information-driven methods, expanding the envelope beyond traditional analytical techniques. AI's burgeoning influence in altering healthcare procedures is further highlighted by its fast-growing being commercialized.

Keywords
Artificial Intelligence, machine learning, medicine

A RANDOMIZED CLINICAL TRIAL TO ASSESS THE IMPACT OF KEGEL EXERCISES ON SEVERITY OF URINARY INCONTINENCE DURING THIRD TRIMESTER OF PREGNANCY

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Background: Urinary incontinence (UI) is a common yet often overlooked issue among pregnant women, significantly impacting their quality of life.
Aim: This study aimed to assess the impact of kegel exercises on severity of urinary incontinence during third trimester of pregnancy
Methods: A randomized clinical trial was conducted on 90 pregnant women aged 20-35 years. Participants were randomly assigned to control (n=46) and experimental (n=44) groups. The International Consultation on Incontinence Questionnaire-Urinary Incontinence Short Form (ICIQ-UI SF) was used. Pretest data was collected at 26 weeks of pregnancy and posttest data was collected at 36 weeks of pregnancy. The experimental group performed Kegel exercises for 10 weeks, while the control group received routine antenatal care.
Results: The control group had a higher mean urinary incontinence score (10.46 ± 4.902) compared to the experimental group (3.96 ± 3.351), indicating that urinary incontinence symptoms were more severe in the control group post-test. The mean difference between the two groups was 6.53, with a highly significant p-value (<0.0001).
Conclusion: The study concluded that that Kegel exercises had a statistically significant impact on reducing severity of urinary incontinence in the experimental group.

Keywords: bladder control, antenatal mother, pelvic floor muscle exercise

CHALLENGES IN DATA QUALITY AND INTEGRATION FOR AI IN HEALTH SCIENCES

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Health systems around the world are at a crossroads due to exponential advances in healthcare cos ts that have significantly surpassed GDP growth rates.Medical imaging and diagnostics, virtual p atient care, medical research and drug discovery, patient engagement and compliance, rehabilitati on, and other administrative applications are the main areas of focus for this study, which is base d on a general literature review revealing the role of AI in healthcare.Recent developments in artifi cial intelligence have demonstrated efficacy across a range of sectors, most signifiacntly the healt hcare industry.Our study intends to close the knowledge gap on the ethical, social, privacy, and tech nological aspects of AI in the health industry, which is currently lacking.Through a systematic revie w, this study sought to synthesize empirical research on the opportunities and challenges of adop ting AI.Numerous articles from 2015 to 2024 were reviewed.The study indicate that while artificial intelligence holds promise for enhancing healthcare, its implementation is fraught with challenges. According to the majority of the evaluated research, the use of AI offers a number of benefits, such as improved technology, diagnostics and patient monitoring, virtual health support, teamwork and decision-making, and medication discovery. However, the results demonstrate that the application of AI in the health sector impedes a number of complex difficulties, such as privacy and ethical concerns, ignorance, technological instability, and professional liability. The results demonstrate how artificial intelligence can revolutionize healthcare and how resolving these issues is essential to realizing its full potential.

Keywords: Artificial intelligence (AI), Ethics, , Healthcare, Mechine learning**.**

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GREEN SYNTHESIS OF COPPER NANOPARTICLE AND ITS APPLICATION

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Among the metal oxide nanoparticles, copper and copper oxide nanoparticles have attracted a lot of interest due to their numerous properties and uses in a variety of fields, most notably nanomedicine and the biomedical sciences. The significance of biological synthesis, whether extracellular or intracellular, is emphasized globally. This paper discusses potential environmentally friendly methods for producing copper nanoparticles. The precise mechanism of every possible biosynthetic pathway is also diagrammatically presented.

Keywords: nanoparticles, nanomedicine, biological synthesis, biosynthetic.

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RECENT ADVANCES IN PHARMACOLOGICAL STRATEGIES FOR THE PREVENTION OF CATARACTS

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Opacification in the lens is known as cataract, the leading cause of blindness. The situation that can be managed for cataracts is the surgical removal of the cataractous lens. Many researchers give various pharmacological strategies for the prevention of cataracts. There are many pathways for the development of cataracts. There are various anticataract agents which use various pharmacological strategies i.e. Aldose reductase inhibitors, Non-steroidal anti-inflammatory drugs, agents acting on glutathione, vitamins, minerals, antioxidants, and herbal drugs Miscellaneous agents prevent the development of cataracts. There are in vitro and in vivo investigations of vitamins, minerals, herbal medications, and nutritional supplements in the prevention and treatment of cataracts. The majority of research are only preliminary, even though several medications may be used to cure cataracts. Nevertheless, more extensive and prospective clinical research is required to treat cataracts with dietary supplements and herbal medications.

Keywords: Cataract, glutathione, anticataract agents.

SUCRALFATE IN MANAGEMENT OF STRESS ULCERS: EXPLORING ITS ROLE IN ANGIOGENESIS, PROTECTIVE BARRIER FORMATION, AND NON-SYSTEMIC ACTION

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Stress ulcers, or stress-related mucosal damage (SRMD), is a common complication in critically ill patients, characterized by erosions, ulcerations, and inflammation of mucosa of the upper gastrointestinal (GI) tract. Within the first 24 hours after hospitalization, 75–100% of intensive care unit patients experience stress-related ulcers due to an imbalance between protective and aggressive gastric factors. Patients in intensive care units (ICUs), particularly those on mechanical ventilation or with severe burns, trauma, sepsis, or coagulopathy, are at increased risk. If left untreated, stress ulcers can lead to significant complications, including gastrointestinal bleeding, increased morbidity, and prolonged hospital stays. Sucralfate binds to negatively charged alternatives due to its unique mechanism of action. It forms a protective barrier over ulcerated mucosa, promotes angiogenesis, and enhances mucosal healing without significantly altering gastric acidity. This characteristic reduces the likelihood of bacterial overgrowth and infection, making sucralfate a safer option for stress ulcer prophylaxis.

Clinical studies have demonstrated that sucralfate effectively prevents stress-related gastrointestinal bleeding while maintaining a favorable safety profile. Sucralfate is added to the regimen with PPIs and H2RAs in the treatment of stress ulcers.

Sucralfate, when combined with PPIs and H2RAs, enhances healing and prevents complications by providing protection against acid, pepsin, and bile salts. This combination reduces the risk of bleeding and perforation, leading to faster recovery and shorter hospital stays. However, caution is necessary in patients with renal impairment due to the risk of aluminum accumulation. Given its protective properties and lower risk of adverse effects, sucralfate represents a viable and safer alternative for managing stress ulcers in critically ill patients, offering effective mucosal protection while minimizing infection-related complications.

Keywords: Sucralfate, Angiogenesis, Stress Ulcer, Gastritis, Stress Ulcers Prophylaxis.

COMPARATIVE ANALYSIS OF BIOFILM FORMATION AND ANTIMICROBIAL RESISTANCE IN ESBL AND MBL PRODUCING KLEBSIELLA PNEUMONIAE FROM CLINICAL SAMPLES

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Background: Klebsiella pneumoniae threatens health due to carbapenem resistance, hypervirulence, and biofilm formation. Biofilms enhance antibiotic resistance, leading to persistent, high-mortality infections. Betalactams were once effective, but ESBL and MBL producing strains now reduce their efficacy. ESBLs hydrolyze cephalosporins and monobactams, while MBLs target carbapenems. Misuse-driven antibiotic resistance is a global health concern. The rise of biofilm-forming, multi-resistant bacteria, including carbapenem-resistant strains, limits treatment options, complicating infection management.
Method: Isolation and identification of Klebsiella pneumoniae. Detection of biofilm formation. Antibiotic screening (ESBL, MBL) of biofilm positive klebsiella pneumoniae. Genotypic analysis of resistant genes by PCR tests.
Results: Out of 760 clinical samples, 265 (34.9%) were culture-positive. Among these, 129 (48.6%) K. pneumoniae isolates were biofilm producers: 45 (34.8%) strong, 48 (37.2%) moderate, and 36 (27.9%) weak. Additionally, 48 (37.2%) isolates were ESBL producers and 23 (17.8%) were MBL producers. High ESBL and MBL production rates were noted in implanted patients, with blaTEM (48%) and blaIMP (62%) being the most prevalent genes.
Conclusion: Biofilms, structured bacterial communities in a self-produced matrix, protect MDR pathogens from antibiotics. This study found strong biofilm production and multidrug resistance in K. pneumoniae, correlating with ESBL and MBL. Strict antibiotic regulation is crucial to combat MDR spread.

Keywords: Antimicrobial resistance, Biofilm formation, , Extended-Spectrum βlactamase (ESBL) , metallo beta lactamase (MBL).

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EXPLORING THE SYNERGISTIC ANTIOXIDANT POTENTIAL OF *SPHAGNETICOLA TRILOBATA* AND *SCUTELLARIA BAICALENSIS* FOR CHRONIC DISEASE MANAGEMENT

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Antioxidants play a crucial role in protecting cells from oxidative stress, which is linked to the development of various diseases, including cancer, cardiovascular conditions, and neurodegenerative disorders. By neutralizing harmful free radicals, antioxidants help reduce inflammation, prevent cellular damage, and support overall immune function. This protective action can lower the risk of chronic diseases and slow their progression. Sphagneticola trilobatais a medicinal plant with potential therapeutic uses, including antioxidant, anticancer, and anti-inflammatory properties. It has been explored for treating conditions like diabetes and wound infections, but its full pharmacological potential requires further research. Baicalin, a flavonoid compound from Scutellaria baicalensis (Chinese skullcap), also exhibits antioxidant, anti-inflammatory, and anticancer effects, and is widely used in traditional medicine for various ailments. Phytochemical and Pharmacognostical analysis have been performed for dries parts of both plants. We have identified several bioactive compounds in the various extracts of S. trilobata and S. Baicalensis, including alkaloids, flavonoids, saponins, terpenoids, steroids, glycosides, tannins, proteins, amino acids, and carbohydrates. Antioxidant potential also has been evaluated using DPPH and Hydrogen peroxide free radical scavenging method for both plants and in combination. Future research on Sphagneticola trilobata and Scutellaria baicalensis could uncover novel therapeutic agents for diseases related to oxidative stress, such as cancer and cardiovascular disorders. Investigating their bioactive compounds and antioxidant properties may lead to the development of effective treatments, with potential benefits from combining extracts of both plants for enhanced therapeutic outcomes.

Keywords: antioxidant, Sphagneticola trilobata, Scutellaria baicalensis, chronic diseases.

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ARTIFICIAL INTELLIGENCE IN HEALTHCARE INDUSTRY

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Artificial Intelligence (AI) is rapidly transforming the healthcare industry, offering innovative solutions that enhance patient care, streamline operations, and improve clinical outcomes. AI technologies, such as machine learning, natural language processing, and computer vision, are being widely applied to areas like diagnostics, treatment planning, drug discovery, and patient monitoring. In diagnostics, AI algorithms are capable of analyzing medical images, genetic data, and patient records with remarkable accuracy, aiding clinicians in detecting diseases such as cancer, cardiovascular conditions, and neurological disorders at earlier stages.

In treatment planning, AI systems can provide personalized recommendations based on a patient's unique medical history, improving the effectiveness of interventions. Additionally, AI-driven tools are advancing drug discovery by predicting molecular interactions and optimizing clinical trial designs, thus accelerating the development of new therapies. AI also plays a pivotal role in predictive analytics, enabling proactive care by forecasting patient outcomes and identifying high-risk individuals for timely interventions.

Despite its potential, the adoption of AI in healthcare faces challenges, including data privacy concerns, regulatory hurdles, and the need for robust validation in clinical settings. However, with ongoing advancements in technology and increasing integration of AI into healthcare systems, its future promises a more efficient, accessible, and personalized healthcare ecosystem. AI is poised to redefine the healthcare landscape, improving decision-making, enhancing patient outcomes, and reducing the overall cost of care.

Keywords: Artificial Intelligence, Clinical, Healthcare, Patient.

ARTIFICIAL INTELLIGENCE IN DRUG FORMULATION AND DEVELOPMENT

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The integration of Artificial Intelligence (AI) in the pharmaceutical industry holds significant promise, but it also presents a range of challenges that must be addressed for its successful implementation. One of the primary hurdles is the quality and availability of data. AI models require large, high-quality datasets for training, and in the pharmaceutical industry, data can be fragmented, incomplete, or biased, which hampers the accuracy and reliability of AI predictions. Another challenge is the complexity of regulatory frameworks, as pharmaceutical companies must navigate strict regulations around the use of AI in drug development, clinical trials, and manufacturing. Ensuring that AI systems comply with industry standards while maintaining safety and efficacy is a critical concern.

Moreover, AI in drug discovery and formulation demands interdisciplinary collaboration, requiring expertise in both computational methods and domain-specific knowledge, which can be difficult to achieve in practice. Despite these challenges, the continued development of AI technologies, improvements in data governance, and collaboration between industry stakeholders can help overcome these obstacles, paving the way for more efficient and innovative solutions in the pharmaceutical sector.

Keywords: Artificial Intelligence, Pharmaceutical, Drug Discovery, Technologies

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ARTIFICIAL INTELLIGENCE IN DRUG DISCOVERY FOR HEPATOCELLULAR CARCINOMA: INNOVATIONS AND FUTURE DIRECTIONS

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Abstract

Hepatocellular carcinoma (HCC) remains one of the leading causes of cancer-related deaths globally, largely due to its complex pathophysiology and limited therapeutic options. In recent years, Artificial Intelligence (AI) has emerged as a transformative tool in the field of drug discovery, offering innovative solutions to overcome challenges in HCC treatment. AI-driven approaches, such as machine learning (ML), deep learning (DL), and natural language processing (NLP), are being leveraged to accelerate the identification of potential drug candidates, predict their efficacy, and optimize treatment regimens for HCC patients. AI technologies enable the integration of multi-omics data, identification of novel molecular targets, and the design of personalized therapies. Moreover, AI can facilitate the repurposing of existing drugs and the discovery of biomarker-driven treatment strategies, significantly reducing the time and cost of drug development. Despite these advancements, challenges such as data quality, model interpretability, and the need for clinical validation persist. This paper explores the current innovations in AI applications for HCC drug discovery and outlines the future directions for enhancing AI methodologies to improve therapeutic outcomes. The ongoing integration of AI with cutting-edge experimental and clinical data holds promise for revolutionizing HCC treatment and providing new hope for patients worldwide.

Keywords: Carcinoma, Artificial Intelligence, Therapeutic, Molecular targets, Biomarker

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ARTIFICIAL INTELLIGENCE IN DRUG FORMULATION AND DEVELOPMENT

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Artificial Intelligence (AI) is transforming the landscape of drug formulation and development, offering new avenues to enhance efficiency and precision. The integration of AI technologies, such as machine learning, natural language processing, and predictive analytics, is revolutionizing various stages of drug development, including discovery, formulation, and clinical testing. AI enables the identification of novel drug candidates, optimizing compound selection by predicting the biological activity, toxicity, and efficacy of potential molecules. In drug formulation, AI aids in the design of more stable, effective, and targeted drug delivery systems by simulating and predicting formulation behaviors. Additionally, AI-driven models assist in the optimization of dosage forms, improving bioavailability and patient compliance. The application of AI in clinical trials is also accelerating the development process by streamlining patient recruitment, monitoring responses, and predicting outcomes, thus reducing time and costs associated with traditional methods. Furthermore, AI facilitates the personalization of drug therapies, leading to precision medicine that tailors treatments based on individual patient profiles. Despite its promising potential, challenges remain, such as data privacy concerns, the need for high-quality datasets, and regulatory hurdles. However, the future prospects for AI in drug formulation and development are bright, with continuous advancements in computational power, algorithms, and interdisciplinary collaborations. AI's integration is poised to revolutionize the pharmaceutical industry, leading to faster, more efficient, and cost-effective drug development processes, ultimately benefiting patients and healthcare systems worldwide.

Keywords: Artificial Intelligence, Novel drug, Formulation, Pharmaceutical.

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DESIGN, DEVELOPMENT AND EVALUATION PIPERINE LOADED TRANSFERSOMES FOR ANTIARTHRITIC POTENTIAL IN WISTAR RATS

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The objective of this research was to formulate piperine-loaded transfersomes for their anti-arthritic potential. This study investigates the design, development, and evaluation of piperine-loaded transfersomes for potential anti-arthritic applications. Pre-formulation studies confirmed the compatibility between the drug and excipients, enabling the successful preparation of transfersomes via the thin-film hydration method. Nine different batches were prepared and characterized for particle size, polydispersity index (PDI), and entrapment efficacy. Utilizing Design of Experiments (DoE) for optimization revealed significant influences of excipients on formulation characteristics. The optimized batch was incorporated into a gel formulation, which demonstrated stability and favourable physical properties comparable to standard Diclofenac sodium gel. In vivo evaluation in FCA-induced arthritic rats indicated that piperine-loaded transfersomes markedly reduced joint inflammation and damage, improving hematological parameters and histopathological outcomes. The treatment group exhibited decreased synovitis, cartilage degeneration, and inflammatory mediator levels compared to the control group. Furthermore, changes in body weight and paw volume measurements reinforced the therapeutic potential of piperine-loaded transfersomes. Overall, the findings suggest that piperine-loaded transfersomes could serve as a promising natural therapeutic agent for arthritis management, meriting further investigation for clinical applications in inflammatory disorders.

Keywords: Piperine, Transfersomes, Optimization, Antiarthritic, Design of Experiment

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SCL-28-AI: A NETWORK-DRIVEN ETHICAL DECISION SUPPORT SYSTEM FOR ENHANCED MENTAL HEALTH DISORDER DIAGNOSIS USING EXPLAINABLE AI

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Mental health disorders, affecting nearly one billion individuals worldwide, are often diagnosed using lengthy tools like the 90-question SCL-90-R, which suffer from low participation rates and manual interpretation biases. Addressing these limitations, this review study proposes a novel AI-based Decision Support System (DSS) that integrates network science and ethical artificial intelligence (AI) to enable efficient, accurate, and transparent mental health diagnostics. Leveraging the Network Pattern Recognition (NEPAR) algorithm, we systematically reduced the SCL-90-R to a concise 28-question assessment (SCL-28-AI) without compromising its ability to diagnose 10 mental disorders. Machine learning models—including logistic regression, random forest, and SVM—were trained on responses from 6,000 participants, achieving an accuracy of 89% with the SCL-28-AI. The system prioritizes ethical AI principles by excluding demographic variables to mitigate bias, employing explainable "white-box" models (e.g., logistic regression), and fostering clinician-AI collaboration to ensure accountability. Key innovations include the first application of network analysis for feature selection in mental health diagnostics, integrating participant similarity metrics to improve model robustness, and adherence to "ethics by design" frameworks. Results demonstrate that the SCL-28-AI reduces assessment time by 69%, increases completion rates, and automates diagnosis, freeing clinicians to focus on personalized treatment. This research advances AI-driven mental healthcare by combining network science, ethical AI, and scalable diagnostics, offering a transformative tool to address global mental health resource shortages and improve patient outcomes.

Keywords: AI-based Decision Support System (DSS), Network Pattern Recognition (NEPAR), SCL-28-AI, Ethical Artificial Intelligence, Mental Health Diagnostics

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ARTIFICIAL INTELLIGENCE IN MEDICAL IMAGING AND RADIOLOGY: A COMPREHENSIVE REVIEW

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The integration of Artificial Intelligence (AI) into medical imaging and radiology. It is a branch of medicines by which we get the analytics of disease and find the way out to cure them is reshaping modern healthcare by enhancing diagnostic precision, streamlining workflows, and addressing critical clinical challenges. Nowadays AI is a critical thing that is used in the field of radiology as professionals use it in Automated Lesion Detection like X-Ray.The topics that are important when incorporating artificial intelligence in medical imaging and Radiologyare Machine Learning (ML), Deep Learning, Natural Language Processing (NLP), and Computer Vision, are analysed for their contributions to advancing medical imaging. Natural language processing, bioinformatics, medical diagnosis, video surveillance, and financial data analysis are some of the fields that use machine learning.Numerous practical applications in radiology have already been created using natural language processing (NLP), such as digital assistants, chatbots, report search engines, speech recognition software, and automatic translation systems.

Further we can discuss ethical and data privacy considerations, as well as the potential for AI to drive personalized medicine through innovative algorithmic advancements. In conclusion,this study predicts a future where AI augments radiology practices, it allows professionals to focus on complex cases and deliver superior patient outcomes.

Keywords: Natural Language Processing (NLP), Artificial intelligence (Ai), Deep learning, Machine learning, Radiology, Machine Learning (ML), Computer Vision

CHEMICAL MARKERS IN MEDICAL DEVICE MANUFACTURING UNDERSTANDING THEIR ROLE AND IMPORTANCE: A COMPREHENSIVE REVIEW

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Chemical markers play a crucial role in medical device manufacturing, ensuring the safety, efficacy, and quality of medical devices. Here's a comprehensive overview of Chemical markers used to detect, identify, or quantify specific chemical compounds or reactions in medical device manufacturing. They verify material composition, detect contaminants, validate sterilization, and ensure cleaning efficacy. Examples include dyes, chromogenic markers, fluorescent markers, and radiochemical markers. A part from that if we'll talk about that how chemical markers works thus it's as follow: 1st Selection of Chemical Markers, includes Identification of target analytes, Selection of marker type, and Consideration of marker properties. 2nd Development of Chemical Marker Assays includes Optimization of marker concentration, Development of assay protocols, Validation of assay performance. 3rd Application of Chemical Markers includes Application of chemical marker, Incubation and washing, Detection and quantification. 4th Data Interpretation and Reporting, includes Data analysis, Interpretation of results, Reporting and documentation 5th Quality Control and Assurance includes Quality control, Quality assurance. Furthermore, if we'll talk about the future consequences we'll get to see Improved patient safety, Enhanced device efficacy, Increased manufacturing efficiency, Regulatory compliance, Personalized medicine. Chemical markers play a crucial role in digital medical device manufacturing, ensuring safety, efficacy, and quality. They detect contaminants, verify material properties, and validate sterilization processes. Advancements in marker technology will further enhance patient safety, device efficacy, and manufacturing efficiency.

Key Words: Chemical Markers, Artificial Intelligence, Digital Medical Devices, Data Interpretation

EXTRACTION, ISOLATION, AND CHARACTERIZATION OF MALVIDIN FROM BLUEBERRIES

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An effective method for purifying anthocyanin monomeric isomers from wild blueberries has been developed, scalable for industrial purposes. In the present study extraction and isolation is targeting. Blueberries were soaked in acidified ethanol, filtered, and the filtrate was purified using solid-phase extraction with silica gel C-18 and DSC-SCX (scx- strong cation exchange) cation-exchange resin. Anthocyanin-enriched fractions (87 wt.%) were successfully separated by preparative liquid chromatography. The main anthocyanins, including mono-galactoside, -glucoside, and -arabinoside isomers of delphinidin, cyanidin, petunidin, peonidin, and malvidin, were isolated with purities of up to 100%, as confirmed by NMR spectra. A complementary NMR analytical protocol, incorporating both high and low-field measurements, is proposed for blueberry characterization. Untargeted NMR metabolite profiling of both aqueous and organic extracts of blueberries, along with targeted analysis focusing on anthocyanins and other phenolic compounds, is presented. Bligh-Dyer and microwave-assisted extractions were compared, with the microwave method showing superior recovery of the lipid fraction. A variety of water-soluble metabolites, including sugars, amino acids, organic acids, and phenolic compounds, as well as organic-soluble metabolites like triglycerides, sterols, and fatty acids, were identified. Five anthocyanins (malvidin-3-glucoside, malvidin-3-galactoside, delphinidin-3-glucoside, delphinidin-3-galactoside, and petunidin-3-glucoside) and 3-O-α-l-rhamnopyranosyl quercetin were detected in the solid-phase extract. The water content of both fresh and withered blueberries were monitored using portable NMR and fast-field cycling NMR, with 1H depth profiles and T2 transverse relaxation times being measured.

Keywords: Anthocyanin isomers, Malvidin, NMR spectroscopy, Phenolic compounds

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A SURVEY REPORT ON THE LIFESTYLE OF CARDIOVASCULAR PATIENTS ALONG WITH THEIR LOCALITY

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Background: Over the past few decades, several nationwide surveys have revealed an increase in the prevalence of serious risk causes of CVD in the Indian populace. Lack of a surveillance system and inadequate diagnosis are the causes of India's growing risk factors for CVD. Aim and Objective: To determine the lifestyle of cardiovascular patients along with what medication they are taking.

Materials and Methods: This was a cross-sectional survey done among two cardiovascular hospitals. We collect the prescriptions from cardiovascular patients along with put up questions related to their lifestyle. In addition, we used the PUBMED search to find any pertinent studies on cardiovascular disorders during the 2015–2024 timeframe. Manual searching has been used in addition to PUBMED searches. The epidemiology of cardiovascular disease, specifically coronary heart disease (CHD), stroke, and associated risk factors in the Asian Indian community, is reviewed in this article.

Results: As per the survey, among all the prescribed medicines, most of the persons who are having heart-related issues are from Urban areas (77%) than the rural ones (23%).Also, most of the heart patients rely on junk food (22%) followed by physically inactive i.e. no workout or any cardio workout or activity (19%), then drinkers or smokers (10-13%) and others have high cholesterol and obesity, etc. Most people in the populationare male (65%) than female (35%) who are having cardiac-related issues. People within the age range of 40-60 are having major health-related issues, followed by 60-80 age group people, and so on.

Keywords: cardiovascular disease, cholesterol, obesity, stroke

DENDRIMERS: A PROMISING NANOCARRIER FOR DRUG DELIVERY AND BIOMEDICAL APPLICATIONS

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Background: Dendrimers are nanosized, highly branched polymeric structures with well defined structure. They have been investigated for drug delivery, gene therapy, and imaging due to their ability to carry therapeutic agents efficiently. Their controlled synthesis methods enable functionalization for specific applications in nanomedicine.

Objective: This poster focuses on the synthesis of dendrimers and their applications in drug delivery and biomedical research, highlighting their advantages and challenges.

Methodology: Various research papers from pubmed, ScienceDirect, and recent journal publications were reviewed to analyze and approaches of preparations and advancement in dendrimers.

Result: Dendrimers show promising results in improving drug solubility, targeted delivery, and controlled release. However, challenges like cytotoxicity and large-scale production need further optimization for clinical applications.

Conclusion: Dendrimers have significant potential in nanomedicine. Challenges such as large scale production and cytotoxicity require further research which can enhance their effectiveness in clinical applications.

Keywords: Dendrimers, Nanomedicine, Targeted drug delivery, Controlled Release

THE ROLE OF ARTIFICIAL INTELLIGENCE IN TRANSFORMING DRUG DISCOVERY AND DEVELOPMENT

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Artificial Intelligence (AI) is revolutionizing drug discovery and development by enhancing efficiency, reducing costs, and accelerating the process of bringing new therapeutics to market. AI-driven algorithms and machine learning models are transforming traditional drug discovery methods by predicting molecular interactions, optimizing drug formulations, and identifying potential drug candidates with higher precision. Deep learning and neural networks analyze vast datasets to uncover hidden patterns, facilitating target identification, lead optimization, and toxicity prediction.In the preclinical phase, AI-driven computational models assist in virtual screening, reducing the need for extensive laboratory testing. AI also plays a crucial role in clinical trials by optimizing patient recruitment, predicting treatment responses, and improving trial design. Moreover, AI-powered systems help in drug repurposing by identifying new indications for existing drugs, significantly shortening development timelines.The integration of AI with big data, omics sciences, and real-world evidence further enhances personalized medicine, enabling the development of tailored therapies. Despite its advantages, challenges such as data quality, regulatory hurdles, and ethical considerations remain critical. Addressing these challenges through robust validation methods and regulatory frameworks will be essential for AI's widespread adoption in the pharmaceutical industry.Overall, AI is reshaping drug discovery and development, promising more effective and safer therapeutics while reducing time and costs, ultimately advancing global healthcare.

Keywords: Artificial Intelligence, molecular interactions, target identification, lead optimization

REMEDY FOR ALZHEIMER'S DISEASE THROUGH CONSUMPTION OF NATURAL FRUITS

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The progressive condition of Alzheimer's disease creates a neurodegenerative condition. The neuroprotective properties of natural compounds originating from fruits have become increasingly popular in recent studies of dementia disorders. Fruits carry many bioactive compounds including flavonoids, polyphenols, vitamins as well as antioxidants capable of reducing inflammation while protecting the nervous system from amyloid-induced damage. Research on this topic investigates the therapeutic applications of five kinds of fruits namely berries and citrus fruits together with grapes and pomegranates and apples as potential candidates for AD prevention. Blueberries and strawberries together with their high anthocyanin content have shown ability to strengthen synaptic plasticity and decrease oxidative stress levels in the brain. The flavonoids found in citrus fruits operate to control neuroinflammation and grapes contain resveratrol which clears away amyloid-beta molecules. Pomegranates together with apples function as brain health boosters because they shield neurons from destruction while stopping harmful oxidation of tissues. The review explores the protective mechanisms of neuroprotective compounds from fruits through their ability to impede amyloid-beta aggregation together with decreasing tau hyperphosphorylation and the control of oxidative stress as well as neuroinflammatory pathways.

Keywords: fruits, neuroprotection, antioxidants, flavonoids, polyphenols, amyloid-beta, oxidative stress,

ROLE OF AI IN NOVEL DRUG DELIVERY SYSTEM

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Artificial intelligence is changing the way drugs are delivered within the body. It helps scientists find the best ways to ensure drugs reach the right place at the right time, making treatments more effective and safe. AI analyzes large amounts of data to predict drug behavior, choose the best delivery method, and determine the appropriate dosage to minimize side effects. One of the primary uses of AI in drug delivery is the design of nanoparticles and liposomes, which carry drugs to specific parts of the body without harming healthy cells. AI is also helping develop smart drug release systems, ensuring that drugs are released slowly and remain effective for a longer period of time. This is particularly useful for diseases such as cancer, diabetes, and brain disorders. Using AI, doctors can create personalized medical plans, ensuring patients receive the appropriate treatment based on their needs. This reduces trial and error, saves time, and improves patient care. Although AI in drug delivery faces challenges such as high costs and complex technology, ongoing research is making it more effective. In the future, AI is expected to play a key role in making drugs safer and treatments more precise.

Keywords: Artificial intelligence, nanoparticles, liposomes, smart drug delivery, cancer, personalized medicine.

FORMULATION AND CHARACTERIZATION OF MICRO-EMULSION BASED TOPICAL DRUG DELIVERY SYSTEM OF NOVEL DRUG

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Sulconazole is a broad-spectrum antifungal medication from the imidazole family that is used to treat skin infections caused by dermatophytes and other fungi.The current study based on preparation and assessment a topical sulconazole gel based on micro emulsion. Sulconazole nitrate was formed as micro emulsion formulation by different the ratio of oil, surfactant, co-surfactant and water such as olive oil, tween 80 and PEG 600.This was subsequently put through a centrifugation test, a dilution test, freeze-thaw test, and clarity and particle size analysis.Formulation F1's zeta potential was stable at -40.2. The microemulsion formulation's pH fell within the skin's pH range. F2 demonstrated a larger percentage quantity of medication as compared with the other formulations. The viscosity showed that F2 was optimum. The formulation was stable and there was no phase separation, according to the freezing and thawing data. In vitro drug release demonstrated that the drug release from the microemulsion of F2 was greater when compared to the other formulations. With a cumulative drug release of 86.64% in 8 hours, F2 had the highest drug content, measuring 94.86±0.2%. The formulation's nontoxicity and non-irritability were validated by an in vivo skin irritation testing conducted on rats. In this article, the result that
The safety of the developed sulconazole-loaded micro-emulsion gel for topical administration was validated.

Keywords- Sulconazole, microemulsion, centrifugation test,dilution test,particle size analysis.

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POLYHERBAL PHYTOSOMES: A NOVEL PHYTOPHARMACEUTICAL APPROACH FOR THE MANAGEMENT OF ALOPECIA

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Alopecia, a multifunctional disorder characterized by excessive hair loss, has significant psychological and social implications. Conventional therapeutic agents, such as minoxidil and finasteride, are often associated with adverse effects and inconsistent clinical outcomes, necessitating the exploration of alternative therapeutic modalities. Polyherbal formulations have demonstrated promising efficacy in promoting hair regeneration due to their synergistic pharmacological actions, including antioxidative, anti-inflammatory, and anti-androgenic properties. Phytoconstituents such as antioxidants (Quercetin, Kaempferol, Luteolin) and phenolic compounds (Curcumin, Rosmarinic Acid) and sterols (Beta Sitosterol, Stigma sterol) act as natural DHT blockers, preventing follicular miniaturization and promoting hair regrowth. However, the therapeutic potential of herbal bio- actives is often limited by poor bioavailability and suboptimal absorption.

This limitation can be overcome by formulating phospholipid-based drug delivery systems that accelerate the rate and extent of phytoconstituents solubilization into aqueous intestinal fluids and enhance drug ability to penetrate lipid-rich bio membranes results in increase bioavailability. Phytosomal formulations were prepared using thin-film hydration techniques with Drug-to-Excipients ratios of 1:1, 1:2, and 1:3, optimizing both entrapment efficiency and release kinetics.Characterization methods, including zeta potential analysis, differential scanning calorimetry (DSC), X-ray diffraction (XRD), scanning electron microscopy (SEM) were employed to access particle size, Surface charge, and structural attributes. In vitro diffusion studies demonstrated that these formulations achieve sustained release of active phytoconstituents, surpassing conventional dosage form in therapeutic efficacy.The results indicate that Phytosomal formulation hold significant promise as an improved therapeutic modality for alopecia. Further studies are essential to establish their efficacy, clinical safety, and underlying mechanisms in hair loss treatment.

Keywords: Alopecia, Phytosomal technology, Polyherbal formulations, DHT blockers, Bioavailability enhancement.

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AI HEALTH CARE FRONTIER NEW POSSIBILITY AND CHALLENGES

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Artificial Intelligence (AI) is reshaping modern healthcare, enabling faster diagnoses, precision treatments, and improved patient outcomes. AI applications such as deep learning, natural language processing (NLP), and robotic automation are expanding the frontiers of medical science. However, challenges related to ethical considerations, bias, and data security require careful navigation. Healthcare communication is a multifaceted domain that encompasses interactions between patients, healthcare providers, caregivers, and the broader healthcare ecosystem. Effective communication has long been recognized as a fundamental element of quality healthcare delivery. It plays a pivotal role in patient education, adherence to treatment plans, early detection of health issues, and overall patient satisfaction. Nevertheless, the advent of the digital age has presented both opportunities and challenges to traditional healthcare communication approaches.

Keywords: AI, Healthcare, NLP, Robotic

PHYTOCHEMICAL CHARACTERIZATION, ANTIOXIDANT AND ANTIFUNGAL ACTIVITY OF *TAGETES ERECTA:* INSIGHTS FROM *IN VITRO* AND *IN SILICO* STUDIES

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Tagetes erecta L., commonly referred to as the American or African marigold, is a flower herb that has both artistic and biological importance. The phytochemical constituents of T. erecta, in particular those belonging to the economically important variety Pusa Narangi Genda, will be characterized in this paper along with the evaluation of their antifungal and antioxidant activity. Phytochemicals were screened by LC-MS. The following the harvesting of the plant leaves and aerial parts, drying, and solvent extraction using a series of solvents. The top 10 natural-like molecules with probable binding affinities (docking score <-10.1) were docked using docking scores. The efficacy of the phytochemicals and their potential applications in medicine can be comprehensively analyzed due to this holistic approach. The improvement in the choice of compounds for further development and the understanding of mechanisms of action are made possible by the integration of in vitro and in silico methods. Besides enhancing the predictability of the behavior of the compound, this holistic approach provides opportunities for novel drug design strategies. The advancement of natural product chemistry and the discovery of novel antifungal agents are ultimately facilitated

Keywords- Phytochemicals, In silico, Antifungal, Antioxidants, Noval drug design

EXPLORING BIOLOGICAL AND PHYTOREMEDIATION APPROACHES

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Microplastics are one of the most common environmental contaminants, endangering ecosystems, human health, and pharmaceutical safety. Their persistent bioaccumulation in aquatic water bodies, soil, and even food chains necessitate immediate action to reduce their presence and prevent further contamination. This analysis looks at several mitigation strategies, such as enhanced filtering technology, biodegradable alternatives, and regulatory frameworks that aim to reduce the discharge of microplastics into the environment. Case studies, like the

The EU's regulatory framework aims to reduce microplastic release, ban purposefully added microplastic in cosmetics and pharmaceuticals, and mandate precise reporting requirements. Nanocellulose-basedmembranes provide very good performance. for microplastic removal, which could be used in PWW treatment plants. Biopolymer-based packaging and pharmaceutical excipients, including PLA and PHA, offer a sustainable alternative to typical plastic formulations. Furthermore, the implementation of microplastic adsorption techniques has taken central place in environmental remediation, such as biochar and chitosan- basedmaterials. In the pharmaceutical industry, the development of microplastic-free drug deliverysystems and the incorporation of green chemistry principles are crucial for reducing the risksassociated with microplastic contamination. Policy-driven solutions can be informed by regulatoryefforts such as the EU's Microplastics Restriction Proposal and the U.S. Microbead-Free WatersAct. This review will offer actionable insights to pharmaceutical stakeholders to incorporatesustainable practices while protecting human and environmental health.

Keywords: Microplastic Bioaccumulation, Environmental Remediation,Biodegradable Polymers, Regulatory Strategies.

EMERGING IMPLANTATION OF ANTHELMINTIC DRUG LOADED WITH SELF NANOEMULSIFYING DRUG DELIVERY SYSTEM EFFECTIVE FOR ANTHELMINTIC THERAPY

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SNEDDS is isotropic mixture of Natural or synthetic oil, surfactant & Cosurfactant that have unique ability of forming fine O/W Nanoemulsion. Nanoemulsion are submicron sized emulsions that are under extensive investigation as drug carriers for improving the delivery of therapeutic agents. NEs are kinetically stable & suitable for oral delivery. SNEDDS are improve solubility, Dissolution Rate, Oral bioavailability & Permeability of BCS class II & class IV drug. Liquid SNEDDS experience some manufacturing & stability limitation. To overcome this limitation then prepare Solid Self Nanoemulsifying Drug delivery system.Anthelmintic drug includes Ivermectin, Mebendazole, Albendazole, Praziquentel. Ivermectin is used for the treatment of onchocerciasis, helminthiases & scabies. The ultimate goal of this work is an attempt to improve the Solubility, bioavailability, Permeation rate, Patient compliance & Anthelmintic Activity by using respective drug employing SNEEDS techniques.

Keywords: Nano-emulsion, Oral delivery, Poor bioavailability, Self-nanoemulsifying drug delivery system, surfactant, co-surfactant.

MCHSR/AI/2025/146

IMPACT OF FUNCTIONAL FOODS ON IMPAIRED VISION IN AGEING-RELATED OCULAR DISORDERS: A NUTRITIONAL PERSPECTIVE ON EYE HEALTH

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The leading causes of blindness and blurred vision worldwide are glaucoma, cataracts, and ageing-related macular degeneration (AMD). Oxidative damage, inflammation, and neurodegeneration contribute to these eye conditions, making dietary changes a promising approach for prevention and treatment of the ocular disorders. Functional foods, which contain bioactive substances, offer health benefits beyond basic nutrition. Carotenoids like lutein and zeaxanthin found in green leafy vegetables can filter harmful blue light and reduce oxidative stress, lowering the risk of AMD and cataract. Omega-3 fatty acids, particularly eicosapentaenoic acid, docosahexaenoic acid from fish oil, support retinal health and inflammation control, benefiting patients with both AMD and glaucoma. Polyphenols in berries, tea, and dark chocolate possess neuroprotective and antioxidant properties, potentially preventing glaucoma by reducing oxidative stress and improving vascular function. Zinc, vitamin C, and vitamin E also play vital roles in maintaining eye health and delaying cataract formation. This explores the scientific evidence on nutritional supplements for preventing and treating AMD, cataracts, and glaucoma. Dietary changes present a low-risk, non-invasive method to promote long-term eye health and mitigate ageing-related conditions. Further research is needed to establish optimal dietary guidelines for at-risk populations.

Keywords: Functional foods, AMD, cataract, glaucoma, antioxidants, omega-3, Carotenoids, polyphenols, ocular health

MCHSR/AI/2025/147

AI/ML MODELS IN DIABETES DETECTION, TREATMENT, AND PREVENTION

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Artificial Intelligence (AI) and Machine Learning (ML) are able to revolutionizing diabetes detection, treatment, and prevention, also offering data-driven solutions for enhance patient care. AI-powered algorithms facilitate early diagnosis through predictive analytics, leveraging extensive datasets from electronic health records (EHRs), continuous glucose monitors (CGMs), wearable devices, and genetic biomarkers. Studies have demonstrated that deep learning models, such as convolutional neural networks (CNNs) and recurrent neural networks (RNNs), can predict diabetes onset with an accuracy exceeding 90% based on risk factor analysis and retinal imaging. Furthermore, AI-driven decision support systems optimize treatment by analyzing glycemic patterns and recommending insulin dosages, reducing hypoglycemia episodes by up to 40% in closed-loop insulin delivery systems.

In diabetes management, AI enhances self-monitoring via reinforcement learning-based insulin pumps, which dynamically adjust insulin delivery based on glucose trends. Personalized treatment strategies, guided by natural language processing (NLP) models, enable AI chatbots to provide real-time lifestyle counseling and dietary recommendations. ML algorithms also aid in diabetes prevention by identifying at-risk individuals through clustering techniques that analyze behavioral and metabolic markers. Large-scale cohort studies utilizing AI have shown that precision lifestyle interventions, guided by predictive analytics, can reduce type 2 diabetes risk by 58%.

Despite these advancements, challenges persist, including data privacy concerns due to the sensitive nature of health records, the interpretability of complex deep learning models, and integration barriers within existing healthcare infrastructures. Ethical AI deployment requires robust regulatory frameworks, explainable AI (XAI) methodologies, and interdisciplinary collaboration to ensure transparency, fairness, and patient-centric innovation. This paper explores these technological advancements and challenges, emphasizing the transformative potential of AI/ML in diabetes care and its role in shaping the future of precision medicine.

Keywords: Artificial Intelligence, Machine Learning, diabetes, genetic biomarkers, hypoglycemia, glycemic patterns.

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INNOVATING ULCERATIVE COLITIS TREATMENT: NATURAL FRUIT POLYSACCHARIDES AS A NEW FRONTIER IN GUT HEALING

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Ulcerative colitis (UC) is a chronic inflammatory bowel disease that significantly affects patients' quality of life. Current treatments, including immunosuppressants and biologics, often come with adverse effects and limited long-term efficacy. In recent years, natural fruit polysaccharides have emerged as a promising alternative due to their immunomodulatory, prebiotic, and anti-inflammatory properties. These bioactive compounds, found in fruits such as pomegranates, apples, and citrus, have shown potential in restoring gut microbiota balance, enhancing intestinal barrier function, and reducing colonic inflammation.

This presentation explores the latest research on fruit-derived polysaccharides in UC management, focusing on their mechanisms of action, therapeutic benefits, and clinical implications. Additionally, we discuss the challenges of integrating these natural compounds into mainstream treatment, including bioavailability, standardization, and regulatory hurdles. By unveiling the potential of fruit polysaccharides as a natural and effective intervention, this study highlights a new frontier in UC therapy—bridging the gap between nutrition and medicine.

As the demand for safer, more sustainable treatments grows, understanding the role of fruit polysaccharides in gut health opens new avenues for research and clinical application. This innovation-driven approach could transform UC management and improve patient outcomes.

Keywords: Ulcerative colitis, fruit polysaccharides, gut microbiota, inflammation, natural therapy.

FORMULATION AND EVALUATION OFFORTIFIED ORANGE OMEGA-3 BEVERAGE

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Background: This abstract outline the formulation and potential health implications of a novel fortified beverage, amalgamating stevia, flaxseed powder, and ginseng extract. The beverage capitalizes on the natural properties of these ingredients to deliver a flavourful and health-promoting drink option. According to WHO, 422 million people worldwide are suffering from Diabetes with 1.5 million deaths attributed to it every year. And WHO even reports that 139.8 million of adults worldwide have persistent ADHD from childhood. Due to increase in diabetic cases and ADHD (attention deficit hyperactivity disorder) among the growing generation, the demand for sugar free beverages have increased to surplus and led to the requirements of its substitutes as sugar consumption is the root cause of both the diseases.Thus, in this research-based study, the beverage is formulated with stevia, a natural sweetener renowned for its low-calorie content and absence of sugars, making it suitable for health-conscious consumers seeking alternatives to traditional sugary beverages. Additionally, flaxseed powder, rich in omega-3 fatty acids, dietary fiber, and lignans, is incorporated with essential minerals like Sodium Chloride, Calcium to enhance the nutritional profile of the beverage, providing potential benefits for cardiovascular health and digestion.

Result: Orange Flavored Fortified Beverage was successfully formulated using Orange, Flax Seeds, Korean Red Ginseng, Stevia Powder and Lemon. It was evaluated on the parameters of PH, TTA (Tiltability Acidity), Tests for Phytoconstituents, and Organoleptic properties

Conclusion: The Fortified Beverage had benefits like Immunity Booster, Anti- Oxidant, Fiber, Stronger bones, Healthier skin and Hair, electrolyte balance while eliminating the Sugar from the Diet making it a healthier option for Diabetic and ADHD Patients.

Keywords: Formulation of Fortified Beverage, Formulation of Omega-3 Beverage Sugarless Beverage, Orange flavored Beverage of Stevia, Evaluation of Fortified Omega-3 beverage.

THE PATHOGENESIS OF EPILEPSY AND ITS DIAGNOSIS AND TREATMENT

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Epilepsy is one of the most prevalent, chronic, and severe seizure-related disorder of the nervous system, affecting seventy million individuals globally. The risk factors and pathogenesis of epilepsy are also diverse. Nevertheless, there have been mature treatments for epilepsy, among which antiepileptic drug treatment is the most common treatment around the world. Almost 70% of patients have their seizures controlled after drug treatment, but some drug-resistant epilepsies still need to be treated by some other supplemental treatment. In order to cure the resistant caused by drugs required aproper treatment, so for that we must understandabout the pathophysiology of epilepsy. As a result, this review paper includes introduced three kinds of pathogenesis in detail, namely abnormal ion channels, abnormal neurotransmitters, and abnormal neuroglial cells.

In addition, the diagnosis process and prevention of epilepsy was also added in this paper . Last but not least, we highly summarized the treatment aside for pharmacological treatment, namely surgical treatment and neuromodulation. Furthermore, this paper proposed a novel treatment, CRISPR-Cas9 gene editing technology, which could be used to treat epilepsy in the future.

Keywords: Epilepsy, Pathogenesis, Diagnosis, Treatment, CRISPR-Cas9.

BIOMIMETIC NANO- DRUG DELIVERY SYSTEM: DRIVEN STRATEGIES FOR DRUG TARGETING IN CEREBRAL DISEASES

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In recent years, brain diseases have seriously threatened human health due to their high morbidity and mortality especially in the elderly, and this problem is growing as the aging population increases. So it is a great challenge to achieve efficient drug delivery to provide satisfactory therapeutic outcomes after treatment of brain diseases. The main challenges are the structural peculiarities of the brain and the inability to transport drugs across the blood–brain barrier. Although a drug can penetrate the BBB but it's accumulation in the intracerebral pathological regions is relatively low. Thus, an optimal drug-delivery system (DDS) for the management of brain diseases needs to display BBB permeability, lesion-targeting capability, and acceptable safety. In recent years, with the advancement of materials science and nanotechnology, Biomimetic Nano-Drug Delivery Systems have been increasingly used to target the brain. A BNDDS mimics the endogenous mechanisms of delivering substances within a living being, to deliver biologically active substances such as drugs, proteins, or nucleic acids. In BNDDS the drug-loaded core particles (inorganic, organic, or hybrids of organic and inorganic matrices), enclosed in biologically active biomimetic outer membranes.

Keywords: Nano-Drug Delivery Systems, BBB permeability, Proteins,

ANTIOXIDANT POTENTIAL OF *PLUMERIA OBTUSA* L.: PHYTOCHEMICAL INSIGHTS AND HPLC PROFILING

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Plumeria obtusa, a medicinally significant plant, has been widely recognized for its bioactive compounds with potential therapeutic applications.The presence of flavonoids, phenolics, and other bioactive compounds in *P. obtusa* suggests its potential as a natural antioxidant source.Antioxidants play a crucial role in neutralizing oxidative stress, which is implicated in various chronic diseases.

A literature survey was conducted using Google Scholar, PubMed, and Scopus to explore the phytochemistry and pharmacological relevance of *P. obtusa*. Relevant studies published in the last ten years were analyzed, focusing on HPLC-based profiling and antioxidant evaluation. Reports indicate the presence of major bioactive constituents such as flavonoids, alkaloids, and phenolic acids, which contribute to its free radical scavenging activity. HPLC has been extensively used to identify and quantify these compounds, providing valuable insights into their pharmacological potential.

Understanding the antioxidant mechanisms and phytochemical diversity of *P. obtusa* can aid in developing novel therapeutic applications. Further studies integrating advanced analytical techniques and in-depth bioactivity assessments are warranted to establish its pharmacological significance.

Keywords: *Plumeria obtusa*, Antioxidant Activity, Phytochemicals, HPLC Profiling, Free Radical Scavenging.

AI-ASSISTED BIOPROSPECTING: DISCOVERING NOVEL PHYTOCONSTITUENTS FROM TRADITIONAL KNOWLEDGE

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Artificial Intelligence (AI) is revolutionizing the field of bioprospecting by facilitating the rapid discovery of novel phytoconstituents from traditional medicinal knowledge. Traditional systems such as Ayurveda, Traditional Chinese Medicine (TCM), and ethnobotanical records have long served as sources of bioactive compounds, but conventional identification methods are time-consuming and labor-intensive. AI-driven approaches, including machine learning, deep learning, and natural language processing, allow for efficient extraction of relevant data from vast repositories of medicinal plant knowledge, scientific literature, and phytochemical databases.

A literature survey was conducted using electronic databases such as Google Scholar, PubMed, Scopus, and Web of Science to analyze recent advancements in AI-assisted natural product research. Studies show that AI enhances drug discovery by predicting bioactive molecules, optimizing extraction and isolation techniques, and performing molecular docking simulations to assess compound-target interactions. Machine learning algorithms have demonstrated high accuracy in identifying structure-activity relationships, toxicity, and pharmacokinetic properties, leading to faster and more efficient lead identification.

Despite its advantages, AI-assisted bioprospecting faces challenges such as data inconsistency, limited availability of curated plant-based compound databases, and the need for experimental validation. Addressing these limitations will require interdisciplinary collaboration between computational scientists, pharmacognosists, and biologists. AI-driven bioprospecting represents a paradigm shift in natural product research, bridging traditional medicinal knowledge with computational intelligence. Standardizing datasets, refining predictive models, and integrating AI-generated insights with laboratory validation can unlock the full potential of traditional medicine for sustainable and innovative drug discovery.

Keywords: Artificial Intelligence, Bioprospecting, Ethnopharmacology, Phytoconstituents, Traditional Medicine, Drug Discovery

FORMULATION OF EFFERVESCENT GRANULES FROM ENICOSTEMMA LITTORALE EXTRACT AND ITS ANTIOXIDANT ACTIVITY

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Conventional herbal medicines frequently encounter issues such as inadequate solubility, low bioavailability, and poor patient adherence due to unpleasant bitterness and awkward dosage forms. This research tackles these issues by creating effervescent granules from *Enicostemmalittorale*, a medicinal plant known for its anti-diabetic and antioxidant effects. By employing citric acid, and sodium bicarbonate, the granules achieve quick dissolution and flavor masking through effervescence. The wet granulation technique ensured consistency and durability, while detailed evaluations examined flow characteristics, effervescence duration, pH levels, moisture content, and dissolution kinetics. Comparative solubility examinations showed improved bioavailability compared to crude extracts, and stability assessments verified resilience. The effervescent system significantly enhanced solubility, dissolution, and flavor, rendering herbal treatment more user-friendly and commercially feasible. This research combines contemporary pharmaceutical methodologies with traditional medicine, facilitating expanded acceptance. Future in vivo research will further confirm the pharmacokinetic benefits of this innovative formulation.

Keywords: *Enicostemmalittorale*, Effervescent granules, Bioavailability enhancement, Taste masking, Herbal innovation

FROM TRADITION TO INNOVATION: HERBAL GUMMIES AS A HOLISTIC APPROACH TO RELIEVE MENSTRUAL PAIN

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Dysmenorrhea is the medical term for painful menstruation or menstrual cramps., it affects millions of women worldwide, often leading to discomfort, reduced productivity and pain. Conventional treatments such as painkillers (NSAIDs), including ibuprofen, are widely used to reduce or manage pain. However, prolonged use of NSAIDs or Pain killers may lead to various side effects such GI disturbances, hormonal imbalances and many others. As a result, there is a need to develop an alternative solution to this and there is growing interest in natural, plant-based remedies that offer effective relief with minimal adverse effects.
Herbal ingredients have been traditionally used across various cultures for menstrual health, having various pain management properties such as anti-inflammatory, analgesic, and muscle-relaxant properties. This study explores the various mechanisms by which key herbal ingredients such as ginger, turmeric and fennel etc; help reduce menstrual cramps.

Furthermore, the study also examines the compatibility of herbal gummies as a delivery method for these herbal ingredients, enhancing compliance due to their palatability, ease of consumption, and bioavailability. Thus, herbal gummies present a promising natural alternative for dysmenorrhea management, providing a safe, effective, and convenient menstrual pain relief. We will perform further research and clinical validation for optimizing formulations and ensuring efficacy.

Keywords: Dysmenorrhea, hormonal imbalances, Herbal ingredients

DEVELOPMENT AND PSYCHOMETRIC EVALUATION OF THE QUESTIONNAIRE TO ASSESS KNOWLEDGE ON ANTIBIOTIC USE

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Background: When administered as directed, antibiotics have been demonstrated to treat infectious diseases and even save lives. The negative belief that antibiotics are a drug that may treat infectious diseases caused by any type of microbe is the only deception that people have. These false beliefs frequently result in the dangerous problem related to improper antibiotic use. Self-medication, obtaining antibiotics without a prescription, missing doses, and not taking medications on schedule are examples of inappropriate antibiotic use. Inappropriate use of antibiotics will lead to antibiotic resistance, a major public health concern (World Health Report, 2007).

Objective: This study aimed to develop scale to measure the knowledge towards antibiotic use.

Methodology: Respondents were asked to self-administer the developed questionnaire twice on two occasions. To evaluate homogeneity of the items Chronbach's alpha coefficient and inter-partial correlation were done and intraclass correlation coefficient for test-retest reliability. Extreme Groups Comparison was performed to assess the construct validity of the knowledge scale.

Results: A total of 73 responses were collected. Alpha value for knowledge was found to be 0.6 and test-retest reliability was 0.5. Knowledge scale consists of seventeen items. All the questions were given score and sum up to get a total score which was found to be 76.55%.

Conclusion: Currently developed questionnaire showed good psychometric properties on the population studied and showed moderate level of knowledge (Blooms cut off 60-79% shows moderate) towards antibiotic use.

Keywords: antibiotics, knowledge, questionnaire, psychometric.

ROLE OF AI IN PERSONALIZED TREATMENT

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Artificial Intelligence (AI) has become a groundbreaking tool in personalized medicine, offering the potential to transform treatment methods by customizing therapies to meet the specific needs of individual patients. By analyzing extensive patient data, such as genetic information, medical histories, and lifestyle factors, AI algorithms can predict how patients will respond to various treatments, optimize drug dosages, and determine the most effective therapeutic approaches. Machine learning models, especially deep learning, enable the analysis of intricate biological patterns and the discovery of new biomarkers, which can enhance diagnostic accuracy and improve treatment outcomes. AI is widely applied in genomics, where it helps analyze genetic data to detect mutations or predispositions that affect a patient's treatment response. In oncology, AI tools can aid in determining the most effective treatment plan for cancer patients based on the genetic makeup of their tumors, potentially improving therapeutic results while minimizing side effects. AI also plays a crucial role in drug development by forecasting which compounds will be most successful for particular genetic profiles, accelerating the process of personalized treatments. Additionally, AI-powered systems support clinicians by providing real-time, evidence-based insights that enhance decision-making and minimize human error. However, integrating AI into personalized treatment presents challenges, such as concerns about data privacy, ethical considerations, model transparency, and the need for proper regulatory guidelines. Moreover, AI models must be trained using diverse and representative datasets to prevent biases and ensure accurate predictions across various patient groups. As AI continues to evolve, it holds the promise of improving personalized treatment, offering better outcomes, fewer side effects, and more efficient healthcare delivery. Nevertheless, its full potential can only be achieved through careful integration and collaboration between technology developers, healthcare professionals, and regulators.

Keywords: Personalized treatment, AI, Drug Discovery, Data privacy, Deep learning, diagnostics

ADVANCED TECHNOLOGIES POTENTIALLY APPLICABLE IN PERSONALIZED TREATMENTS

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This review, we describe general concepts and emerging research in this field based on multidisciplinary approaches aimed at creating personalized treatment for a broad range of highly prevalent diseases (e.g., cancer and diabetes). This review is composed of two parts. In this review, we describe general concepts and emerging research in this field based on multidisciplinary approaches aimed at creating personalized treatment for a broad range of highly prevalent diseases (e.g., cancer and diabetes). Advanced drug delivery systems (DDS) present indubitable benefits for drug administration. Over the past three decades, new approaches have been suggested for the development of novel carriers for drug delivery. This review is composed of two parts. The first part provides an overview on currently available drug delivery technologies including a brief history on the development of these systems and some of the research strategies applied. The second part provides information about the most advanced drug delivery devices using stimuli-responsive polymers. Their synthesis using controlled-living radical polymerization strategy is described. Advanced drug delivery systems (DDS) present indubitable benefits for drug administration. Over the past three decades, new approaches have been suggested for the development of novel carriers for drug delivery. A comprehensive literature review was conducted, covering various aspects of ADDS, including nanoparticle-based systems, liposomal systems, polymeric systems, microelectromechanical systems and transdermal systems. In a near future it is predictable the appearance of new effective tailor-made DDS, resulting from knowledge of different interdisciplinary sciences, in a perspective of creating personalized medical solutions. ADDS have revolutionized the field of therapeutics, offering improved efficacy, reduced toxicity, and enhanced patient compliance. Despite challenges in scalability, regulatory frameworks, and toxicity, ADDS hold great promise for the future of medicine.

Keywords: nanoparticle, liposome, polymeric, microelectromechanical, transdermal.

THE TRANSFORMATIVE POTENTIAL OF ARTIFICIAL INTELLIGENCE IN HEALTHCARE

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AI's ability to enhance various medical fields, including diagnostics, personalized treatment, drug discovery, telemedicine, and patient care management. Key areas of focus including AI are Cancer Screening which improve early detection and diagnosis, Reproductive Health supporting fertility treatments and prenatal care, Cardiology enabling precise risk assessment and treatment planning, Outpatient Care helps in streamlining clinical processes and patient monitoring, Laboratory Diagnosis enhance test accuracy and efficiency, Language Translation breaking language barriers in healthcare communication, Neuroscience aids in research and treatment of neurological disorders, Robotic Surgery improve surgical precision and outcomes, Radiology advancing imaging interpretation for faster diagnosis, Personal Healthcare offering customized health insights and guidance, Patient Engagement improving communication and follow-up care, AI-Assisted Rehabilitation supports mobility with exoskeleton robots, Administrative Efficiency optimize resource management and documentation. The critical challenges to AI adoption, such as data privacy concerns, ethical considerations, cost barriers, and questions regarding decision-making authority in patient care. By overcoming these obstacles and fostering trust in AI technologies, healthcare systems can harness AI as a powerful driver of innovation — improving outcomes, enhancing efficiency, and better meeting the evolving needs of patients and providers.

Keywords: Artificial intelligence (AI) in healthcare, cancer screening, cardiology, robotic surgery, AI-assisted rehabilitation.

ARRIVAL OF EFFECTIVE NANOFORMULATION FOR DRUGDELIVERY USING ARTIFICIAL INTELLIGENCE

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Artificial Intelligence (AI) is transforming nano drug formulation by addressing challenges such as experimental errors, drug-polymer interactions, and formulation inefficiencies. AI-driven models optimize encapsulation efficiency, predict drug release, and enhance formulation stability. AI simulations improve atomic-level interaction accuracy between drugs and nanomaterials. Computational Fluid Dynamics (CFD) identifies optimal formulation conditions, while Quantitative Structure-Activity Relationship (QSAR) predicts drug-polymer interactions based on chemical and physical properties. AI-powered Design of Experiments (DoE) minimizes trial runs by optimizing formulation parameters, while High-Throughput Screening (HTS) ranks drug-polymer combinations for stability and efficacy. Additionally, AI analyzes vast datasets of successful formulations to identify patterns and recommend new combinations. By integrating AI, nanodrug formulation becomes more efficient, cost-effective, and innovative, accelerating the development of advanced drug delivery systems.

Keywords: Computational Fluid Dynamics, Quantitative Structure-Activity Relationship

GENERIC MEDICINE: TRENDS, CHALLENGES, AND THE CURRENT GLOBAL SCENARIO

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Generic medicines play a crucial role in global healthcare by providing cost-effective alternatives to brand-name drugs, ensuring wider accessibility and affordability. This presentation explores the current landscape of generic medicines, highlighting key trends, challenges, and regulatory developments. Countries like India, known as the "pharmacy of the world," produce a large portion of global generic medicines. This helps supply affordable drugs to many countries, including low-income regions.

The growing demand for generics, driven by patent expirations and healthcare cost containment, has led to significant market expansion. However, challenges such as regulatory hurdles, quality concerns, supply chain disruptions, and brand competition persist. This study also examines regional disparities in generic drug adoption and the impact of recent policies on their availability and affordability. Generic medicines are not just a cheaper option — they are a vital part of making healthcare affordable and accessible for everyone. By addressing these factors, the presentation aims to provide insights into the evolving role of generic medicines in global healthcare and the strategies needed to enhance their accessibility and quality.

Keywords: Generic Medicine, Pharmaceutical Trends, Regulatory Challenges, Healthcare Accessibility, Global Market

A PHARMACOVIGILANCE STUDY IN PATIENT WITH RESPIRATORY DISEASES AT TERTIARY CARE TEACHING HOSPITAL

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This study aimed to evaluate the pharmacovigilance practices and adverse drug reactions (ADRs) in patients with respiratory diseases at a tertiary care teaching hospital. Employing a cross-sectional observational design, the research focused on identifying and characterizing ADRs associated with medications used in the treatment of respiratory conditions. Data collection encompassed patient demographic variables and detailed ADR information obtained through a structured pharmacovigilance tool. This tool facilitated the assessment of ADR causality, and preventability. Patient demographic variables, including age, gender, and comorbidities, were analysed to identify potential risk factors for ADRs. The pharmacovigilance tool captured details regarding the suspected drug, the nature of the ADR, onset time, and management strategies. The analysis involved descriptive statistics to summarize patient demographics and ADR profiles, while inferential statistics were used to explore associations between demographic factors and ADR occurrences. The findings of this study will provide valuable insights into the safety profile of respiratory medications and contribute to improved pharmacovigilance practices, ultimately enhancing patient safety and optimizing therapeutic outcomes in respiratory disease management.

NON-PRESSURIZED SPRAY BANDAGE FOR THE TREATMENT OF PSORIASIS

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Psoriasis is an autoimmune disease which may affects many areas like palms, soles, scalp, face, nails and genitalia which are difficult to treat and may have a profound impact on activities of daily living. Curcumin is a complementary therapy that is very useful for the treatment of psoriasis due to its anti-inflammatory, antiangiogenic, antioxidant, and antiproliferative effects. Curcumin is a natural compound which is generated from the golden spice (Curcuma longa), has been recommended for the treatment of psoriasis. Transdermal as well as topical drug delivery systems is on hype in the field of pharmaceutical technology. These drug delivery system avoiding the oral delivery and delivery of active compounds through the skin by using enhancer to enhances their therapeutic effect, biological effect and pharmacological properties. Film-forming spray (FFS) is an novel which is alternative approach along with topical treatment in case of psoriasis. Film-forming sprays have many advantages when its compared to conventional topical preparations because they can provide better safety and effectiveness with increased in bioavailability, continuous drug release, and accelerated wound healing through moisture control. Non pressurized Film-forming sprays contain polymers and excipients that improve the solubility, permeability and enhance the stability of active substance.

Keywords: Curcumin, Film forming, Transdermal, oral delivery

A TOPICAL HERBAL NANOGEL OF ANTI-INFLAMMATORY

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Most latest developments in drug delivery and nanogel manufacturing were studied in this st udy.The branch of chemistry known as phytochemistry examines chemicals found in plants. Modern treatments for a variety of diseases have been made possible by the use of herbal me dicines. Due to their wide medical characteristics and pharmacokinetics, several of these compounds are not allowed to be used in medicines. Numerous innovative technical strategies have been studied to improve herbal discoveries in the pharmaceutical industry. The historical data regarding herb-related nanogels, which have excellent patient compliance, delivery rate, and efficacy in treating a range of illnesses, is the main topic of the article. There is also discussion of types of Nanogel Based on Polymers such as Polysaccharide-based nanogel, Chitosan-based nanogel, Pullulan-based nanogel, Hyaluronic acid-based nanogel, Alginate-based nanogel, Cyclodextrin-based nanogel, Gum acacia-based nanogel and type of Protein based Nanogel such as Gelatin**,** Soy protein and Type of stimulus-responsive nanogels, including pH-responsive, Thermosensitive nanogel, Magnetic response nanogel, Response to multiple stimuli.

The crosslinking method and noncovalent bonding techniques for generating nanogels can be divided into groups based on the size, polymerization technique, and nanometer scale.As promising targets for drug delivery systems, nanogel formulations can change a drug 's profile, genotype, protein, peptide, oligosaccharide, or immunogenic substance. They can also change a drug's ability to cross biological barriers, biodistribution, and pharmacokinetics , which can improve patient cooperation, safety, and efficacy.

Keywords: herbal; nanogels, noncovalent, genotype

FORMULATION AND IN-VITRO ANTIOXIDANT ACTIVITY OFA DUAL-DRUG LOADED EMULGEL OF COCCINIA GRANDIS AND CURCUMA LONGA FOR ORAL ULCER THERAPY

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This study aimed to develop a dual-drug loaded emulgel incorporating Coccinia grandis and Curcuma longa extracts to leverage their combined antioxidant properties for targeted oral ulcer therapy. The emulgel was formulated using a water-in-oil base, with the extracts incorporated at optimized ratios. Key physicochemical properties, including viscosity, spreadability, pH, and stability, were thoroughly evaluated. The emulgel exhibited excellent spreadability (8.6 ± 0.2 g·cm/s) and remained stable without phase separation for over 30 days. In vitro antioxidant activity was assessed using DPPH and FRAP assays, revealing a synergistic effect between the two extracts. The emulgel demonstrated significant DPPH scavenging activity (82.4 ± 1.8%) and FRAP activity (138 ± 5 µM Fe^{2+}/g), surpassing the performance of the individual extracts. These results underscore the potential of the emulgel as an advanced, dual-drug delivery system for effectively managing oxidative stress in oral ulcer treatment.

Keywords: Dual-drug emulgel, Coccinia grandis, Curcuma longa, Antioxidant activity,

AI- POWERED PERSONALISED MEDICINE

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A new era of precision healthcare is being promised by artificial intelligence (AI), which is revolutionizing customized medicine by improving treatment efficacy and lowering side effects. However, AI technologies have greatly enhanced our capacity to evaluate enormous volumes of intricate data, which has improved the results of diagnosis and therapy. The use of AI into individualized treatment will necessitate changes to the healthcare infrastructure. When patients arrive, their personal data and clinical information (including pictures, electrophysiological findings, genetic data, blood pressure, medical notes, and so on) are entered into the AI system with their permission. As a result, the AI system uses this patient-specific data to provide healthcare suggestions, assisting healthcare professionals in their clinical decision-making. Whether or not these suggestions are correct, the results and insights are recorded and given back into the AI system to increase its accuracy.

Keywords – Artificial Intelligence, Medical Notes, clinical decision- making.

OXADIAZOLE-BASED DERIVATIVES: SYNTHESIS, ANTIOXIDANT PROPERTIES, AND IN SILICO EXPLORATION FOR INFLAMMATORY DISORDERS

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Oxadiazole derivatives have gained significant attention in medicinal chemistry due to their diverse pharmacological properties, particularly in antioxidant and anti-inflammatory applications. In this study, a series of novel oxadiazole derivatives were synthesized via a multi-step reaction process and characterized using spectroscopic techniques, including FT-IR, NMR, and mass spectrometry. The synthesized compounds were evaluated for their antioxidant potential using DPPH scavenging assays, demonstrating promising free radical inhibition activity. To further explore their therapeutic potential, In silico studies were performed, including molecular docking against COX-2/5-LOX inflammatory targets, revealing strong binding interactions with residues crucial for enzyme inhibition. Additionally, ADME (Absorption, Distribution, Metabolism, and Excretion) predictions were carried out to assess the drug-likeness and pharmacokinetic properties of the synthesized molecules. The results indicated favourable bioavailability and safety profiles, suggesting potential of these moleculesas drug candidates.

Keywords: Oxadiazole, DPPH scavenging assays, In silico studies

DAPAGLIFLOZIN AS ANTIDIABETIC ACTIVITY: A REVIEW

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Diabetes affects millions of people worldwide, making it a major health concern. Notably, type 2 diabetes mellitus (T2DM) continues to be associated with significant morbidity and death on a global scale despite the availability of a large range of anti-diabetic drugs. Dapagliflozin, a sodium-glucose cotransporter 2 (SGLT2) inhibitor that is frequently used to treat Type 2 Diabetes Mellitus, is one medication of interest (T2DM). Dapagliflozin, either alone or in combination with other anti - hyperglycaemic medications, effectively controlled blood sugar levels and blood pressure or decreased body weight in a wide range of individuals in multiple well-designed clinical studies. In patients with established atherosclerotic cardiovascular disease (CVD) or multiple risk factors for CVD, dapagliflozin decreased the hospitalisation for heart failure or rate of cardiovascular death, did not adversely impact major adverse CV events (MACE), and possibly decreased renal disease progression relative to placebo. Dapagliflozin was generally well tolerated and had a low risk of hypoglycaemia, it was more commonly associated with genital infections and the rare diabetic ketoacidosis (DKA) than the placebo. Dapagliflozin offers a significant option for the therapy of a wide patient group, regardless of the history of CVD, due to its antihyperglycemic, cardioprotective, and maybe Reno protective qualities as well as a generally favourable tolerability profile.

Keywords: Diabetes Mellitus, Dapagliflozin, Antihyperglycemic

HR-LCMS BASED METABOLITE PROFILING, IN-VITRO ACTIVITY, MOLECULAR DOCKING AND ADMET STUDY OF TABERNAEMONTANA DIVARICATA ANALYSIS FOR MULTIPLE TARGETS AGAINST ASTHMA

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Introduction: Asthma is a chronic inflammatory disease of the airways characterized by recurrent episodes of wheezing, dyspnea, and bronchoconstriction, affecting approximately 300 million individuals globally, with projections indicating an increase of 100 million cases by 2025. The pathogenesis of asthma is complex, involving genetic, environmental, and immunological factors, with a prominent role of Th2 cytokines (IL-4, IL-5, IL-13), which mediate airway inflammation, eosinophil activation, and mucus secretion. Given the limitations of conventional therapies, there is a growing interest in alternative treatments, particularly those derived from medicinal plants.

Materials and Methods: This study investigates the anti-inflammatory and anti-allergic potential of Tabernaemontana divaricata, a plant traditionally used in Southeast Asia, through in vitro and computational approaches.

Result and Discussion: The hydroalcoholic extract of T. divaricata (TDHE) was obtained using Soxhlet extraction and analyzed for its phytochemical composition using liquid chromatography-mass spectrometry (LC-MS). The extract was found to contain a variety of secondary metabolites, including flavonoids, terpenoids, and alkaloids, which are known for their anti-inflammatory and antioxidant properties.In vitro studies demonstrated that TDHE exhibited significant anti-inflammatory activity through protein denaturation inhibition, with a dose-dependent reduction in albumin denaturation (12.63±0.36% to 51.42±0.17%) across concentrations (20–100 µg/mL). Additionally, TDHE protected human red blood cell membranes from hypotonic-induced lysis, showing a 60.97% inhibition at 100 µg/mL.

Keyword: Asthma, Tabernaemonata divaricata, Molecular Docking, ADME

ANTICANCER POTENTIAL OF P. QUADRIFIDA, P. OLERACEA, AND THEIR BIOGENIC SILVER NANOPARTICLES AGAINST CANCER CELL LINES

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Portulaca oleracea and Portulaca *quadrifida,* commonly found as weeds in Asia, Africa, and the Mediterranean region, have been traditionally used in medicine for their pharmacological properties. This study evaluates the in-vitro Anticancer activity of their extracts against breast cancer (MCF-7) and cervical cancer (HeLa) cell lines using morphological observations, MTT assay, and DNA fragmentation assay. The extracts were further employed for the green synthesis of silver nanoparticles via a single-pot synthesis method. The nanoparticles were characterized using scanning electron microscopy (SEM), transmission electron microscopy (TEM), and Fourier transform infrared spectroscopy (FTIR).
All plant extracts exhibited Anticancer activity at higher concentrations, with *P. oleracea* seed extract showing the highest potency. The Anticancer of *P. quadrifida* from western India has been underexplored, and this study provides comparative insights into its effects. Phytochemicals identified in the extracts, known for their cytotoxic properties, may contribute to the observed anticancer activity. Notably, silver nanoparticles demonstrated significantly enhanced Anticancer compared to crude extracts. Characterization studies revealed spherical nanoparticles (~100 nm) with phytochemical binding via chemical and electrochemical interactions. The findings suggest that these *Portulaca* species possess notable anticancer potential, which is further amplified through nanoparticle synthesis.

Keywords: *Portulaca oleracea*, *Portulaca quadrifida*, Silver Nanoparticles, Anticancer , Cancer Cell Lines, Green Synthesis.

A REVIEW OF PHARMACEUTICAL NANO-DELIVERY SYSTEMS

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Nanotechnology is the study of processes at the molecular and nanoscale levels. Nanotechnology has the potential to reduce medication toxicity, improve bioavailability, biocompatibility, stability, and release, making it an appealing topic for the pharmaceutical industry. Developing improved nano-materials for drug delivery can achieve therapeutic goals. This paper will provide a quick overview of several types of pharmaceutical nano-sized drug delivery systems, emphasizing their unique characteristics.

Keywords: Pharmaceutical Nanotechnology, Nanotechnology, Nanoparticles Delivery Systems.

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INTERACTION OF BLACK PEPPER WITH ANTIHYPERTENSIVE DRUGS: IMPLICATIONS FOR DRUG ABSORPTION AND EFFICACY

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Introduction: Black pepper (Piper nigrum), known for its active compound piperine, has been shown to enhance the absorption and bioavailability of various drugs. This study investigates the potential interactions between black pepper and common antihypertensive medications to assess its impact on drug efficacy and safety.

Materials and Methods: We evaluated the effects of piperine on the absorption of three antihypertensive drugs: enalapril (ACE inhibitor), amlodipine (calcium channel blocker), and atenolol (beta-blocker). In vitro permeability studies were performed using Caco-2 cell models, and in vivo pharmacokinetic analysis was conducted on rats, measuring plasma drug concentrations after co-administration of black pepper extract.

Results: Piperine significantly enhanced the absorption of enalapril and amlodipine, increasing their plasma concentrations. In contrast, atenolol showed minimal interaction with piperine. Both in vitro and in vivo data indicated that piperine enhanced the bioavailability of these drugs, shortening their time to peak concentration (T_max) and increasing peak plasma concentration (C_max).

Discussion: The findings suggest that piperine can alter the pharmacokinetics of certain antihypertensive drugs, particularly enalapril and amlodipine, by increasing their absorption. However, this enhancement did not translate into a significant increase in therapeutic effects, indicating that while piperine can influence drug bioavailability, its clinical impact may be limited. Caution is advised when consuming black pepper in combination with antihypertensive medications due to potential unintended drug interactions.

Keywords: Black pepper, piperine, antihypertensive drugs, drug absorption, pharmacokinetics

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ARTIFICIAL INTELLIGENCE (AI) IN CHEMICAL ANALYSIS AND INSTRUMENTATION

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Over the past ten years, artificial intelligence has expanded into a variety of academic fields and become a thriving field capable of processing vast amounts of data and even interacting with people in an intuitive way. In the field of chemistry, these advancements in hardware and algorithms have made it possible to create ground-breaking methods for organic synthesis, drug discovery, and the design of the materials. Despite these developments, data-intensive approaches related to image recognition, vibrational spectroscopy, and mass spectrometry have been the mainstay of using AI to support analytical purposes. Other, simpler technologies that hold promise for significantly improved analytics now that AI is mature enough to utilize them have not been included. This tutorial review is to provide as a starting point for young researchers thinking about incorporating AI into their programs in order to address the upcoming possibility for analytical chemists to employ AI. Therefore, fundamental ideas in AI are initially examined, then a critical evaluation of illustrative reports that combine AI with different spectroscopies, sensors, and separation methods. The assessment also offers a basic flow of steps for those who have the guts (and the time) to start incorporating AI into their systems.

Keywords: Artificial intelligence; Analytical; Sensors; Spectroscopy.

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ROLE OF ARTIFICIAL INTELLIGENCE IN THE TREATMENT OF CHRONIC DISEASES

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Chronic diseases, such as diabetes, cardiovascular disorders, and cancer, pose significant healthcare challenges worldwide. Artificial Intelligence (AI) is revolutionizing their management by enhancing early diagnosis, personalized treatment, and continuous monitoring. Key advancements include AI-driven predictive analytics, which enable early disease detection by analyzing vast datasets from electronic health records (EHRs), imaging, and genetic profiles. Machine learning (ML) algorithms assist in personalized medicine by identifying optimal drug regimens based on patient-specific factors. AI-powered chatbots and virtual assistants provide continuous support for disease management, improving patient adherence to treatment plans.Additionally, AI facilitates remote monitoring through wearable devices, reducing hospital visits and enabling real-time health tracking. In oncology, AI accelerates drug discovery and enhances radiology through image-based tumor detection. Challenges such as data privacy, algorithm bias, and integration with existing healthcare systems need to be addressed for widespread adoption.In conclusion, AI plays a transformative role in chronic disease treatment by improving diagnostic accuracy, optimizing therapies, and enhancing patient engagement, ultimately leading to better health outcomes and reduced healthcare burdens.

Keywords: Machine learning algorithms; Artificial Intelligence; Drug discovery.

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NANOMEDICINE

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Nanomedicine is a rapidly growing field at the intersection of medicine and nanotechnology, with the potential to revolutionize the way we diagnose and treat diseases. By utilizing materials and devices at the nanoscale, researchers are developing innovative approaches to improve drug delivery, imaging, and diagnosis. One promising application of nanomedicine is in cancer treatment. Nanoparticles can be engineered to selectively target cancer cells while leaving healthy cells unharmed, reducing the side effects of chemotherapy. Additionally, nanoparticles can be used to deliver drugs directly to cancer cells, increasing their efficacy and reducing the required dosage. Nanoparticles are also being explored as imaging agents, allowing for more accurate and precise diagnosis of diseases. These nanoparticles can be designed to bind specifically to biomarkers of a disease, enabling earlier detection and more targeted treatment. Another area of research in nanomedicine is the development of nano sensors for real- time monitoring of various biomarkers in the body. These sensors could potentially be used to detect disease at its earliest stages or to monitor the effectiveness of treatment. Despite the promising potential of nanomedicine, there are also concerns about the safety and toxicity of nanoparticles. As research continues in this field, it is important to carefully evaluate the risks and benefits of nanomedicine applications to ensure their safety and effectiveness in improving healthcare.

Keywords: Nanoparticles; Nanomedicine; Cancer; Biomarkers.

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ARTIFICIAL INTELLIGENCE (AI) IN EARLY DRUG DISCOVERY

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Artificial intelligence (AI) has permeated various sectors, including the pharmaceutical industry and research, where it has been utilized to efficiently identify new chemical entities with desirable properties. The application of AI algorithms to drug discovery presents both remarkable opportunities and challenges. In this topic we focus on the transformative role of AI in medicinal chemistry. We delve into the applications of machine learning and deep learning techniques in drug screening and design, discussing their potential to expedite the early drug discovery process. In particular, we provide a comprehensive overview of the use of AI algorithms in predicting protein structures, drug–target interactions, and molecular properties such as drug toxicity. While AI has accelerated the drug discovery process, data quality issues and technological constraints remain challenges. Nonetheless, new relationships and methods have been unveiled, demonstrating AI's expanding potential in predicting and understanding drug interactions and properties. For its full potential to be realized, interdisciplinary collaboration is essential. This review underscores AI's growing influence on the future trajectory of medicinal chemistry and stresses the importance of ongoing synergies between computational and domain experts.

Keywords: Artificial Intelligence; Drug discovery; Medicinal Chemistry; Machine learning.

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APPLICATION OF ARTIFICIAL INTELLIGENCE-BASED TECHNOLOGIES IN THE HEALTHCARE INDUSTRY: OPPORTUNITIES AND CHALLENGES

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Artificial Intelligence (AI) has emerged as a transformative force in various industries, with healthcare being at the forefront of its remarkable advancements. This study examines that the current state of AI integration in healthcare, exploring its applications, benefits, challenges, and potential future developments. Key areas of AI implementation in the healthcare domain include medical imaging and diagnostics, drug discovery, personalized medicine, virtual health assistants, predictive analytics, and AI-driven decision support systems. While AI holds great promise in enhancing patient care, reducing costs, and advancing medical research, it also demands careful consideration of ethical concerns, data privacy issues, and regulatory compliance for successful implementation. The integration of AI in healthcare shows immense potential for improving patient outcomes, enabling more accurate diagnoses, facilitating precision medicine, and optimizing healthcare management. However, to fully harness the power of AI, interdisciplinary collaboration between AI experts, healthcare professionals, policy makers, and patients is essential to ensure responsible and equitable deployment of AI technologies in the healthcare ecosystem.

Keywords: Artificial Intelligence, AI, healthcare, medical imaging, diagnostics, drug discovery

THERAPEUTIC EXPLORATION AND POTENTIAL OF *CRATAEVA NURVALA*

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The discovery of a novel chemical component from a medicinal plant may form the basis of development of various therapeutic agents with better activity. More than 500 medicinal plants have been reported to possess medicinal properties. *Crataeva nurvala*, (family: Capparidaceae) is one of the most common species among them. Medicinal usage has been reported in traditional systems of medicine, such as Ayurveda and Unani, where in the plant is frequently preferred in the treatment of urinary disorders that reoccur owing to development of antibiotic resistance by the infecting organism. *C. nurvala* has also been used in the treatment of prostate enlargement and bladder sensitivity. The plant is known to relieve, prevent, and promote the discharge of kidney stones. The plant is used internally as well as externally. Externally, the paste or its leaves or skin of bark and roots is applied in cervical adenitis, abscess and edematous wounds. The same paste is salutary in rheumatic joint for relief of pain. The pulp of leaves is applied on abdomen in splenic enlargement, with great benefit. It also works well as a laxative, cholegogue, appetizer and vermicide, hence useful in anorexia, tumors, liver disorders, flatulent dyspepsia and helminthiasis along with antiinflammatory, urolithiatic, antidiabetic, antibacterial, analgesic, antiinfertility, antidiarrhoeal, antinociceptive and cardioprotective activity. Phytochemically the plant has been investigated for flavonoids, glucosinolates, and plant sterols, including lupeol, saponins, tannins, cardenolides, alkaloids, triterpenes and saponins. Lupeol, a pentacyclic triterpene isolated from the root bark, has been shown to significantly minimize the deposition of stone-forming constituents in kidneys. In this article we are making highlights on the existing information particularly on the phytochemistry and various pharmacological properties of *Crataeva nurvala* which may provide incentive for proper evaluation of the plant as a medicinal agent.

Keywords: Crataeva nurvala, Lupeol, Anti-inflammatory, Urolithiatic, Antibacterial activity

BREAST CANCER: PREVENTION AND PATHOGENESIS

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The second most common cause of cancer related fatalities in women is breast cancer. Breast cancer is the multi step process that involves several cell types, and it is still difficult to prevent globally. One of the most effective ways to stop this cancer from spreading is to diagnosing the disease early .In some developed countries, the 5 – year relative rate of breast cancer patients is above 80% due to early prevention. Both our knowledge of breast cancer and the advancement or prevention measures have advanced significantly in the last 10 years .The identification of breast cancer of stem cell provides inside into the etiology and tumor drug – resistant process, and numerous genes linked to the disease to been identified .In order to improve patients' quality of life, biological prevention has recently been created , while people currently have more pharmacological alternatives for chemo prevention of breast cancer .We will highlight significant research on breast cancer's pathophysiology , risk factors ,and preventative measures conducted in recent years in this review. In the lengthy battle against breast cancer, these findings are but minor step forward.

Key Words: - Breast Cancer, Pathogenesis

ROLE OF AI TECHNIQUES IN HEALTH MONITORING AND PHARMACY PRACTICE

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This essay examines how artificial intelligence (AI) can transform the pharmaceutical and health care sectors by going over both present and potential uses of AI in these fields. We will look at the applications of AI in medication safety and quality control, customized medicine, drug development along with patient counseling. We also talk about the difficulties and restrictions posed by artificial intelligence in the healthcare and pharmacy sectors. The article will make the case that AI has the ability to completely transform the pharmaceutical and healthcare sectors by facilitating quicker drug discovery, enhancing patient outcomes, cutting expenses, and raising the accuracy and efficiency of various pharmacy procedures.
The new artificial intelligence pharmacy system automates repetitive operations, offers individualized treatment plans, lowers costs, and improves patient outcomes while replacing the outdated manual processes and human decision-making that characterized the previous pharmacy system. The primary advantage of incorporating artificial intelligence (AI) into certain pharmacy applications is increased precision and effectiveness in patient treatment. In summary, this study aims to shed light on the pharmacy industry's and health care's future, as well as the revolutionary possibilities of artificial intelligence in this domain.

Keywords Artificial intelligence, healthcare pharmacy, ethical aspects, limitations, features aspects.

"INCORPORATING ARTIFICIAL INTELLIGENCE IN GYNECOLOGIC HEALTH: RECENT APPLICATIONS, CHALLENGES, AND FUTURE DIRECTIONS"

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The diagnosis, management, and treatment of a number of reproductive health issues are being revolutionized by the application of artificial intelligence (AI) in gynecologic health. Early disease identification, individualized treatment planning, and patient-centered care are being improved by AI-powered technologies such as machine learning algorithms, deep learning models, and natural language processing. AI-powered imaging methods increase the precision of the diagnosis of endometriosis, polycystic ovarian syndrome (PCOS), gynecologic malignancies, and other reproductive diseases. AI improves in vitro fertilization (IVF) success rates and embryo selection in fertility treatments. Additionally, monitoring maternal health and identifying high-risk pregnancies are made easier by AI-enhanced predictive analytics, which also lowers complications and improves results. Chatbots driven by AI and virtual health assistants are revolutionizing patient interactions by offering immediate access to mental health and medical information. However, obstacles like algorithmic bias, data privacy issues, legal barriers, and the requirement for clinical validation prevent widespread adoption. The present uses of AI in gynecologic health are examined in this review, which also discusses the obstacles that need to be addressed as well as the technology's revolutionary potential. Gynecologic healthcare can become more accurate, effective, and accessible by appropriately utilizing AI, which will ultimately improve the health of women everywhere.

Keywords: Polycystic Ovarian Syndrome (PCOS), In Vitro Fertilization (IVF), Artificial Intelligence (AI), Reproductive Health

"Harnessing Artificial Intelligence for Precision Medicine in Breast Cancer Treatment"

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Breast cancer is when breast cells mutate and become cancer cells multiple and form tumors. Breast cancer typically affected of so age of women. Estrogen and progesterone help to become cancerous cells to grow. Mostly preempting on medicine and survey, Breast cancer causes 670,000 deaths worldwide in 2022, 2.3 million new cases, Breast cancer mortality rate of 12.7 per 100,000 women. Precision medicine breakthroughs have brought about substantial changes in the treatment of breast cancer, and artificial intelligence (AI) is transforming patient care. Through radiomics, deep learning algorithms, and enhanced imaging analysis, AI-driven solutions improve early diagnosis accuracy and enable more accurate tumor detection.

Genomic analysis driven by AI speeds up the discovery of biomarkers, allowing for customized treatments based on a person's genetic makeup. Furthermore, AI applications in drug research speed up the creation of new therapeutic options, increasing their effectiveness. AI improves accuracy, reduces adverse effects, and facilitates robotically assisted procedures in radiation therapy and surgery. However, for the ethical integration of AI in clinical practice, issues including algorithmic bias, data privacy concerns, and regulatory constraints must be resolved. This study examines the revolutionary effects of AI in precision medicine for the treatment of breast cancer, emphasizing developments, difficulties, and potential paths forward.

Keywords: Breast Cancer, Radiomics, Artificial Intelligence (AI), Precision Medicine, Biomarkers

ASSESSING HEMOGLOBIN LEVELS IN HEAD & NECK CANCER PATIENT DURING THE CHEMOTHERAPY: A SYSTEMATIC META-ANALYSIS

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The hemoglobin level of cancer in the head and neck patient during the chemotherapy treatment completion.Pretreatment hemoglobin values can be utilized to predict prognosis in patients receiving concomitant chemo radiotherapy for locally advanced head and neck squamous cell carcinoma. Anemia, a frequent laboratory abnormality in oncology, is linked to reduced cellular oxygen supply. This, in turn, affects tumor cell radiosensitivity and reduces the efficiency of treatment therapies. Understanding the pretreatment hemoglobin readings is therefore critical in predicting results for individuals undertaking this specific therapy regimen.Patients with HNC (head and neck cancers) are increasingly surviving in greater numbers, accounting for up to 3 percentage of all cancer survivors.Previously, most research focused on improving risk classification, treatment, and illness outcomes. The focus of this study was to see if nutritional status indicators predict locoregional failure after intensity -modulated radiation treatment with concurrent chemoradiotherapy for squamous cell carcinoma of the head & neck.

Keywords- Chemotherapy, Radiosensitivity, Carcinoma, Concomitant, Radiotherapy.

"AI Driven Approaches in Blood Cancer Therapy: Advancing Diagnosis, Treatment"

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Blood cancer, also known as hematologic cancer, affects the blood, bone marrow, lymph, or lymphatic system. It includes cancers such as leukemia, lymphoma, and myeloma. However, when blood cancer is absent, it means that these conditions are not present in an individual's health profile. AI in blood cancer treatment helps personalize care by analyzing patient data, predicting outcomes, and recommending targeted therapies. Machine learning algorithms identify patterns in medical records, enabling earlier diagnosis, optimizing treatment plans, and improving drug discovery. Regular blood tests, such as complete blood counts (CBC), can help in detecting abnormal cell counts or signs of disease. Without blood cancer, the blood's components—red blood cells, white blood cells, and platelets—function normally, contributing to healthy bodily functions like oxygen transport, immune defense, and clotting.

Preventative measures, including a balanced diet, avoiding exposure to harmful chemicals, and routine medical checkups, can help maintain overall health and reduce the risk of blood-related cancers. AI also aids in monitoring patient progress and adjusting treatments in real-time. This review examines AI-driven approaches in blood cancer therapy, highlighting their impact on diagnosis, prognosis, and personalized treatment while addressing challenges and future directions. Despite these advancements, issues like data privacy, algorithmic bias, and clinical validation continue to be obstacles to widespread AI integration.

Keyword: Artificial Intelligence, Blood cancer, Hematologic Cancer, Targeted Therapies

ADVERSE DRUG REACTIONS & PHARMACOVIGILANCE: EMERGING TRENDS

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Adverse Drug Reactions (ADRs) pose a significant challenge in modern healthcare, affecting patient safety and treatment outcomes. Pharmacovigilance (PV) plays a crucial role in detecting, assessing, and preventing ADRs, ensuring the safe use of medications. This poster highlights recent advancements in PV, including the integration of artificial intelligence (AI) and big data analytics in ADR detection, real-time monitoring through electronic health records (EHRs), and the role of social media as a tool for spontaneous reporting. Additionally, emerging trends such as patient-centeredpharmacovigilance, the use of biosensors for real-time drug safety monitoring, and regulatory updates in PV systems are discussed. The impact of global harmonization initiatives, such as the WHO's Uppsala Monitoring Centre and the FDA's Sentinel Initiative, is also explored. With the increasing complexity of drug therapies, innovative PV approaches are essential for enhancing medication safety and reducing healthcare burdens.

Keywords: Adverse Drug Reactions, Pharmacovigilance, Artificial Intelligence, Big Data, Patient Safety, Drug Monitoring

DEVELOPMENT, CHARACTERIZATION & COMPARATIVE EVALUATION OF RANITIDINE GASTRORETENTIVE TABLET BY USING DIFFERENT BIOPOLYMERS

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The purpose of this investigation is to prepare a gastroretentive drug delivery system of ranitidine hydrochloride. Gastro Retentive Drug Delivery Systems (GRDDs) are an approach to prolonging gastric residence time by targeting the release of specific drugs at the top of the GIT for local or systemic effect. GRDDs are one example of a novel strategy to extending gastric residence duration, concentrating on the local or systemic effects of particular medications released in the stomach. Currently, floating tablets are one of the important categories of drug delivery systems with gastric retentive behavior. Ranitidine is a H2 blocker and absorbed from the upper part of GIT and hence there is need to develop a dosage form that releases the drug in stomach so that it can be absorbed from upper part of GIT leading to improved bioavailability. Six different gastroretentive tablets of ranitidine HCl will be prepared by direct compression using different concentrations of biopolymers. The formulations will be evaluated for pharmacopoeial quality control tests and for all the physical parameters .All the formulations will be subjected to *in vitro* drug release study and compare with that of marketed formulation. GRDFs enable the drug to be released longer and continuously to the upper part of GIT, thereby significantly extending the time when the drug is released and improving the bioavailability of a drug with narrow therapeutic windows, thus prolonging the dose interval and increasing patient compliance.

Keywords: Ranitidine hydrochloride, gastroretentive, floating drug delivery, biopolymers

PHARMACOPHORE-BASED IDENTIFICATION AND IN SILICO CHARACTERIZATION OF MICROBIAL METABOLITES AS POTENTIAL MODULATORS OF WNT SIGNALING PATHWAY IN COLORECTAL CANCER THERAPY

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Aberrant activation of the Wnt/β-catenin signaling pathway, driven by APC mutations and AXIN degradation via Tankyrase, plays a crucial role in colorectal cancer (CRC) progression. The resulting β-catenin accumulation highlights the need for novel therapeutic strategies targeting Tankyrase and β-catenin. This study explores microbial metabolites as potential anticancer agents due to their structural diversity, target specificity, and lower toxicity. A computational screening of 27,641 microbial metabolites, based on drug-likeness criteria, identified 2527 promising compounds. An integrated workflow, including molecular docking, molecular dynamics simulations (MDS), MM/PBSA, and principal component analysis (PCA), revealed Terreustoxin I (T1) as a potent Tankyrase inhibitor and 10-phenyl-[12]-cytochalasin Z16 (B1) as a strong β-catenin binder. These compounds exhibited favorable binding stability, dynamic behavior, and pharmacokinetic properties. ADMET profiling confirmed their suitability, with low toxicity and promising bioactivity scores. In silico cytotoxicity, predictions demonstrated significant activity against SW480 and HCT90 colorectal cell lines, alongside anti-neoplastic and anti-leukemic potential. These findings suggest T1 and B1 as promising candidates for CRC therapy, warranting further experimental validation for their clinical potential in safer and more effective treatments.

Keywords*:* Colorectal Cancer; Wnt signaling pathway; Microbial metabolites; Drug discovery; Targeted therapy.

PHYTOTHERAPEUTIC APPROACHES IN THE TREATMENT OF UROLITHIASIS

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Urolithiasis, the formation of kidney stones, is a prevalent urological disorder with high recurrence rates and adverse effects associated with conventional treatments. Medicinal plants offer a promising alternative due to their efficacy, safety, and cost-effectiveness. *Tribulus terrestris*, *Phyllanthus niruri*, and *Tinospora cordifolia* have demonstrated significant antiurolithiatic properties through diuretic, crystallization-inhibitory, antioxidant, and anti-inflammatory mechanisms. Their bioactive constituents, including flavonoids, saponins, alkaloids, and polyphenols, contribute to stone dissolution and prevention. This study employs the egg shell membrane (ESM) model, a cost-effective and physiologically relevant in vitro system, to evaluate the efficacy of these plants. The calcium carbonate-rich ESM mimics renal crystal nucleation, providing a surface for calcium oxalate deposition. Incubation with synthetic urine containing lithogenic ions allowed assessment of plant extract effects on stone formation. Results indicated a significant reduction in crystal growth and aggregation, highlighting the potential of these plants in kidney stone management. The ESM model provides a reproducible and ethical alternative for preliminary screening of antiurolithiatic agents before in vivo studies. This review discusses the pharmacological mechanisms, phytochemical composition, and clinical evidence supporting these medicinal plants, emphasizing their potential for novel herbal drug formulations in urolithiasis treatment.

Keywords: Urolithiasis, Medicinal Plants, Phytoconstituents, Egg Shell Membrane Model, Kidney Stones, Herbal Therapy

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NANOCARRIERS FOR CANCER CHEMOTHERAPY: CLINICAL APPLICATIONS AND CHALLENGES

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Cancer remains one of the most challenging diseases worldwide, necessitating the development of effective therapeutic strategies. Traditional chemotherapy, although widely used, faces limitations due to poor selectivity, systemic toxicity, and low bioavailability of chemotherapeutic agents. Nanocarriers have emerged as a promising solution to these challenges, offering the potential to improve the therapeutic index of chemotherapy by enhancing drug delivery and minimizing side effects.

However, the translation of nanocarrier-based chemotherapy into clinical practice is fraught with challenges. One of the major hurdles is the scale-up and reproducibility of nanocarrier formulations. The preparation of nanocarriers requires precise control over size, surface charge, and drug release profiles, which can be difficult to achieve consistently on a large scale. Moreover, the long-term stability and toxicity of nanocarriers in vivo remain areas of concern.

In conclusion, while nanocarriers hold significant potential to revolutionize cancer chemotherapy by improving drug delivery, overcoming current challenges related to formulation, safety, and regulation is crucial. Continued research is essential to optimize nanocarrier designs and develop standardized protocols for their clinical translation. The future of nanomedicine in cancer treatment will likely rely on interdisciplinary collaborations between researchers, clinicians, and regulatory bodies to bring safe, effective, and tailored therapies to patients.

Keywords: surface charge, Nanocrrier, chemotherapy, cancer

FORMULATION DEVELOPMENT AND CHARACTERIZATION OF IMMEDIATE RELEASE TABLET CONTAINING ANTI-BACTERIAL DRUG HAVING POOR COMPRESSIBILLITY

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In many patients, a rapid onset of action is often more essential than traditional treatment methods. Tablets remain the most preferred dosage form today due to their ease of self-administration, compact size, and straightforward manufacturing process. To address these issues, immediate-release dosage forms have been developed as alternative oral medications. These immediate drug release dosage forms rapidly disintegrate after administration, leading to an increased rate of dissolution. The primary strategy used in tablet development involves the incorporation of superdisintegrants such as cross-linked polyvinylpyrrolidone or crospovidone (Polyplasdone), sodium starch glycolate (Primogel, Explotab), and carboxymethylcellulose (Croscarmellose), among others. In this area, immediate release liquid dosage forms and parenteral dosage forms have been introduced for patient treatment. The advancement of immediate release therapy opens the door for line extensions in the market, with a diverse selection of medications, such as anticoagulants and others, being possible candidates for this type of dosage form. The advancement of immediate release therapy opens the door for line extensions in the market, with a diverse selection of medications, such as anticoagulants and others, being possible candidates for this type of dosage form.

Keywords: Immediate release, super disintegrates, direct compression, wet Granulation, carboxymethylcellulose, parenteral dosage forms.

NANO-CARRIER BASED DRUG DELIVERY SYSTEM FOR ENHANCING BIOAVAILABILITY OF POORLY WATER-SOLUBLE DRUG

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The primary objective of this thesis is to concentrate on the advancement and assessment of valsartan nanosuspensions as a means to enhance the solubility and bioavailability of this antihypertensive agent, which is known for its limited water solubility and falls under the classification of BCS class II. The restricted solubility of valsartan in biological fluids results in its low oral bioavailability of 25-35%, which presents issues for both patient outcomes and therapeutic efficacy. Valsartan solubility and bioavailability were improved by utilizing a nanosuspension method with Poloxamer as a stabilizer. The beaker approach with medium milling was used to create the optimal nanosuspension of valsartan, yielding 43 nm-sized nanoparticles on average. Valsartan's solubility and rate of dissolution were significantly increased as a result of this particle size modification. The optimized nanosuspension exhibited satisfactory physical stability when subjected to storage conditions of 40°C/75% relative humidity for one month. A notable rise in solubility and dissolving rate was seen in the valsartan nanosuspension's dissolution profile. The study's findings show that valsartan's solubility, rate of dissolution, and bioavailability may all be improved by using nanosuspension technology. This methodology presents a viable technique to enhance the effectiveness of BCS class II medications and provide efficient oral dose forms that promote improved patient outcomes and adherence.

Keywords: Valsartan nanosuspension, BCS Class II, solubility enhancement, bioavailabilty

A NOVEL APPROACH TO THE COLON TARGETED DRUG DELIVERY SYSTEM: REVIEW ON SELECTION OF POLYMER FOR THE MANAGEMENT OF CHRONIC INFLAMMATORY BOWEL DISEASE

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Targeted drug delivery has attracted enormous attention in biomedical applications for superior properties, especially targeting the molecule to the specific site for better action on the disease making a promising platform for drug delivery. For the treatment of colonic disorders such as Crohn's disease, inflammatory bowel disease, cancer, rheumatoid arthritis, amoebiasis, etc., drugs that target the colon are frequently employed. For this, the medicine must stop being absorbed or degraded in the unfriendly conditions of the stomach. There are several common delivery techniques for drugs, including pH-dependent systems, time-dependent systems, and microbial-triggered systems. The most recent technologies, such as CODESTM, pressure-controlled colonic delivery capsules, and osmotically controlled drug administration, are capable of being manufactured. The focus of this study is on the major and cutting-edge methods of colon-targeted medication administration in detail.

Keywords: inflammatory bowel disease, cancer, rheumatoid arthritis, amoebiasis, CODESTM

HERBAL HAIR CARE: FORMULATION AND EVALUATION OF A SHAMPOO FOR DANDRUFF MANAGEMENT AND HAIR GROWTH SUPPORT

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The need for effective, chemical-free alternatives in hair care has led to the exploration of herbal formulations. This study focuses on the development of a herbal shampoo designed to manage dandruff and support hair growth. The shampoo combines natural ingredients such as Bhringraj, Neem, Shikakai, and Hibiscus, all of which have been used traditionally for their beneficial effects on hair health. The formulation was evaluated for its cleansing ability, antifungal activity, and hair growth-promoting properties. The results suggest that this herbal shampoo offers a safe and effective solution for dandruff and hair care, providing nourishment and conditioning benefits without the harsh chemicals found in many commercial products.

Keywords: Herbal Hair Care, Dandruff Management, Hair Growth Support, Natural Shampoo, Traditional Ingredients

THE NEUROPROTECTIVE EFFICACY OF FICUS BENGHALENSIS LEAVE'S IN A PARKINSON'S DISEASE MODEL INDUCED BY MPTP IN WISTAR RATS

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Parkinson's disease (PD) is a progressive neurodegenerative disorder characterized by the loss of dopaminergic neurons in the substantia nigra, leading to motor and non-motor symptoms. This study aims to investigate the pathophysiological mechanisms of PD using a rat model, focusing on oxidative stress. Wistar rats were subjected to MPTP lesions to induce PD-like symptoms. Behavioral assessments, including Morris water maze, rotarod and open field tests, were conducted to evaluate motor deficits. Histological analyses revealed significant neuronal loss and increased microglial activation in the striatum. Additionally, we measured levels of oxidative stress markers finding a correlation between elevated oxidative stress and behavioral impairments. These findings highlight the critical role of neuroinflammation and oxidative damage in the progression of Parkinson's disease, supporting the use of the rat model for further therapeutic exploration.The outcomes demonstrated that the leaf extract of Ficus benghalensis leaves to significant enhancements in motor coordination, a reduction in oxidative stress (characterized by decreased MDA levels and increased SOD and CAT levels), and preservation of neuronal structure.

Keywords- Parkinson, MPTP, Parameter, Neurodegenerative.

ARTIFICIAL INTELLIGENCE IN CATARACT, CORNEA, AND REFRACTIVE SURGERY: FUNDAMENTALS, REAL-WORLD USES, AND PROSPECTS

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Globally, cataracts, uncorrected refractive errors, and corneal disorders are the main causes of blindness. The need for flawless vision is also driving up the frequency of refractive procedures, whether they are lens-based or corneal. Due to the recent progress and promising potential of artificial intelligence (AI) technologies in the field of ophthalmology, specifically in the areas of retinal diseases and glaucoma, researchers and clinicians of AI are now focusing on the less studied ophthalmic areas associated with the anterior segment of the eye.

The most frequently investigated conditions are those that depend on anterior segment imaging modalities, such as slit-lamp photography, anterior segment optical coherence tomography, corneal tomography, in vivo confocal microscopy, and/or optical biometers. Preoperative screening prior to refractive surgery, intraocular lens calculation, corneal grafts, ocular surface diseases, infectious keratitis, keratoconus, and automated refraction are a few of these. With a focus on the latest developments in the last few years, our goal in this review was to present a thorough update on the application of AI in anterior segment illnesses.

In order to enhance ophthalmologists' and vision scientists' comprehension, research, and clinical use of AI technologies, we also clarify some of the fundamental concepts and jargon associated with AI, including machine learning and deep learning. Guidelines like CONSORT-AI, SPIRIT-AI, and STARD-AI will be essential in directing and standardizing the conduct and reporting of AI-related studies as we move closer to the era of digital health, ultimately enhancing their potential for clinical translation.With a focus on the most recent developments in the last few years, our goal in this study was to present a thorough update on the application of AI in anterior segment diseases and operations, including cornea, refractive surgery, and cataract.

Keywords: cataracts, CONSORT, retinal diseases and glaucoma

UTILIZATION OF ARTIFICIAL INTELLIGENCE IN RECENT MEDICAL FIELD

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Artificial intelligence can aid in the monitoring and treatment of patients. It evaluates images and results without the need for doctors, surgeons, or clinicians. AI-based wsolutions give decisions that can aid in the prediction of medical emergencies. It is advantageous to give medical consulting via a digital app. The practical use of this technology is to improve diagnostic and treatment accuracy. It can be used to prevent sickness and lower medical costs. This technology is utilized to provide answers to patients' inquiries and to minimize the number of needless hospital visits. During a doctor shortage, AI is a good source for identifying issues. This method first identifies the biological cause of sickness in order to effectively treat the patient. It can readily envision medical pictures and complete the work properly. The analysis of patient data using AI aids in the detection and treatment of cancer. Whether or if the systems are scaled enough to be beneficial, maintaining AI adoption in routine clinical practice is the most difficult job for these healthcare industries. Based on the condensed data, it has been determined that AI may help healthcare workers become more knowledgeable, allowing them to spend more time directly caring for patients and lessening fatigue. Its uses include heart disease diagnostics. AI-based medical chat bots may be used for consultations to ease hospital congestion and the transmission of infectious diseases, which will help critical care services run more effectively. It expedites clinical studies in order to provide a definite conclusion. AI creates analytical algorithms of various aspects are based on patient data. It is useful in providing information about the patient, survival times and illness level. In the next years, it will be used for digital surveillance in hospitals to improve patient care.

Keywords- Artificial intelligence, AI application, Medical, Machine learning, Health Care

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THE POTENTIAL OF ARTIFICIAL INTELLIGENCE IN UNVEILING HEALTHCARE'S FUTURE

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This article explores the potentially transformative potential of artificial intelligence (IA) to remodel the future of health care. The comment highlights that IA can revolutionize diverse medical sectors, including diagnostics, personalized treatments, drug discovery, telemedicine and patient care management. It highlights the role of IA in diverse areas such as cancer detection, reproductive health, cardiology, ambulatory care, laboratory diagnostics, translation, neurosciences, robotic surgery, radiology, personalized health care, patient engagement, re-education assisted by IA thanks to robotic exoskeletons and the improvement of administrative efficiency.It also addresses the main challenges related to the adoption of IA, including concerns regarding confidentiality, ethical dilemmas, financial obstacles and questions related to decision-making power in the care of patients. Relevant to these challenges and supporting confidence, IA is positioned as an essential engine to progress health care, improve outcomes and respond to the changing needs of patients and health professionals.

Keywords:AI-assisted diagnostics, Artificial intelligence, healthcare, Ethical challenges in ai healthcare adoption, predictive analytics in medicine, rehabilitation robotics.

TRANSFORMATIVE INNOVATIONS IN NEUROLOGICAL DISORDER TREATMENTS

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Neurological disorders like Alzheimer's, Parkinson's, and ALS are some of the toughest challenges in medicine today. They not only impact patients but also place a heavy burden on families and healthcare systems. However, advancements in genetics, molecular biology, and targeted therapies are transforming how we approach these diseases.

Scientists are uncovering how genetic mutations, protein misfolding, and neuroinflammation drive these conditions, paving the way for personalized treatments. Precision medicine is revolutionizing care by tailoring therapies to an individual's genetic profile, improving both effectiveness and quality of life. Gene therapy, including gene replacement and silencing, offers hope for conditions like Huntington's and spinal muscular atrophy. Immunotherapies, such as monoclonal antibodies and vaccines, are showing promise in fighting neuroinflammation, particularly in multiple sclerosis.

One of the biggest hurdles has been the blood-brain barrier, but innovative drug delivery methods—like nanoparticles and focused ultrasound—are making targeted treatment possible. Clinical trials remain crucial in bringing these discoveries to patients, balancing ethical concerns with the urgency for breakthroughs. With these advancements, the future of neurological care is shifting toward more effective, personalized, and ethical treatment strategies, bringing new hope to millions.

Keywords: Neurological disorders, Precision medicine, Gene therapy, Immunotherapy, Drug Delivery, ALS

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PATHOGENESIS AND CLINICAL MANAGEMENT OF HYPERSENSITIVITY PNEUMONITIS

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Hypersensitivity Pneumonitis (HP), also known as extrinsic allergic alveolitis (EAA), is an inflammatory lung disease caused by immune responses to inhaled organic antigens. Common sources include bird droppings (particularly from pigeons) and moldy hay, frequently found in urban and rural environments. The rising pigeon population in cities has increased exposure risks, as their droppings harbor antigens that can trigger HP in susceptible individuals. Repeated exposure leads to Type III (immune complex-mediated) and Type IV (delayed-type) hypersensitivity reactions, driving chronic inflammation that results in alveolar damage, granuloma formation, and interstitial fibrosis, causing restrictive lung changes in advanced stages.

Symptoms vary by disease stage and include fatigue, fever, nonproductive cough, shortness of breath, and weight loss. Advanced or untreated cases may progress to severe dyspnea, respiratory failure, or signs like cyanosis and clubbing of fingers.

Management begins with identifying and avoiding antigens to prevent further exposure. Corticosteroids (e.g., prednisone) remain the main therapy to control inflammation, while refractory cases may require immunosuppressive agents like azathioprine. In advanced disease stages, oxygen therapy or lung transplantation may be necessary for improving outcomes.

Keywords: Hypersensitivity pneumonitis (HP), Birds Dropping, Type III and Type IV hypersensitivity, Interstitial fibrosis, Corticosteroids, Causative antigens

PREDICTIVE ANALYTICS IN HEALTHCARE: AI FOR EARLY DISEASE DETECTION AND PREVENTION

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The integration of Artificial Intelligence (AI) and predictive analytics is revolutionizing healthcare by enabling early disease detection, personalized treatment strategies, and proactive prevention measures. With vast amounts of medical data available-ranging from electronic health records (EHRs) to genetic profile AI-driven algorithms can identify patterns, detect anomalies, and forecast disease progression with unprecedented accuracy.This transformation is particularly crucial in the fight against chronic and life-threatening diseases such as cancer, cardiovascular disorders, and neurodegenerative conditions, where early intervention significantly improves patient outcomes. Machine learning models can analyze subtle physiological changes long before symptoms manifest, allowing for timely medical interventions and reducing healthcare costs.

However, despite these breakthroughs, challenges remain. Data privacy, ethical concerns, algorithmic biases, and regulatory hurdles must be addressed to ensure AI-driven predictions are both reliable and equitable. The fusion of AI with real-world clinical expertise will be the key to unlocking a future where diseases are not just treated but anticipated and prevented.

As AI continues to advance, its potential to reshape global healthcare systems is limitless. The question is no longer if AI will redefine early disease detection, but how soon we can fully harness its power for a healthier tomorrow.

Keywords: Predictive Analytics, Early Disease Detection, Machine Learning in Medicine, Electronic Health Records (EHRs), Medical Data Analytics,Healthcare Innovation

AI AND ROBOTICS IN SURGERY

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Robotic surgery is benefiting from the incorporation of AI technologywhich is transforming precision and efficiency, and image analysis performed by machines enables segmentation and tumor identificationrelevant to surgery during the procedure AI decision support systems dopredictive analytics. Automation of tissue dissection and suturing diminishes human error and fatigue thereby improving the quality of work. AI-assisted virtual reality training tools provides individualized endorsement which further help improve surgeon's skills. Along withtheseveral advantages AI poses ethical or legal deficiencies regarding algorithmic discrimination or data privacy. This is an issue that comes with the proper implementation of AI. If the human supportive capabilities of AI helps patients, and if it cansurpass all the obstacles surrounding research and development, thenthe precise needs of advanced procedures will be accessible along withincreased autonomy. Further, AI in robotics surgery intends to personalize patient-related care therefore the procedures will expand. The accuracy standard for surgery is bound to change.

Keywords: Real-time decision support systems, AI-powered imageanalysis, Automation, Surgical Skill enhancement, Instrument Placement, Tumor Detection, Virtual reality.

IN-SILICO MOLECULAR DOCKING, PHARMACOKINETIC STUDIES ON KAEMPFEROL DERIVATIVES TO IDENTIFY POTENTIAL TYROSINASE INHIBITOR

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Tyrosinase is a copper-containing enzyme that plays a central role in the biosynthesis of melanin, the pigment responsible for the color of skin, hair, and eyes. It is found primarily in melanocytes, which are specialized cells in the skin. The enzyme catalyzes key steps in the conversion of the amino acid tyrosine into melanin. Specifically, tyrosinase catalyzes the hydroxylation of tyrosine to form L-DOPA and then the oxidation of L-DOPA to form dopaquinone, which eventually leads to the production of melanin.Tyrosinase inhibitors are compounds that reduce the activity of the tyrosinase enzyme. These inhibitors are widely used in cosmetics and dermatology to treat hyperpigmentation disorders by reducing the formation of melanin. The mechanism of action of these inhibitors typically involves blocking the enzyme's active site or interfering with its copper binding, thereby preventing the conversion of tyrosine into melanin. Examples of reported inhibitors are Arbutin, Kojic Acid, Hydroquinone, and some compounds reported to have inhibitory activity such as Ellagic acid and Kaempferol. On the basis of this data, we downloaded a library of Kaempferol derivatives from ChEMBL library database. This library used for molecular docking studies; selected compounds used for ADMET studies. Interestingly Kaempferol derivatives showed good molecular docking scores. Top scorer compounds selected of ADMET studies. Overall results suggested that further optimization in the compound can give a more potent and prominent tyrosinase inhibitor.

Keywords: Tyrosinase, Tyrosinase inhibitors, CADD, molecular docking, secondary metabolites and Kaempferol

ROLE OF EPIGENETICS IN AUTOIMMUNE DISORDERS

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Systemic autoimmune diseases are intricate conditions marked by an imbalance in the immune system, causing it to target self-antigens and resulting in tissue and organ damage. While genetic predisposition playsa role, they do not entirely account for the development of these diseases. The pathophysiology of autoimmune/inflammatory diseases has been closely linked with disease causing gene mutations or a combination of genetic susceptibility and epigenetic modifications arising from exposure to the exposomes. Over recent years, scientists have found connections between epigenetic marks and avariety of autoimmune diseases. Without modifying the genomic sequence, epigenetic modifications impact gene expression and alter cellular functionsMajor epigenetic mechanisms include DNA methylation, histone modifications, and non-coding RNAs. In this presentation we have reviewed the role of epigenetics in autoimmune disorders and the link between epigenetic changes and various autoimmune disorders such as rheumatoid arthritis (RA),systemic lupus erythematosus (SLE), systemic sclerosis (SSc), Sjogren's syndrome (SS), their potential as diagnostic biomarkers and future of epigenetics based therapies to treat autoimmune disorders.

Keywords: Autoimmune, Epigenetic modifications, Genetic predisposition, DNA methylation

METABOLOMICS AS A PROMISING APPROACH FOR ADVANCING PHYTOCHEMICAL SYNERGY RESEARCH

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Phytochemical synergy occurs when two or more phytoconstituents work together to produce a greater combined biological effect than individual compounds. However, the mechanistic aspect of such synergy often remains unknown because of the involvement of multiple compounds triggering unique biochemical pathways.

Some of the strategies that are currently being used to study phytochemical synergy include checkerboard assays, isobologram analysis, metabolomics, network pharmacology, etc. Of these, metabolomics, a branch of omic studies, is defined as the study of metabolites in biological systems. It utilizes techniques such as Liquid Chromatography-Mass Spectrometry (LC-MS) and Nuclear Magnetic Resonance (NMR) to identify synergistic phytochemicals and elucidate their mode of action. But despite its potential, metabolomics has its drawbacks such as complexity in data interpretation, variability in biological samples, and standardisation issues.

This review aims to establish metabolomics as a promising approach to advancing phytochemical synergy research while also discussing its current challenges.

Keywords: Phytochemical synergy, metabolomics, nuclear magnetic resonance, mass spectrometry

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ARTIFICIAL INTELLIGENCE IN NEURODEGENERATIVE DISEASE: A FOCUS ON PARKINSON'S DIAGNOSIS AND PROGRESSION

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Parkinson's disease is a chronic neurological condition leading to difficulties in movement and cognitive decline. Conventionally, diagnosis is based on clinical symptoms and imaging, but it leads to detection often at an advanced stage. Recent advancements in AI models help in improvement in diagnosis by using speech, gait, MRI data, and biomarker analysis. It is evident from available literature that AI is shifting towards biological and metabolic indicators from symptoms-based assessments. AI-assisted blood tests have demonstrated ability to detect PD, up to 7 years before symptoms manifest. The use of AI for gut-based alpha-synuclein provides non- invasive alternative, often promising diagnostic tool, but microbial differences need to be considered. Instead of detecting specific bacteria, new models analyse gut bacterial metabolism activities for more precise PD detection. Beyond diagnosis, AI predicts progression to help in categorizing patients for more tailored treatment plans along with patient's response to drugs for better treatment. These methods are still evolving with key challenges including data standardization and regulatory barriers. AI based PD detection represents a significant step offering early detection and precise-based medical intervention.

Keywords: Parkinsons' Disease, Artificial Intelligence, α-Synuclein, Gut microbiome, biomarkers.

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AI IN NEURODEGENERATIVE DISEASES: REVOLUTIONIZING EARLY DIAGNOSIS & DRUG DISCOVERY

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Neurodegenerative diseases like Alzheimer's, Parkinson's, and Amyotrophic lateral sclerosis are challenging because of complex pathology and limited treatment options. An early diagnosis and drug discovery staying on principles is crucial for attenuating patient prognoses. Artificial intelligence (AI) is a transformative tool in neurology, greatly advancing disease prediction, biomarker identification, and therapeutic advancement. Machine-learning models or deep-learning ones are now able to exploit the vast data from neuroimaging, genomic, and clinical records, allowing diagnosis at earlier stages with more accuracy. AI-powered algorithms detect subtle brain structural and functional changes which precede clinical symptoms, facilitating earlier intervention. Alongside, AI-driven biomarker discovery accelerates the identification of these molecular targets for precision medicine. AI drug discovery optimizes drug repurposing, molecular docking, and virtual screening processes, saving time and cost over traditional methods of drug development. AI-based predictive modelling also improves clinical trials capacity for identification of the best patient populations and optimal treatment responses. Furthermore, AI-driven personalized treatment plans utilize patient-specific data and offer therapeutic strategies tailor-made for individual patients. Issues related to data privacy, model interpretability, and the need for large and good-quality datasets present challenges for a broader implementation of AI. Meeting these challenges, including those of proper data sharing, explainable AI, and regulatory frameworks, will be essential for clinical adoption.

Keywords: Machine learning, Drug discovery, Biomarkers, Neuroimaging, Personalized therapy.

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Nanotechnology & Herbal Medicine: A New Era in Hepatoprotection

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Liver diseases, including non-alcoholic fatty liver disease (NAFLD), hepatitis, and cirrhosis, pose significant global health challenges. Conventional hepatoprotective treatments often have limited efficacy and adverse side effects, driving interest in plant-based medicine as a safer alternative. Herbal compounds, rich in flavonoids, alkaloids, and polyphenols, have demonstrated potent antioxidant, anti-inflammatory, and hepatoregenerative properties. However, their therapeutic potential is hindered by poor bioavailability, low solubility, and rapid metabolism. Nanotechnology offers a transformative approach to overcoming these limitations, enhancing the efficacy of herbal medicine in hepatoprotection. Nanoformulations, including liposomes, polymeric nanoparticles, and nanoemulsions, improve the solubility, stability, and targeted delivery of bioactive plant compounds. These nanosystems facilitate controlled drug release, ensuring prolonged therapeutic action while minimizing toxicity. Additionally, nanocarriers enable precise targeting of hepatic cells, maximizing treatment efficiency in liver disorders. Recent studies highlight the successful integration of herbal nanoparticles in managing liver diseases, particularly in mitigating oxidative stress, modulating inflammatory pathways, and promoting liver regeneration. Despite promising advancements, challenges such as large-scale production, regulatory approval, and long-term safety assessments remain. Addressing these concerns through interdisciplinary research can accelerate clinical translation.

Keywords: Nanotechnology, Herbal medicine, Antioxidants, Polyphenols, Nanoformulations.

NOVEL APPROACH FOR THE TREATMENT OF DIABETIC FOOT ULCER

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Diabetes mellitus (DM)a cluster of persistent metabolic disorders marked by high blood glucose levels and inadequate insulin production or resistance to its effects. Diabetic foot ulcers is effect of several contributing factors. Peripheral neuropathy and peripheral vascular disease—induced ischemia are recognized as the primary underlying causes forulcers. Diabetes, according to a research study published by the International Diabetes Federation (IDF), is one of the world's health crises progressing at the fastest rate in the twenty-first century.Diabetic foot ulcers (DFUs), affecting nearly 15% of diabetic patients.The management of DFUs isa major challenge due to delayed wound healing, poor vascular supply, and multidrug-resistant (MDR) infections. Conventional treatments, including debridement and antibiotics have limitations in effectivelychallenges.

Recent advancements in DFU management focus on innovative drug delivery systems and biomaterials, such as nanosponges, hydrogels, microneedles, electrospun fiber dressings, and lipid-based systems. These novel formulations enhance drug stability and improve antimicrobial efficacy, and faster wound healing. Advances in diabetic foot ulcer classification systems, such as the Wagner-Meggitt classification, provide a standardized approach for assessment and treatment planning.

The complex interplay between metabolic dysfunction, neuropathy, angiopathy, and immunopathy in DFU pathophysiology is essential for developing effective therapeutic interventions. Public health initiatives are crucial to mitigating the burden of DFUs and improving patient outcomes. This review highlights recent research and emerging treatment strategies that hold potential in transforming DFU management.

Keywords: Diabetes mellitus, diabetic foot ulcer, multidrug resistance, wound healing,

DEVELOPMENT AND CHARACTERIZATION OF NANOCONSTRUCTS FOR COLON TARGETING

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Oxaliplatin (OHP) resistance is a major hurdle in the chemotherapeutic treatment of colorectal cancer (CRC). The concomitant administration of OHP and curcumin act synergistically in OHP resistant cell lines, leading to the reversion of their resistant phenotype. The present study was aimed to formulate Eudragit S-100 (ES-100) coated alginate beads bearing drugs loaded targeted liposomes for simultaneous delivery of OHP and curcumin (CUR) to exert a synergistic therapeutic effect on OHP resistant HT 29 cell line. The liposomes were fabricated by the film dispersion method and optimized using a BoxBehnken design (BBD) with the aid of Design-Expert® software. Hyaluronic acid (HA) was conjugated on the liposomal surface using carbodiimide chemistry to target CD44 receptors overexpressed on the CRC cells. The conjugated liposomes (i.e. OC-L-HA) depicted uniform vesicular size (132.4 ± 21 3.4 nm) and low polydispersity index (0.165 ± 0.070) and high entrapment of OHP and CUR. HA coupled drugs bearing liposomes (OC-L-HA) are exhibiting higher cellular uptake than unconjugated liposomes (UC-L), as evidenced by confocal laser microscopy. OC-L-HA were entrapped in the alginate beads and characterized for various in vitro parameters such as bead size, in vitro drug release, and % swelling. MTT assay demonstrated that OC-L-HA exhibited 2.76 and 2.58 fold higher cytotoxicity than targeted CUR liposomes and targeted OHP liposomes, respectively. The colon targeting ability of these liposomes entrapped Eudragit S 100 coated beads on oral administration were assessed by X-ray radiography. The in vivo X-ray images affirmed a good targeting ability of the targeted beads to the colon. The outcomes of the studies revealed that these surfacemodified liposomes entrapped in Eudragit S-100 coated beads could be an effective strategy for the treatment of CRC. Keywords: oxaliplatin, alginate beads, colon cancer, Eudragit S 100, curcumin

METFORMIN BEYOND DIABETES: OLD DRUGS WITH NEW INDICATIONS

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Background:

Metformin is a widely prescribed drug for managing type 2 diabetes mellitus (T2DM) and has gained attention for its potential therapeutic benefits beyond glycaemic control.Clinical studies suggest that metformin, when added to conventional TB treatment, enhances treatment outcomes and strengthens the host immune response, potentially aiding in latent TB infection control. However, most findings are based on retrospective studies, necessitating well-designed prospective clinical trials.

Metformin as repurposed antitubercular drug: Metformin improves insulin sensitivity, regulates menstrual cycles, and reduces hyperandrogenism in PCOS patients. It also enhances fertility and metabolic outcomes, making it a valuable therapeutic option for PCOS management.Preclinical and epidemiological data indicate that metformin may reduce cancer cell proliferation and influence various malignancies. Its modulation of key cellular pathways, such as AMPK and mTOR, contributes to its anticancer effects.

Conclusion:

Metformin's versatile pharmacological profile extends its potential utility in diverse medical conditions, including TB, PCOS, and cancer. Further clinical research and well-designed prospective trials are essential to elucidate its mechanisms of action and establish its role as a valuable adjunctive therapy in these disorders.

SINAPIC ACID SLN HYDROGEL: A NOVEL APPROACH TO BURN WOUND HEALING – FORMULATION AND PERFORMANCE ANALYSIS.

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Burn wounds can be very serious and may lead to infections, organ failure, and fluid loss. Hydrogels are often used as wound dressings but have some limitations. This study introduces a solid lipid nanoparticle (SLN) dressing that includes Sinapic acid (SA), known for its healing properties like lipophilicity, anti-microbial and anti-oxidantbut limited by poor solubility and limited absorption. We aimed to release SA in a soluble form over time using a safe surfactant, Tween 80, to create SLN-hydrogel. This dressing is made to be non-irritating and provides porosity, elasticity, and occlusivity, which helps maintain a moist wound environment. for wound care. The SA-loaded SLN-hydrogel was prepared using a high-pressure homogenization technique. The hydrogel dressing was evaluated for various parameters, including particle size, zeta potential, Fourier-transform infrared spectroscopy, differential scanning calorimetry, and texture. We successfully achieved significant SA loading (88.45%) in spherical SLN(ranging from 0.3 nm for nanoparticles to 5 μm). The hydrogel exhibited good spreadability, mechanical properties, and a slow release of SA over up to 24 hours. The SLN-hydrogel proved to be safe according to the OECD-404 guidelines, showing no signs of irritation. In-vivo studies over 21 days demonstrated complete healing, outperforming Silvadene cream.

DETECTION AND IDENTIFICATION OF CYANOBACTERIAL SPECIES BY MORPHOLOGICAL FEATURES

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Chemical fertilizer can lead to nutrient imbalances and gives hazardous effect on environment, therefore in this investigation Cyanobacterialmembers were found in all selected locations of Muzaffarpur district, Bihar state for reducing of chemical as a biofertilizer. An attempt has been made to isolate some rare species of Cyanobacteria from ponds of Muzaffarpur district Bihar State. These are characterized based on their morphological character by using standard literature and key points. Cyanobacteria are the most important group of nitrogen fixing organism. Among algae, the cyanobacteria are considered to be very valuable in agriculture and industries. To initiate the study water sample were collected in Erlenmeyer flasks and brought to the laboratory. Cultures were maintained and periodical observations were made for isolation and identification of different species of Cyanobacteria that is useful for their identification by Morphological and Biochemical studies of some common and rare Cyanobacterial strains, of *Ocillatoriaprinceps ,Microcystisaeruginosa, and Riluveria species, Gloeocapsa magma*for further beneficial uses of human welfare.

Key Words: Biofertilizer,Cyanobacteria, Identification, Isolation, Morphological, Strain

CLASSIFY THE FLOW BEHAVIOR AND TO CHARACTERIZE THE RHEOLOGICAL BEHAVIOR OF SEMI SOLID DOSAGE FORM IN PHARMACEUTICAL FORMULATION.

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Rheological characterization or classification of pharmaceutical dosage form is of importance as it provides fundamental information required for the assessment of some of the final properties of a product such as viscosity, elasticity, and quality and storage stability. The rheological profile of a semi-solid product is a critical quality attribute. To monitor changes of this attribute during manufacturing, it would be beneficial to measure the rheological parameters and implement this as a part of a control strategy for manufacturing of semi-solids. Pharmaceutical formulation has Newtonian and non-Newtonian characteristics. Simple liquid dosage form has Newtonian characteristics and Semisolid dosage form showing non-Newtonian characteristics like shear-thinning or shear-thickening. The effect of formulation variables on product characteristics such as consistency and patient compliance. Various test like continuous shear tests such as flow and viscosity curves and yield point measurements, oscillatory tests such as amplitude and frequency sweeps, Creep test, Thixotropy as well as step and temperature ramp tests need to be performed for the detail Rheological characterization or classification of pharmaceutical dosage.

KEY WORDS: continuous shear, oscillatory, pharmaceutical semisolids, processing, quality, rheology, scale-up, specification, storage stability, viscosity.

COMPUTATIONAL STUDIES, SYNTHESIS & BIOLOGICAL ACTIVITY OF SOME NEW SCHIFF BASES

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Schiff bases are a significant class of organic compounds with diverse biological and pharmaceutical applications. This study focuses on the computational analysis, synthesis, and biological evaluation of novel Schiff bases derived from various aldehydes and amines. The synthesis was carried out via condensation reactions under mild conditions, yielding high-purity products characterized by spectroscopic techniques such as FT-IR, NMR, and mass spectrometry. Computational studies, including density functional theory calculations, were employed to investigate the electronic properties, molecular stability, and reactivity of the synthesized compounds. Molecular docking simulations were conducted to assess their potential interactions with biological targets, providing insights into their mechanism of action. The synthesized Schiff bases were evaluated for their antimicrobial, antioxidant, and anticancer activities using standard in vitro assays. The results demonstrated that several compounds exhibited significant bioactivity, with strong inhibitory effects against bacterial and fungal strains, as well as promising radical scavenging and cytotoxic properties. The structure-activity relationship analysis indicated that specific substituents on the Schiff base framework played a crucial role in enhancing biological efficacy. This multidisciplinary approach, combining computational and experimental techniques, highlights the potential of Schiff bases as lead compounds for drug discovery. Further optimization and in vivo studies are recommended to explore their full therapeutic potential.

Keywords: Schiff bases, Computational studies, Biological activity, Molecular docking, Anticancer.

POLYHERBAL LIPOSOMAL FORMULATIONS: ENHANCED BIOAVAILABILITY AND LOCALISED TARGETING

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Herbal formulations are prioritised over the synthetic formulations for their pharmacological effect with fewer side effects as they align with body's natural healing process. But herbal formulations are also associated with adverse effects such as gut bleeding, ADRs along with low bioavailability. Liposomal herbal formulations have emerged as a promising approach in the modern drug delivery system as they have reduced the chances of ADRs and toxicity significantly and has up levelled the bioavailability of active phyto-ingredients of herbal drugs.The addition of stimulant reactive character in liposomal herbal formulations has made the drug more target specific.

We reviewed liposomal herbal formulations used against various kinds of cancer, reducing proliferation of carcinoma cells with the help of poly and monoherbal formulations. Liposomal herbal formulations were also used in treating various NDs like Alzheimer's and Parkinson's disease, and against skin disorders like psoriasis and eczema.

In cancer treatments, theranostic liposomal formulations are made by designing liposomes with imaging agents such as fluorescent dyes and MRI contrast agents so that tumour cells can be diagnosed and treated side by side, this ensures that the drug acts only on the targeted cells. Liposomal herbal formulations have also shown significant potential in the treatment of various diseases, including neurodegenerative disorders (NDs) such as Alzheimer's and Parkinson's diseases since they can cross the blood brain barrier. Their enhanced penetration has also helped in the treatment of skin related disorders like eczema, psoriasis along with wound healing.

Keywords: Liposomal herbal formulations, Alzheimer, Parkinson

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MANAGEMENT OF HYPERTENSION: AN APPROACH THROUGH AI

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Hypertension continues to be a major global health issue, significantly contributing to cardiovascular disease and mortality worldwide. Despite progress in pharmacological treatments and lifestyle-based approaches, many patients still struggle to achieve and maintain optimal blood pressure levels. Digital therapeutics, leveraging artificial intelligence (AI), machine learning (ML), and predictive analytics, are revolutionizing the management of hypertension. This poster examines how these advanced technologies are being integrated into clinical practice to improve diagnosis, monitoring, and tailored treatment strategies. AI-powered algorithms can process large datasets, such as electronic health records, wearable device metrics, and patient-generated health data, to detect patterns and accurately predict hypertension risk. Machine learning models facilitate the creation of individualized treatment plans by evaluating unique patient factors, including genetic profiles, lifestyle habits, and responses to medications. Predictive analytics further enhance clinical decision-making by identifying potential complications, such as stroke or heart failure, enabling timely and preventive measures. Additionally, digital therapeutics foster greater patient engagement through mobile health applications and remote monitoring systems, which deliver real-time insights and promote adherence to prescribed therapies. These innovations address limitations in traditional care models, particularly for marginalized communities and individuals in geographically isolated regions. This presentation will highlight real-world examples of AI and ML applications in hypertension care, address challenges like data security and algorithmic biases, and explore future opportunities for research and implementation

Keywords: Hypertension, Monitoring, Health care, AI Tools.

STUDY OF NANOPARTICLE DRUG DILIVERY SYSTEM FOR DRUG TARGETING IN NDDS

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A particle that is between one and one hundred nanometers in size is called a nanoparticle. Because of their small size, these are invisible to the human sight and have improved qualities such high surface area, stability, sensitivity, strength, and reactivity. In order to save human life, nanoparticles can exhibit a great deal of favorable physical, chemical, and therapeutic capabilities as compared to their larger material counterparts. Particulate systems, such as nanoparticles, have recently been employed as a physical method to modify and enhance the pharmacokinetic and pharmacodynamic characteristics of many kinds of pharmacological molecules. They have been employed in vivo to protect the drug entity in the systemic circulation, limit the drug's access to certain areas, and transport the drug to the site of action at a steady and regulated rate. It is evident that research on drug delivery is shifting from the micro to the nanoscale. As a result, nanotechnology is becoming a specialty in medicine that should yield major therapeutic benefits. The primary types of nano delivery systems consist of nano emulsions, lipid or polymeric nanoparticles, and liposomes. In recent years, substantial research has focused on innovative drug delivery systems that utilize particulate vesicle systems as carriers for both small and large molecules. Nanoparticles have been enhancing the therapeutic effectiveness of drugs while reducing side effects. Generally, nanoparticles are created through various methods such as the dispersion of preformed polymers, polymerization of monomers, and ionic gelation or coacervation of hydrophilic polymers.

Key words: Nanoparticles, Nanotechnology, Polymeric Nanoparticles, Particulate system, Nano delivery.

IN VITRO PERMEATION TESTING -RECENT ADVANCEMENTS IN CONTEXT OF TOPICAL AND TRANSDERMAL DRUG DEVELOPMENT.

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To improve the accuracy and reliability of results in case of Topical and Transdermal Drug Development, *In Vitro Permeation Testing* has undergone significant advancements.Recent development include the use of *Reconstructed Human Epidermis Models*,*Parallel Artificial Membrane Permeability Assay*and *Flow Through Systems* which offerimproved predictive accuracy and relevance.Enhanced understanding of skin permeability,including the role of the stratum corneum and hydration has also been achieved.These advancements have potential to reduce the need for animal testing,accelerate formulation development and enable more accurate prediction of human skin permeability.This abstract highlight the latest development and their implication for the future of In Vitro Permeation Testing.

Keywords: Reconstructed Human Epidermis Models**,** Parallel Artificial Membrane Permeability Assay, Flow Through Systems, stratum corneum,Transdermal Drug Development

ADVANCEMENTS IN NATURAL HEPATOPROTECTIVE AGENTS: CURRENT TRENDS & FUTURE PERSPECTIVES

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Liver diseases, including hepatitis, cirrhosis, and hepatocellular carcinoma, remain a global health concern, necessitating the development of effective hepatoprotective agents. Natural compounds have gained significant attention due to their potent hepatoprotective properties, minimal side effects, and affordability. This abstract explores recent advancements in natural hepatoprotective agents, highlighting their sources, mechanisms of action, and therapeutic potential. Medicinal plants, phytochemicals (such as flavonoids, polyphenols, alkaloids, and terpenoids), and bioactive peptides have demonstrated promising hepatoprotective effects by mitigating oxidative stress, reducing inflammation, enhancing detoxification pathways, and modulating signaling cascades involved in liver regeneration. Recent studies have also emphasized the role of gut microbiota in liver health, suggesting that natural probiotics and prebiotics could serve as novel hepatoprotective agents. Advanced drug delivery systems, including nanoformulations and targeted delivery mechanisms, have improved the bioavailability and efficacy of natural hepatoprotective compounds. Computational approaches, such as molecular docking and network pharmacology, have further aided in identifying potent bioactive molecules. Despite these advancements, challenges such as standardization, bioavailability issues, and clinical validation remain. Future research should focus on multi-targeted approaches, combinational therapies, and large-scale clinical trials to validate the therapeutic potential of natural hepatoprotective agents. This abstract provides insights into current trends and future perspectives, emphasizing the need for continued exploration of natural compounds in liver disease management.

Keywords: Medicinal plants, Phytochemicals, Oxidative stress, Bioactive peptides, Gut microbiota.

MOLECULAR MODELING : A POWERFUL TOOL FOR DRUG DESIGN

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This abstract deals with Molecular modeling which has become an essential tool to medicinal chemists in drug design process.
Molecular modeling involves use of computer software to stimulate the behavior of molecules in different environment.Two major modeling strategies are used for conception of new drugs which are direct drug design and indirect drug design.Various tools are being used for molecular modeling which includes hardware and software tools.
It has various applications in the field of pharmaceuticals which includes designing of new materials,predicting drug target interactions,predicting reaction pathways and understanding reaction kinetics etc.The modeling techniques are derived from concepts of molecular orbitals of Huckel,Mulikan and “classical mechanical programs “of Westheimer,Wiberg and Boyd.

Keywords: Molecular modeling, Molecularorbitals, drug target interactions, Reaction pathways

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MICRONEEDLING: ADVANCEMENTS IN COSMETIC

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Microneedling—also referred to as percutaneous collagen induction—has been used extensively in cosmetic applications for the treatment of acne scars, skincare, hair loss, melisma, skin rejuvenation, and skin cancer by using micro-needling equipment and artificial microneedle patches. Through the stratum corneum, microneedling creates microchannels that make it easier to administer cosmetics and promote the synthesis of collagen and elastin by triggering the wound-healing process and cascading, maintaining wrinkle-free, lustrous skin. Microneedling has been used to administer several cosmetic agents, including ascorbic acids, peptides, retinoids, niacinamide, and hyaluronic acid. The purpose of the poster is to emphasize the application of manufactured microneedle patches and microneedling equipment in making it easier for cosmetic products to pass through the layers of the skin. Additionally, the distinctions between the microneedling tools, frequently utilized either alone or in conjunction with topical formulations are investigated. Furthermore, the safety of microneedling concerning pain and skin irritation feeling, systemic or skin illness, and the biodegradable and chemical components utilized to make microneedles.

Keywords: Microneedling devices, Microneedle patches, Cosmetic agents, Skin care, Hair loss. Melisma, Skin rejuvenation

"PHYTOCHEMICAL PROFILE AND ANTIOXIDANT POTENTIAL OF *PLUMERIA OBTUSA*: A REVIEW OF RECENT ADVANCES"

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Plumeria obtusa, a medicinally significant plant, has been widely recognized for its bioactive compounds with potential therapeutic applications.The presence of flavonoids, phenolics, and other bioactive compounds in *P. obtusa* suggests its potential as a natural antioxidant source.Antioxidants play a crucial role in neutralizing oxidative stress, which is implicated in various chronic diseases.

A literature survey was conducted using Google Scholar, PubMed, and Scopus to explore the phytochemistry and pharmacological relevance of *P. obtusa*. Relevant studies published in the last ten years were analyzed, focusing on HPLC-based profiling and antioxidant evaluation. Reports indicate the presence of major bioactive constituents such as flavonoids, alkaloids, and phenolic acids, which contribute to its free radical scavenging activity. HPLC has been extensively used to identify and quantify these compounds, providing valuable insights into their pharmacological potential.

Understanding the antioxidant mechanisms and phytochemical diversity of *P. obtusa* can aid in developing novel therapeutic applications. Further studies integrating advanced analytical techniques and in-depth bioactivity assessments are warranted to establish its pharmacological significance.

Keywords: *Plumeria obtusa*, Antioxidant Activity, Phytochemicals, HPLC Profiling, Free Radical Scavenging.

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COMPUTATIONAL DRUG REPURPOSING: TARGETING ENZYMES, PROTEINS, AND RECEPTORS IN NEUROLOGICAL DISORDER

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Computational drug repurposing has emerged as a powerful strategy for identifying novel therapeutic applications of existing drugs, particularly in the treatment of neurological disorders. This approach leverages bioinformatics, artificial intelligence (AI), and machine learning to systematically analyse interactions between small molecules and biological targets such as enzymes, proteins, and receptors. Neurological disorders, including Alzheimer's, Parkinson's, and epilepsy, involve complex pathophysiological mechanisms where traditional drug discovery is often time-consuming and expensive. Computational techniques such as molecular docking, network pharmacology, virtual screening, and deep learning models facilitate the identification of promising drug candidates with high specificity and efficacy. Additionally, omics-based approaches and big data analytics enhance our understanding of disease pathways, allowing for a more targeted repurposing strategy. This manuscript explores the latest advancements in computational drug repurposing, focusing on key enzyme targets, receptor-ligand interactions, and protein network modulation in neurological disorders. It also discusses challenges such as data integration, validation strategies, and regulatory considerations. By accelerating drug discovery and reducing costs, computational drug repurposing holds significant promise for expanding therapeutic options in neuropharmacology, ultimately leading to more effective and personalised treatment strategies for patients with neurological diseases

Keywords: Computational Drug Repurposing, Neurological Disorders, Artificial Intelligence, Enzyme Targeting, Protein-Ligand Interaction

IMMUNOTHERAPY: SHAPING THE FUTURE OF MODERN MEDICINE

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Immunopharmacology has contributed towards the improvement of immunotherapies which has been able to provide alternative treatment options for autoimmune diseases, cancer, infectious diseases, allergy and even organ transplantation. Understanding immune systems such as cytokine blockade and Toll-LikeReceptorsare vital in developing immunotherapies.The study investigates the action of various immunomodulators and their effects on the immune system. It explores the mechanism and clinical use of certain therapies, like checkpoint inhibitors, CAR-T cell therapy, and cancer vaccines. Immunomodulators, including cytokines, mesenchymal stem cells, are pivotal in the delivery of immune response. CAR-T cell therapy and checkpoint inhibitors have shown clinical success, particularly in cancer treatment. TLR-targeted therapies offer potential in autoimmune and infectious diseases, while therapeutic vaccines contribute to long-termimmune modulation.Immunopharmacology continues to make advances in new therapeutic means for the treatment of immune-related disorders.Immunomodulatorsand Immunosuppressants have shown activity in targeted therapeutic interventions.This review explores the critical roles and mechanisms ofimmunomodulators, highlighting their impact on contemporary healthcare and their potential for future therapeutic developments.

Keywords: Immunomodulators, Immunosuppressants,TLRs, CAR-T cell therapy, Check point inhibitors.

A COMPREHENSIVE REVIEW ON DIFFERENT ANTIOXIDANTS HERBS HAVING CARDIOPROTECTIVE EFFECT.

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Cardiovascular diseases (CVDs) remain a leading cause of global morbidity and mortality, prompting increased interest in natural therapeutic interventions. Antioxidants derived from medicinal herbs have gained significant attention for their cardioprotective properties, attributed to their ability to mitigate oxidative stress, a key contributor to cardiovascular pathology. These bioactive compounds, including polyphenols, flavonoids, and terpenoids, exhibit anti-inflammatory, anti-apoptotic, and vasodilatory effects, thereby improving endothelial function and reducing the risk of atherosclerosis, hypertension, and myocardial injury. This review highlights the mechanisms by which antioxidant-rich herbs confer cardioprotection and underscores their potential as adjunctive therapies in the management of CVDs.

Epidemiological and clinical studies suggest that diets rich in antioxidant-containing foods, such as fruits, vegetables, nuts, and whole grains, are associated with a reduced risk of CVD, including coronary artery disease, hypertension, and heart failure. Mechanistically, antioxidants improve endothelial function, reduce LDL oxidation, inhibit platelet aggregation, and modulate inflammatory pathways. However, the efficacy of antioxidant supplementation in clinical trials has yielded mixed results, with some studies showing benefits and others demonstrating no significant impact or even potential harm in certain populations.This abstract highlights the dual role of antioxidants in cardiovascular health: their protective potential through dietary sources and the complexities surrounding supplemental use.

Keywords: antioxidants, cardioprotective, oxidative stress, cardiovascular diseases, polyphenols, flavonoids.

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DEVELOPMENT OF SELECTIVE NEURONAL NITRIC OXIDE SYNTHASE INHIBITORS AS NEUROPROTECTING AGENTS

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Neuronal nitric oxide synthase (nNOS) is an enzyme constitutively expressed in the mammalian brain and skeletal muscles. The excessive activation of nNOS in the neurons results in oxidative and nitrosative stress associated with neuronal loss in various neurological disorders. Several nNOS inhibitors have been reported to limit the excessive activation of nNOS. The rational development of novel nNOS inhibitors will be carried to obtain a ligand with high potency and selectivity of nNOS along with the economically viable synthetic strategy. In Future work, we will try to designed and carried the synthesis of benzo[d] thiazole derivatives as novel neuronal nitric oxide inhibitors. nNOS inhibition assay of the compounds will be illustrated that the compound will be most selective for nNOS in HEK 293 cells expressing NOS isoforms. 6-OHDA-induced unilaterally lesioned rats will be showed the improvement in motor and non-motor functions after treatment of synthesized compounds. These synthesized compounds will be possessed significant nNOS inhibiting activity and neuroprotecting potential in 6-OHDA-induced unilaterally lesioned rat model of PD and other neurodegenerative disorders.

Keywords: Neural nitric oxide synthase, Neurological disorder, Oxidative stress, NOS isoforms.

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DEVELOPMENT OF MODERN TREATMENT APPROACHES FOR POSTPARTUM CARDIOMYOPATHY

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Pregnancy is regarded one of the most sensitive states for the woman and her foetus, causing physiological stress on her body.This can occasionally result in unwanted occurrences of specific systemic illnesses that make pregnancy even more difficult.Pregnancy-related cardiovascular disorders have a significant morbidity rate in the general population.One of the leading causes of elevated morbidity and death in expectant mothers is peripartum cardiomyopathy, a disorder linked to heart failure during pregnancy.The primary cause of maternal mortality that is not related to pregnancy.Fetomaternal mortality is not uncommon in the prognosis of this disorder because of the stress on the cardiovascular system, which impairs the body's ability to operate in the environment.Certain studies have noted not only familial but also geographical variations in the prevalence of peripartum cardiomyopathy in certain areas.Despite the fact that the condition is rather frequent, more knowledge about it is still required in order to prevent the pathology's dismal prognosis.To accurately diagnose the illness, the electrogram must show a distinctive presentation.In particular, the treatment choices for this illness lean toward medical care.A number of newly developed medications are undergoing clinical trials to determine their efficacy.Together with non-pharmacological interventions and the neoadjuvant combination of anticoagulant medications, bromocriptine therapy is an effective treatment plan that helps prevent the progression of the disease.

KEYWORDS: Cardiac pathologies, peripartum complications, feto-maternal morbidity, peripartum cardiomyopathy

EFFECT OF NUTRACEUTICALS ON ANTIBACTERIAL EFFICACY

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This study evaluates the change in antibacterial efficacy using nutraceutical products, such as multivitamin tablets and omega-3 fish oil, against several microbial populations representing Gram-positive, Gram-negative, and Mollicutes: S. aureus, E. coli, Pasteurella multicide, B. cereus, Salmonella Enteritidis, and M. gallisepticum using the standard cup and plate method. The antibacterial activity of nutraceuticals is thought to be related to mechanisms such as disrupting bacterial cell walls, inhibiting protein synthesis, and interfering with metabolic pathways, thereby impacting bacterial viability.Different diluted samples revealed variable results against the microorganisms under study. The results of the zone of inhibition (ZOI) by the nutraceutical dilutions against the six bacteria ranged from 625 to 5000 µg/ml. The used dilutions could enhance the antibacterial efficacy by inhibiting the selected microorganisms under study with variable zone of inhibition (ZOI).Comparatively, some nutraceuticals showed promising inhibitory effects, highlighting their potential as alternative or complementary treatments to traditional antibiotics. This could also aid in reducing the risk of antibiotic resistance, especially when used in combination with conventional therapies.Significant variations were observed in the sensitivity of different bacteria, with some showing higher susceptibility to specific nutraceutical dilutions. The findings suggest that these nutraceuticals could potentially be applied in fields like food preservation, preventive healthcare, and medical treatment. Overall, the study supports the efficacy of nutraceuticals in inhibiting selected microorganisms, indicating their potential role in combating bacterial infections through enhanced antibacterial efficacy.

Keywords: Antibacterial efficacy, Nutraceutical dilutions, Gram positive, Gram negative, Zone of inhibition (ZOI), Antibiotic resistance

SINAPIC ACID SLN HYDROGEL: A NOVEL APPROACH TO BURN WOUND HEALING – FORMULATION AND PERFORMANCE ANALYSIS.

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Burn wounds can be very serious and may lead to infections, organ failure, and fluid loss. Hydrogels are often used as wound dressings but have some limitations. This study introduces a solid lipid nanoparticle (SLN) dressing that includes Sinapic acid (SA), known for its healing properties like lipophilicity, anti-microbial and anti-oxidantbut limited by poor solubility and limited absorption. We aimed to release SA in a soluble form over time using a safe surfactant, Tween 80, to create SLN-hydrogel. This dressing is made to be non-irritating and provides porosity, elasticity, and occlusivity, which helps maintain a moist wound environment. for wound care. The SA-loaded SLN-hydrogel was prepared using a high-pressure homogenization technique. The hydrogel dressing was evaluated for various parameters, including particle size, zeta potential, Fourier-transform infrared spectroscopy, differential scanning calorimetry, and texture. We successfully achieved significant SA loading (88.45%) in spherical SLN(ranging from 0.3 nm for nanoparticles to 5 μm). The hydrogel exhibited good spreadability, mechanical properties, and a slow release of SA over up to 24 hours. The SLN-hydrogel proved to be safe according to the OECD-404 guidelines, showing no signs of irritation. In-vivo studies over 21 days demonstrated complete healing, outperforming Silvadene cream.

Keywords: Preclinical studies, SLN-hydrogel, Fourier-transform infrared spectroscopy

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ARTIFICIAL INTELLIGENCE IN RADIOMICS: A GAME CHANGER FOR HEALTHCARE TRANSFORMATION

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AI is important tool in precision medicine, radiomics—the way to extract from medical images—has significantly make possible diagnosis, prognosis, and treatment planning for a range of diseases, particularly cancer. However, In the radiomics, it Involve feature extraction, analysis, and interpretation are severely restricted by the complexity and sheer volume of data. In particular machine learning has shown big problem tin solving this challenge, The extraction, selection, and interpretation of imaging features artificial intelligence with automating. Artificial intelligence (AI) methods, including support vector machines (SVMs) and convolutional neural networks (CNNs), can improve forecast accuracy by seeing small patterns in radiomic data that can be difficult for human doctors to recognize. In the making of tailored medicine treatment strategies.This synergy between AI and radiomics offers promising prospects outcome, facilitating earlyor a faster detection of diseases, improving clinical workflows, and enhancing the overall efficiency & effectiveness of radiological practices. The current advancements, challenges, and future directions, emphasizing the potential for AI-powered radiomics in transforming healthcare delivery by the integration of AI with radiomics This review explores a current advancementin AI-powered radiomics, discusses existing problem, and high-lights future directions, emphasizing the potential of AI to revolutionize medical imaging and patient care.

Keyword :-Radiomics, Feature Extraction , Machine Learning (ML), Support Vector Machines (SVM), Convolutional Neural Networks (CNN) , AI-Powered Radiomics.

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ARTIFICIAL INTELLIGENCE IN NEURODEGENERATIVE DISEASE: A FOCUS ON PARKINSON'S DIAGNOSIS AND PROGRESSION

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Parkinson's disease is a chronic neurological condition leading to difficulties in movement and cognitive decline. Conventionally, diagnosis is based on clinical symptoms and imaging, but it leads to detection often at an advanced stage. Recent advancements in AI models help in improvement in diagnosis by using speech, gait, MRI data, and biomarker analysis. It is evident from available literature that AI is shifting towards biological and metabolic indicators from symptoms-based assessments. AI-assisted blood tests have demonstrated ability to detect PD, up to 7 years before symptoms manifest. The use of AI for gut-based alpha-synuclein provides non- invasive alternative, often promising diagnostic tool, but microbial differences need to be considered. Instead of detecting specific bacteria, new models analyse gut bacterial metabolism activities for more precise PD detection. Beyond diagnosis, AI predicts progression to help in categorizing patients for more tailored treatment plans along with patient's response to drugs for better treatment. These methods are still evolving with key challenges including data standardization and regulatory barriers. AI based PD detection represents a significant step offering early detection and precise-based medical intervention.

Keywords: Parkinsons' Disease, Artificial Intelligence, α-Synuclein, Gut microbiome, biomarkers.

AI IN PERSONALIZED MEDICINE

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Personalized medicine is also known as the customized medicine, which improves healthcare by tailoring the medical treatments and strategies to individual's lifestyle and their unique genetic and environmental conditions. This approach wasenhancing the patient outcomes and minimize adverse effects and also enhance the treatment efficacy. Artificial intelligence (AI) is used as a transformative tool in the personalized medicine by analyzing the vast and complex datasheet and it also include the electronic health records (EHRs), genomic sequence and the real time patient data.With the help of deep learning models and machine learning (ML) algorithms were predict the disease risk and identify the patterns and then also recommend the personalized treatment strategies. AI also play a vital role in the Pharmacogenomics by predicting that how the individual patients will respond to specific drugs and these personalized or customized medicines reduces the side effects and enhance the effectiveness. AI- driven models detect the disease in early stage by analyzing the pathology reports, medical imaging and clinical data. AI accelerates drug discovery by identifying the potential of the drug candidates and also optimize the clinical trials designs, it reduces the cost and time of bringing the new therapies to market.Furthermore, AI- powered decision provide the latest medical knowledge and ensure the evidence based and personalized care. Mobile health applications and the wearable devices that equipped with AI, will continuously monitoring the patients.

Keywords: Machine learning, Artificial intelligence, Electronics health records, Drug Discovery

ARTIFICIAL INTELLIGENCE IN DRUG DISCOVERY

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The field of drug discovery is undergoing a significant transformation due to the advent of Artificial Intelligence (AI), which presents remarkable opportunities for expediting the identification of new therapeutic agents and enhancing the drug development process. AI methodologies, including machine learning, deep learning, and natural language processing, are increasingly being incorporated into various phases of drug discovery, encompassing target identification, compound screening, preclinical evaluations, and clinical trials. These advanced technologies enable the analysis of extensive and intricate datasets, facilitate the prediction of molecular characteristics, identify biomarkers, and improve the efficacy and safety profiles of drugs. By markedly decreasing both time and costs, AI is reshaping the pharmaceutical research landscape, allowing for more tailored and precise therapeutic solutions. Although challenges such as data integrity, model transparency, and regulatory compliance persist, AI continues to prove its value as a pivotal driver of innovation in drug discovery, ultimately leading to the more rapid and efficient development of new medications to meet unmet medical needs.

Keywords: Artificial Intelligence, Machine Learning, Deep Learning, Biomarker, Drug Efficacy, Drug Safety, Pharmaceutical Research.

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POLYCYSTIC OVARIAN SYNDROME : A COMMON ENDOCRINE DISORDER

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Polycystic ovarian syndrome is a common endocrine disorder widely seen in the female population capable of childbearing. It is distinctly marked by increased and imbalanced hormonal levels such as insulin, growth hormone, gonadotropin-releasing hormone, luteinizing hormone, follicle-stimulating hormone, androgens, and estrogens, causing hyperinsulinemia, ovarian dysfunction and follicular arrest. It is markedly linked with the metabolism of fat/lipid. This review is aimed to study the correlation between gut microbiota, metabolism, and PCOS which may lead to physiologically and psychologically improved quality of life. The findings highlighted are related to gut dysbiosis linked to insulin resistance, hyperandrogenism, and inflammation, along with the significance of short-chain fatty acid levels in gynecological conditions. Our work identified gut microbiome dysbiosis as a hallmark of PCOS as well as its direct correlation with chronic low-grade insulin resistance, marked by elevated levels of C-reactive proteins and interleukins, often driven by microbial imbalance. Current treatment options include hormone therapy, insulin desensitizing agents, use of ovulation inducing agents. Preclinical studies aiming at improving these metabolic disturbances in PCOS patients through fecal microbiota transplantation along with lifestyle counseling are increasing rapidly.This could lead to more targeted and effective treatment options, ultimately providing hope for enhanced metabolic and reproductive health outcomes and a better quality of life for those affected.

Keywords: Polycystic ovarian syndrome, gut microbiota, Preclinical studies.

IMPLEMENTATIONS OF PATIENT-CENTRIC ARTIFICIAL INTELLIGENCE IN THE HEALTHCARE INDUSTRY

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The healthcare industry is currently experiencing a significant change, and it is crucial to utilize emerging technologies to produce fresh data and facilitate the development of precision medicine (PM). Recent scientific breakthroughs and technological advancements have enhanced our comprehension of disease pathophysiology and revolutionized the methods of disease diagnosis and treatment, resulting in more accurate, foreseeable, and potent healthcare that is tailored to each unique patient. Various diseases seem to be influenced by genetic, genomics, and epigenetic modifications. By employing in-depth clinical characterization and advanced molecular profiling, it becomes possible to create causal network models that suggest a genomic region's impact on the expression of transcripts, proteins, and metabolites. Phenotypic analysis is highly significant for understanding the pathophysiology of networks at the molecular and cellular level. The healthcare industry is undergoing constant changes, with significant breakthroughs in technology and growing patient requirements shaping its future. This chapter examines the significant patterns and forecasts that are influencing the sector. The subject matter encompasses the incorporation of artificial intelligence, telemedicine, genomics, and patient empowerment. These changes guarantee a healthcare system that is significantly more efficient, accessible, and tailored to individual needs than ever before. Nevertheless, they also pose difficulties, such as concerns over data privacy, ethical implications, and fair access. To successfully navigate the changing healthcare environment, it is crucial to strike a careful equilibrium between innovative approaches and ethical principles. This will ensure that the advancements in healthcare ultimately benefit all sectors of society. The purpose of this chapter is to provide stakeholders with knowledge and strategies to navigate the complex healthcare landscape. It promotes a future in healthcare that prioritizes patient-centricity and embraces technological progress in a way that is inclusive and beneficial for everyone.

Keywords*:* Data security, genomics, precision medicine, patient centric care, artificial intelligence

IN-VITRO WOUND-HEALING ACTIVITY OF THE AQUEOUS LEAF EXTRACT OF MORINGA OLEIFERA.

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Moringa oleifera, a plant native to parts of Asia and Africa, is known for its wide range of medicinal properties, including anti-inflammatory, antimicrobial, and antioxidant effects. Traditionally used in various cultures for treating ailments, the leaves of Moringa oleifera have been particularly recognized for their potential in wound healing. This study aims to evaluate the in-vitro wound-healing activity of the aqueous leaf extract of Moringa oleifera, focusing on its effects on key cellular processes involved in wound repair.

The aqueous extract was made by boiling fresh Moringa leaves and filtering the resulting solution. The extract's ability to stimulate fibroblast migration and proliferation—two crucial steps in wound healing—was investigated using standard in-vitro models such as scratch assays and cell viability assays. The extract's impact on collagen synthesis was also assessed because collagen is a protein that is necessary for tissue repair. The data showed significant increases in cell migration and proliferation, suggesting that the extract speeds up wound closure.

The aqueous leaf extract also demonstrated antibacterial properties that reduced the risk of infection at the wound site and anti-inflammatory properties that may help reduce pain and swelling during the healing process. All things considered; these findings suggest that leaf extract from Moringa oleifera may be used as a natural remedy. More research is needed to fully understand how Moringa oleifera aids in wound healing and whether it is suitable for use in therapeutic settings, the study highlights.

Current research has focused on evaluating the ability of plant extracts to heal wounds, and Moringa oleifera has shown promise due to its bioactive components. The complex process of wound healing involves several stages, including haemostasis, inflammation, proliferation, and remodelling. For wounds to heal, certain cell types, including fibroblasts, which are responsible for the production of extracellular matrix proteins like collagen, must function correctly. In this study, we assessed the in-vitro wound-healing properties of Moringa oleifera aqueous leaf extract using a variety of cell-based assays.

Keywords

Moringa oleifera, aqueous leaf extract, in-vitro wound healing, fibroblast proliferation, cell migration, collagen synthesis, anti-inflammatory, antimicrobial, wound closure, natural remedy, tissue repair, phytochemicals.

COMPUTATIONAL APPROACHES IN NEURODEGENERATION: AI IN DIAGNOSIS, DRUG TARGETING, AND THERAPY

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Neurodegenerative diseases, including Alzheimer's, Parkinson's, and Huntington's disease, pose significant challenges due to their complex pathology and limited therapeutic options. Advances in computational approaches, particularly artificial intelligence (AI), have revolutionized the diagnosis, drug targeting, and therapeutic strategies for these disorders. AI-driven techniques such as machine learning, deep learning, and network-based modeling enable early disease detection through biomarker analysis, neuroimaging interpretation, and predictive analytics. Furthermore, in silico drug discovery and molecular docking simulations accelerate the identification of novel therapeutic candidates while reducing the time and cost associated with traditional drug development. AI also facilitates precision medicine by analyzing multi-omics data to tailor individualized treatment strategies. This manuscript explores recent advancements in AI applications for neurodegenerative disease diagnosis, predictive modeling, and targeted therapy development. It also addresses challenges such as data standardization, ethical concerns, and the integration of AI with clinical practice. By harnessing computational power and big data analytics, AI has the potential to enhance our understanding of neurodegenerative diseases and drive the development of innovative therapeutic interventions. The integration of AI into neurodegenerative research represents a paradigm shift, offering hope for early diagnosis, effective drug targeting, and personalized treatment strategies.

Keywords: Neurodegeneration, Artificial Intelligence, Machine Learning, Drug Discovery, Computational Neuroscience, Precision Medicine.

ARTIFICIAL INTELLIGENCE IN IMMUNOTHERAPY: ADVANCING PD-1 INHIBITORS FOR NEURODEGENERATIVE DISORDERS

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The intersection of artificial intelligence (AI) and immunotherapy has opened new avenues for treating neurodegenerative disorders by advancing the development and optimization of programmed death-1 (PD-1) inhibitors. Neurodegeneration is increasingly recognized as having an immunological component, where chronic neuroinflammation contributes to disease progression in Alzheimer's, Parkinson's, and multiple sclerosis. PD-1 inhibitors, widely used in cancer immunotherapy, have shown potential in modulating neuroimmune responses and reducing neuroinflammation. AI-driven approaches, including machine learning, deep learning, and computational modeling, are accelerating PD-1 inhibitor discovery, optimizing drug design, and predicting therapeutic efficacy. AI also facilitates precision medicine by integrating multi-omics data to identify patient-specific treatment strategies. Furthermore, AI-powered imaging and biomarker analysis enhance early diagnosis and patient stratification, ensuring targeted and effective interventions. Despite these advancements, challenges such as data standardization, ethical considerations, and clinical validation remain critical barriers to widespread implementation. This manuscript explores the role of AI in revolutionizing PD-1 inhibitor-based immunotherapy for neurodegenerative diseases, emphasizing recent breakthroughs, challenges, and future directions. The synergy between AI and immunotherapy has the potential to redefine treatment paradigms, offering hope for effective and personalized therapeutic strategies in neurodegenerative disorders.

Keywords: Artificial Intelligence, PD-1 Inhibitors, Immunotherapy, Neurodegeneration, Biomarker Analysis, Drug Discovery.

CLASSIFY THE FLOW BEHAVIOR AND TO CHARACTERIZE THE RHEOLOGICAL BEHAVIOR OF SEMI SOLID DOSAGE FORM IN PHARMACEUTICAL FORMULATION.

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Rheological characterization or classification of pharmaceutical dosage form is of importance as it provides fundamental information required for the assessment of some of the final properties of a product such as viscosity, elasticity, and quality and storage stability. The rheological profile of a semi-solid product is a critical quality attribute. To monitor changes of this attribute during manufacturing, it would be beneficial to measure the rheological parameters and implement this as a part of a control strategy for manufacturing of semi-solids. Pharmaceutical formulation has Newtonian and non-Newtonian characteristics. Simple liquid dosage form has Newtonian characteristics and Semisolid dosage form showing non-Newtonian characteristics like shear-thinning or shear-thickening. The effect of formulation variables on product characteristics such as consistency and patient compliance. Various test like continuous shear tests such as flow and viscosity curves and yield point measurements, oscillatory tests such as amplitude and frequency sweeps, Creep test, Thixotropy as well as step and temperature ramp tests need to be performed for the detail Rheological characterization or classification of pharmaceutical dosage.

KEY WORDS: continuous shear, oscillatory, pharmaceutical semisolids, processing, quality, rheology, scale-up, specification, storage stability, viscosity.

FORMULATION AND EVALUATION OF SITOPALADI CHURNA SOFT LOZENGES BY USING GELATIN

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Objective : The objective of the present work was to formulate and evaluate Sitopaladi Churna Soft lozenges by using Gelatin. Gelatin provides lozenges with a smooth, pleasanttexture that dissolves easily in the mouth. Also, can have a soothing effect on the mucous membranes in the mouth and throat.

Methods : Firstly, Sitopaladi Churna is to be heated with distilled water for theextraction process.The liquid extracts of Sitopaladi Churna is for uniform distribution in Lozenges. TheSoft Lozenges were then formulated withgelatin, glycerin, citric acid, sodium benzoate, distilled water. The prepared lozenges were evaluated by their physical parameters, friability test, weight variation test, pH test andDisintegration time.

Results : The general appearance of a soft lozengebrownish in colour, Smooth texture. The pH of the lozenges is about 6.12. There was no water expulsionbeing observed.Friability testingillustrated the hardness of the lozenges. Disintegration time was also studied.

Conclusion : From the present work, it was concluded that the formulation and evaluation of Sitopaladi Churna soft lozenges have been successfully carried out. The study aimed to develop a convenient and effective dosage form. Overall, the study demonstrated the feasibility of formulating Sitopaladi Churna into soft lozenges that are effective, safe, and stable.

Keywords : Lozenge, Sitopaladi Churna, Gelatin and soothing effect

AI IN REAL-TIME MONITORING OF INFECTIOUS DISEASE

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Real Time Infectious Disease monitoring is being revolutionized by Artificial Intelligence(AI),which make it possible for quick detection,prediction and action. AI driven model look for pattern in disease and possible outbreaks by analyzing large datasets from wearable technology, social media, electronic heath records and distant sensors. By improving outbreak forcasting and resource allocations, machine learning and deep learning algorithms strengthen early warning systems.AI reduces healthcare costs and accelerate response time by facilitating automated diagnosis, contact tracing, and customised treatment recommendations; real-time data processing enables faster actions, slowing the spread of infectious diseases; and AI powered natural language processing (NLP) enhances epidemiological surveillance by extracting valuable information from unstructured data sources.Issues with data privacy, model biases, and integration with current healthcare systems are some of the obstacles that AI in disease monitoring faces, despite its potential. To enable responsible AI implementation, ethical issues and legal framework need to be addressed. Data security, interoperability, and the precision of real time monitoring are expected to be enhanced by future developments, especially in the Internet of Things (IoT) and blockchain.By exploiting AI's capabilities, public health authorities can boost preparedness, enabling more efficient responses to new infectious risks and ultimately defending global health.This expansion ensures a deeper understanding of the subject by incorporating critical perspectives and the latest research developments. By analyzing data from multiple sources, synthesizing insights, and presenting well-reasoned conclusions, this approach fosters comprehensive academic discourse. Furthermore, integrating diverse viewpoints helps refine arguments, enhance clarity, and contribute to meaningful scholarly discussions.

Keywords: Artificial Intelligence, real-time monitoring, infectious diseases, machine learning, deep learning, outbreak prediction, epidemiological surveillance, contact tracing, data privacy, IoT, blockchain.

"CHALCONES AS ANTIMICROBIAL AGENTS: NEW AVENUES IN DRUG DEVELOPMENT"

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Antimicrobial resistance (AMR) is a growing global threat, demanding novel therapeutic solutions. Chalcones, a class of naturally occurring flavonoids, have gained attention for their potent antimicrobial properties against bacteria, fungi, and viruses. Their mechanism of action includes membrane disruption, enzyme inhibition, and interference with quorum sensing, making them effective against multidrug-resistant (MDR) pathogens.Structural modifications, such as halogenation and hydroxylation, have been shown to enhance chalcones' antimicrobial efficacy. Additionally, their low toxicity and favourable pharmacokinetics highlight their potential for drug development. Recent advances in computational drug design and structure-activity relationship (SAR) studies are accelerating chalcone-based antimicrobial discovery.Computational drug design approaches and structure-activity relationship (SAR) studies are accelerating the identification of highly effective chalcone derivatives. Future research should focus on in vivo evaluations, synergistic effects with existing antibiotics, and formulation strategies to improve bioavailability.

This study emphasizes chalcones as promising candidates for next-generation antimicrobial agents. Further research on their in vivo efficacy, synergistic combinations, and bioavailability improvements could pave the way for novel treatments against resistant infections.

Keywords: Chalcones, Antimicrobial Agents, Drug Resistance, Flavonoids, Drug Discovery

INNOVATIVE APPROACHES IN DIABETES MANAGEMENT: THE ROLE OF FUNCTIONAL FOODS AND AI

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Diabetes mellitus (DM) is a widespread metabolic disorder that significantly impacts individuals' quality of life. The ongoing administration of hypoglycemic agents can effectively manage the progression of diabetes; however, it poses challenges in reducing severe side effects and metabolic contraindications. Consequently, there is a pressing need to explore new drug candidates or dietary supplements that have minimal adverse effects and demonstrate excellent biological efficacy to address the needs of an increasing population. As a metabolic condition, DM necessitates dietary management to enhance recovery outcomes. Incorporating a variety of functional foods, such as legumes, spices, and whole grains, in appropriate amounts into the daily diet can help prevent complications linked to DM. Recent studies have shown that combinations of functional foods can hasten recovery times, enhance clinical effectiveness, and reduce instances of endothelial dysfunction and microvascular complications associated with diabetic pathogenesis, thereby presenting innovative, cost-effective treatment options for DM management. Advanced technologies, including artificial intelligence (AI), imaging techniques, and metabolic engineering tools, are instrumental in uncovering the signaling mechanisms related to DM and identifying sensitive targets for new drug interactions, marking a pivotal advancement in diabetes research. In conclusion, this review emphasizes that the direct consumption of functional foods or their derivatives, such as food proteins and bioactive peptides, holds promise as effective anti-diabetic agents in the near future. The significant role of AI in bioactive peptide development and in identifying new targets for functional foods and their derivatives is recognized as a promising strategy for managing DM. The findings indicate that a regulated intake of functional foods, combined with healthcare monitoring, can effectively control DM-related complications.

Keywords- AI, Diabetic mellitus, Functional foods, Cost-effective treatment, Hypoglycaemia.

A BRIEF REVIEW ON SGLT2 INHIBITORS IN DIBATES MELITUS DISEASE.

To check the quality, concentration, and makeup of medications in biological fluids, the pharmaceutical industry uses a range of analytical procedures. This review aims to provide the most up-to-date analytical methodologies currently available for analyzing SGLT2 inhibitors (Empagliflozin, Dapagliflozin, Canagliflozin, Bexagliflozin, Ertugli-flozin) in active pharmaceutical components, biological fluids, and pharmaceutical dosage forms. SGLT2 inhibitors are typically prescribed to treat type 2 diabetes mellitus, working pharmacologically in the kidneys to maintain glucose homeostasis by filtering and reabsorbing glucose in the proximal convoluted tubule. A review was conducted on the analytical techniques used on certain SGLT2 inhibitors, including HPLC, LC-MS/MS, mass spectrometry, UV spectroscopy, and HPTLC.

Keywords: Type 2 Diabetes, Sodium Glucose Co-transporter 2 Inhibitor (SGLT 2), Diabetes mellitus

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TARGETING MOLECULAR PATHWAYS FOR NEUROPROTECTION IN NEURODEGENERATIVE DISORDERS

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Alzheimer's disease, Parkinson's disease and Huntington's disease are examples of neurodegenerative diseases that are typified by the progressive loss of neuronal structure and function. Recently, shared molecular and cellular mechanisms have connected neurodegenerative processes to migraine, a common neurological condition. Both disorders include neuroinflammation, mitochondrial dysfunction, oxidative stress and impaired calcium signalling all of which lead to damage to neurons and dysfunction. There are promising treatment approaches for migraine treatment and neuroprotection by focusing on certain molecular pathways. Promoting autophagy, improving mitochondrial function and modifying inflammatory cytokines have become important strategies for maintaining brain health. Mitigating neurodegeneration and migraine symptoms may also be achieved by preventing the development of reactive oxygen species (ROS) and cortical spreading depression. By creating customized medication delivery systems, nanotechnology advancements have improved the effectiveness and bioavailability of neuroprotective drugs. New research shows how crucial calcium channel modulation and synaptic maintenance are to the pathophysiology of migraines and neurodegenerative illnesses. This study highlights how molecular pathways in these disorders converge and highlights novel treatment approaches to fully address neuronal dysfunction. Knowing these interrelated pathways opens up new possibilities for integrative therapy strategies, which may help patients with neurodegenerative diseases as well as migraines.

Keywords: Neurodegenerative disorders, Molecular pathways, Neuroprotection, Alzheimer's disease, Parkinson's disease, Migraine, Oxidative stress, Neuroinflammation, Kinase signalling

PHARMACOGNOSTIC STUDY AND QUALITATIVE DETERMINATION OF PHYTOCHEMICALS FROM *TABERNAEMONTANA DIVARICATA*

Background:
Traditional medicine across various cultures has extensively utilized *Tabernaemontana* species due to their rich bioactive compounds, including alkaloids, flavonoids, and phenolics. These secondary metabolites contribute to the pharmacological properties of the plant. However, a comprehensive comparative analysis of these bioactive substances in different *Tabernaemontana* species remains lacking.

Objectives:

- To collect the plant material.
- To conduct a pharmacognostic study of the plant material.
- To prepare extracts from the plant material.
- To perform phytochemical screening tests.
- To determine the concentration of secondary metabolites, including alkaloids, flavonoids, and phenolic contents, using a UV spectrophotometer.

Methodology:
The plant material was collected, authenticated, and subjected to a pharmacognostic study. Methanolic extracts of the plant material were prepared and analyzed for the presence of bioactive compounds through preliminary phytochemical screening. A UV spectrophotometer was used to quantify the concentrations of alkaloids, flavonoids, and phenolic contents, employing specific standard drugs for comparison.

Results:

Preliminary Phytochemical Screening: The methanolic extract confirmed the presence of alkaloids, flavonoids, phenols, and tannins.

Quantitative Analysis Using UV Spectrophotometer:

Alkaloids: 0.20 g, using atropine sulphate as the standard.

Flavonoids: 0.21 g, using rutin as the standard.

Phenolic content: 10.42 g, using gallic acid as the standard.

Conclusion:
The phytochemical analysis confirmed the presence of essential secondary metabolites in the *Tabernaemontana* species. The quantitative analysis revealed significant concentrations of alkaloids, flavonoids, and phenolic compounds, which may contribute to the plant's pharmacological properties. Further studies can focus on isolating and characterizing these compounds for potential medicinal applications.

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NEXT-GENERATION LYOPHILIZATION: TECHNIQUES, CHALLENGES, AND FUTURE PROSPECTS

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Lyophilization, or freeze-drying, is a widely used technique in pharmaceutical, biotechnology, and food industries, for the preparation of amorphous drug formulations to enhance solubility, stability, and bioavailability of heat-sensitive products. This process involves three main stages: freezing, primary drying (sublimation), and secondary drying (desorption), ensuring the removal of water while preserving the drug's amorphous state. Various lyophilization techniques, including conventional freeze-drying, vacuum-assisted lyophilization, and spray-freeze drying, offer tailored approaches to optimize drug formulation. The selection of excipients, cryoprotectants, and lyophilization parameters significantly impacts the final product's stability and performance. Understanding the mechanisms of amorphous phase formation and the influence of process variables is crucial for achieving high-quality lyophilized drug products. This review explores the latest advancements in lyophilization techniques, their applications in pharmaceutical development, and strategies to mitigate common challenges.

Keywords: Lyophilisation, Freez Drying

NEW ERA OF AI AS A HEALTHCARE FRONTIER

Introduction

The integration of Artificial Intelligence (AI) in healthcare marks a transformative era, enabling faster diagnostics, personalized treatments, and innovative drug discoveries. However, challenges such as ethical concerns, data privacy, and AI bias must be addressed to ensure safe and equitable implementation.

AI Healthcare Market Growth: Projected to reach **$187 billion by 2030**, with a **37% CAGR**. **Clinical Impact**: AI reduces medical errors by **30%** and improves diagnostic accuracy by **20-40%.**. **Cost Efficiency**: AI-driven automation could save **$150 billion annually** in US healthcare.

New Possibilities

1. AI in Medical Imaging & Early Disease Detection

Breakthrough: AI-powered imaging enhances diagnostic accuracy in radiology and pathology.

Evidence: AI detected **breast cancer with 97.3% accuracy**, outperforming radiologists, AI-assisted CT scans diagnosed **COVID-19 pneumonia with 94% accuracy** in **20 seconds**.

2. AI in Personalized Medicine & Treatment Optimization

Breakthrough: AI customizes treatments based on genetic and clinical data.

Evidence: AI reduced chemotherapy side effects by **45%** by predicting optimal drug dosages, IBM Watson matched cancer patients with personalized treatments, improving survival rates.

3. AI in Drug Discovery & Vaccine Development

Breakthrough: AI accelerates drug discovery and repurposes existing drugs for new treatments.

Evidence: AI discovered **Halicin**, an antibiotic effective against drug-resistant bacteria, in **48 hours**. AI identified **COVID-19 vaccine candidates** within **days**, speeding up development timelines.

4. AI in Remote Patient Monitoring & Virtual Healthcare

Breakthrough: AI-powered wearables and chatbots enhance telemedicine.

Evidence: AI-based wearables detected **cardiac arrhythmias with 95% accuracy**, preventing hospitalizations. AI mental health chatbots provided **reliable support for 83% of users**, reducing anxiety and depression symptoms[5].

Challenges & Ethical Considerations

1. AI Bias & Inequality in Healthcare

Issue: AI models trained on non-diverse datasets may lead to inaccurate diagnoses for underrepresented populations.

Evidence: AI dermatology models were **25% less accurate for darker skin tones**, raising concerns about racial bias[6].

2. Data Privacy & Cybersecurity Risks

Issue: AI relies on vast health data, increasing the risk of data breaches.

Evidence: Healthcare AI faced a **239% increase in cyberattacks in 2021**, threatening patient confidentiality[7].

TARGETING BACE1 WITH FLUORO-BENZIMIDAZOLE DERIVATIVES: A POTENTIAL APPROACH FOR AMYLOID-B REDUCTION IN ALZHEIMER'S DISEASE

Alzheimer's disease (AD) is a progressive and debilitating neurodegenerative disorder characterized by the accumulation of amyloid-β (Aβ) plaques and neurofibrillary tangles, leading to cognitive impairment and neuronal loss. The β-site amyloid precursor protein cleaving enzyme 1 (BACE1) is a key enzyme involved in the production of Aβ peptides, making it a critical target for therapeutic intervention. However, despite significant research efforts, many BACE1 inhibitors have failed in clinical trials due to limitations such as poor blood-brain barrier (BBB) penetration, toxicity, and off-target effects.In this study, we designed, synthesized, and evaluated a series of eight fluoro-benzimidazole derivatives as potential BACE1 inhibitors. Virtual screening and molecular docking studies were employed to guide the rational design of these compounds, leading to the identification of 6-fluoro-2-(2,4,5-trifluorophenyl)-1H-benzo[d]imidazole (7c) as the most potent candidate. Fluorine substitution was strategically incorporated to enhance inhibitory activity, bioavailability, and metabolic stability. In vitro enzymatic assays demonstrated effective BACE1 inhibition with IC50 values ranging from nanomolar to micromolar levels, while in vivo studies confirmed oral bioavailability and a significant reduction in Aβ plaque burden in an AD transgenic mouse model.The promising results highlight fluoro-benzimidazole derivatives as a new class of potential BACE1 inhibitors with therapeutic relevance for AD. Further research will focus on optimizing pharmacokinetic properties, reducing potential side effects, and conducting preclinical evaluations to enhance their clinical translatability. These findings provide valuable insights for the development of novel BACE1-targeting agents in the fight against AD.

Keywords:BACE1 inhibitors, Fluoro-benzimidazole derivatives, Alzheimer's disease, Amyloid-β plaques, Blood-brain barrier penetration, Molecular docking.

FORMULATION AND EVALUATION OF SITOPALADI CHURNA SOFT LOZENGES BY USING GELATIN

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The objective of the present work was to formulate and evaluate Sitopaladi Churna Soft lozenges by using Gelatin. Gelatin provides lozenges with a smooth, pleasant texture that dissolves easily in the mouth. Also, can have a soothing effect on the mucous membranes in the mouth and throat. Firstly, Sitopaladi Churna is to be heated with distilled water for the extraction process. The liquid extracts of Sitopaladi Churna are for uniform distribution in Lozenges. The Soft Lozenges were then formulated with gelatin, glycerin, citric acid, sodium benzoate, and distilled water. The prepared lozenges were evaluated by their physical parameters, friability test, weight variation test, pH test and disintegration time. The general appearance of a soft lozenge is brownish in colour a smooth texture. The pH of the lozenges is about 6.12. There was no water expulsion being observed. Friability testing illustrated the hardness of the lozenges. Disintegration time was also studied. From the present work, it was concluded that the formulation and evaluation of Sitopaladi Churna soft lozenges have been successfully carried out. The study aimed to develop a convenient and effective dosage form. Overall, the study demonstrated the feasibility of formulating Sitopaladi Churna into soft lozenges that are effective, safe, and stable.

Keywords: Lozenge, Sitopaladi Churna, Gelatin, Extraction, Soothing effect

AKT1 Inhibition: Design, ADMET Analysis, DFT, Synthesis, and Characterization of Novel 1,3,4-Oxadiazoles

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Globally, cancer represents a leading cause of death. Protein kinase B (also known as AKT1), is a key regulator of cell survival, proliferation, and metabolism within cancer cells, and is therefore an enticing therapeutic target. Limitations of current AKT1 inhibitors are poor selectivity, off-target side effects, poor oral bioavailability, etc. This study seeks to develop new 1,3,4-oxadiazole derivatives for use as anticancer agents; in silico-based Computer Aided Drug Discovery (CADD) using molecular hybridizations and derivatizations are employed to assess potential new therapeutics. We designed and synthesized a library of fifty oxadiazole compounds via robust synthetic protocols and column chromatography, and assessed them comprehensively (including but not limited to: molecular docking, ADMET profiles, and density functional theory) in silico for their relative ability to inhibit AKT1. Fifty derivatives were achieved at final yields of 45–60%, had favourable predicted binding and desirable pharmacokinetics, were predicted stable and reactive via DFT studies, and demonstrated strong inhibition of AKT1 and anticancer activity in vitro. Our findings demonstrate the oxadiazole derivatives had selective ability to inhibit AKT1 through novel synthetic protocol, providing valuable leads toward addressing deficiencies in current therapy. Our work demonstrates the merger of synthetic drug discovery and CADD has potential outcome in development of effective cancer medicine. Our integrated approach demonstrates a promising avenue for drug development in oncology.

Keywords: Oxadiazoles, AKT1, Molecular docking, ADMET, DFT.

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AI FRONTIER IN HEALTH SCIENCES: UNVEILING NEW POSSIBILITIES & CHALLENGES

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Artificial Intelligence (AI) is revolutionizing healthcare by enhancing diagnosis, treatment, and patient care through enhanced data analytics and automation. AI-driven robotic algorithms support enhanced disease diagnosis and early detection, particularly in the areas of medical imaging, pathology, and neurology. AI accelerates the identification of new therapeutics in drug discovery and enables precision medicine based on the unique genetic profile of an individual. AI-driven robotic surgery enhances surgical precision, reducing complications and recovery time.AI diagnoses disease risks and suggests tailored treatment plans in customized and preventive medicine. AI-powered virtual health assistants and chatbots enhance patient empowerment through 24/7 availability of health guidance. AI is also used for optimizing medical studies, clinical tests, and managing hospital resources with the help of data-driven insights. In the field of public health, AI supports disease detection and prediction of outbreaks, including the early monitoring of COVID-19.While helpful, there are downsides to AI in medicine in terms of data privacy, ethical issues, and regulation by authorities. These are all going to be crucial to overcome in order for AI to smoothly integrate. There is the future possibility of an automated hospital, drug discovery through AI, and advancements in bioprinting. Over time, AI will be able to transform medicine as we know it today and make healthcare more accurate, effective, and accessible.

Keywords: Artificial Intelligence, bioprinting, virtual health

MEDIA OPTIMIZATION AND NOVEL SYNTHESIS OF SILVER NANOPARTICLES FROM *CORDYCEPS MILITARIS*: GROWTH, DEVELOPMENT, AND ANTIMICROBIAL POTENTIAL

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Cordyceps militaris is a medicinal fungus rich in bioactive compounds like cordycepin and polysaccharides, offering various health benefits, including immune enhancement, anti-cancer, anti-inflammatory, and antioxidant properties. It also supports metabolic, cardiovascular, liver, and kidney health, making it valuable in functional foods and pharmaceuticals.This study examined the effects of different culture media on the growth and development of *C. militaris* mycelia using MEA, PDA, WA, WEA, and YEPA. PDA and MEA supported the highest mycelial growth, followed by YEPA and WA, while WEA exhibited the slowest growth. Morphologically, the mycelia displayed flat, cottony growth with abundant density except WA, while microscopic examination showed septate and branched hyphae.Additionally, *C. militaris* extracts from fruiting bodies, grain-spent substrates, and mycelia were used to synthesize silver nanoparticles (AgNPs) via a novel synthesis method. UV-visible spectroscopy confirmed AgNP formation, and their antimicrobial efficacy was tested against *E. coli*. The AgNPs demonstrated significant antibacterial activity, with those from fruiting bodies exhibiting slightly higher potency. This eco-friendly synthesis method offers a sustainable alternative to conventional chemical processes, contributing to reduced environmental pollution and addressing antibiotic resistance.

Keywords: *Cordyceps militaris,* Medicinal Fungus, Culture Media, Silver nanoparticles (AgNPs), Antimicrobial activity, Biomedical applications.

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ARTIFICIAL PANCREAS: A PERSPECTIVE

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The artificial pancreas represents a groundbreaking advancement in diabetes management, offering an innovative solution to maintaining optimal glucose levels, particularly in individuals with Type 1 diabetes (T1D). By integrating continuous glucose monitoring (CGM), insulin delivery systems, and sophisticated control algorithms, artificial pancreas systems automate blood sugar regulation, reducing the burden of manual adjustments.Current systems, including hybrid and fully closed-loop models, demonstrate significant improvements in glycemic control, quality of life, and patient outcomes. Despite these achievements, challenges such as cost, technological limitations, and regulatory hurdles persist. Looking forward, advancements in artificial intelligence, personalized medicine, and multi-hormonal approaches are poised to shape the future of artificial pancreas systems

Keywords: Artificial pancreas; Type 1 diabetes; Continuous glucose monitoring (CGM); Insulin pumps; Glycemic control

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THE ROLE OF ARTIFICIAL INTELLIGENCE IN DIABETES CARE: FROM DIAGNOSIS TO MANAGEMENT

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Diabetes mellitus is a multifaceted chronic condition that demands ongoing monitoring and tailored management to mitigate complications and enhance patient outcomes. Artificial intelligence (AI) is transforming diabetes care by introducing cutting-edge solutions for diagnosis, treatment, and long term management. This presentation delves into the groundbreaking potential of AI in diabetes care, showcasing its applications across the entire healthcare spectrum. AI-driven algorithms are capable of processing extensive datasets, such as electronic health records, wearable device metrics, and patient-reported data, to detect early indicators of diabetes and forecast disease progression. Machine learning models facilitate the creation of customized treatment plans by assessing individual patient factors, including genetic profiles, lifestyle behaviors, and medication efficacy. These advanced tools also improve clinical decision-making by anticipating complications such as hypoglycemia, diabetic retinopathy, and cardiovascular events, enabling timely and targeted interventions. Beyond improving clinical outcomes, AI-powered tools empower patients through mobile health applications and remote monitoring platforms. These systems deliver real-time insights, personalized recommendations, and educational content, promoting better adherence to treatment plans and self-care practices. Additionally, AI helps bridge gaps in diabetes care by supporting telehealth initiatives and extending access to underserved communities. This presentation will examine these obstacles and explore future directions for research and implementation. By leveraging the capabilities of AI, healthcare systems can advance toward more precise, proactive, and patient-focused diabetes care, ultimately alleviating the global impact of this chronic condition.

Keywords: Diabetes Mellitus, AI, ML, Personalized Medicine, Remote Monitoring, Predictive Analytics.

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THE FUTURE OF ARTIFICIAL INTELLIGENCE IN HERBAL DRUG DISCOVERY: WILL IT REPLACE HUMAN EXPERTISE?

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Artificial Intelligence (AI) is revolutionizing herbal drug discovery by accelerating the identification, screening, and optimization of bioactive compounds from medicinal plants. Machine learning, deep learning, and computational modeling have enhanced phytochemical profiling, structure-activity relationship predictions, and molecular docking, significantly reducing the time and cost associated with traditional drug discovery methods. AI-driven approaches can analyze vast datasets from ethnopharmacology, genomics, and cheminformatics to identify potential drug candidates with high precision. However, the question remains whether AI can replace human expertise in this field.

A literature survey was conducted using databases such as Google Scholar, PubMed, Scopus, and Web of Science to analyze recent advancements in AI-assisted herbal drug discovery. Studies indicate that AI excels in data processing, automation, and predictive analytics, enabling faster identification of lead molecules. AI-based models have demonstrated high accuracy in predicting pharmacokinetics, toxicity, and bioactivity, streamlining the drug development pipeline. However, challenges such as data bias, limited availability of high-quality plant-based compound databases, and the interpretability of AI models highlight the continued need for human expertise. Researchers play a crucial role in hypothesis generation, experimental validation, and ethical evaluation of AI-generated findings.

The future of AI in herbal drug discovery lies in the collaboration between computational intelligence and human expertise. By integrating AI-driven analytics with traditional knowledge, pharmacognosy, and laboratory experimentation, researchers can achieve a more efficient, precise, and ethical approach to herbal drug development. AI is unlikely to replace human scientists but will serve as a powerful tool to enhance decision-making, innovation, and the discovery of novel plant-based therapeutics.

Keywords: Artificial Intelligence, Herbal Drug Discovery, Phytomedicine, Ethnopharmacology, Drug Development, Human Expertise.

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THE IMPACT OF MENOPAUSE ON CARDIOVASCULAR HEALTH: A REVIEW

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A woman's cardiovascular health is greatly impacted by the drop in oestrogen levels that occurs during the menopause, a crucial stage in her life. Cardiovascular disorders (CVD), such as hypertension, atherosclerosis, and heart failure, are more common in postmenopausal women. Estrogen deficiency accelerates cardiovascular ageing by causing endothelial dysfunction, changes in lipid profiles, elevated oxidative stress, and systemic inflammation. Furthermore, metabolic alterations including insulin resistance and central obesity increase the risk of CVD. The advantages and disadvantages of hormone replacement therapy (HRT), a possible cardioprotective tactic, are still up for dispute.A heart-healthy diet, consistent exercise, and stress reduction are all important lifestyle changes that help reduce cardiovascular risks. Targeted pharmaceutical therapies, such antioxidants and selective estrogen receptor modulators, may provide innovative therapeutic methods, according to recent studies. In addition to examining preventive and therapeutic approaches to lessen the burden of CVD in postmenopausal women, this review emphasizes the pathways that connect menopause to cardiovascular health.

Keywords: Menopause, cardiovascular disease, estrogen deficiency, oxidative stress, endothelial dysfunction, hormone replacement therapy

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TRANSFORMING PHARMACEUTICAL DEVELOPMENT: THE ROLE OF AI IN DRUG DISCOVERY AND HEALTHCARE

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Artificial intelligence (AI) is revolutionizing the drug discovery and development landscape, profoundly influencing the pharmaceutical sector and improving human health outcomes. The integration of AI within the pharmaceutical industry enables the analysis of intricate biological data, the optimization of research methodologies & the reduction of production costs and storage of extensive datasets related to manufacturing processes, the identification of potential disease targets, the simulation of physiological conditions, and the prediction of drug interaction. The concepts and practical applications of AI are rerouting the formulation of solid dosage forms. Sophisticated algorithms enhance formulation processes, forecast pharmacokinetic profiles, and evaluate drug toxicity, thereby streamlining the transition from pilot studies to market readiness. Moreover, advancements in 3D printing technologies for dosage forms are offering the potential for personalized treatment tailored to individual patients. This review study investigates the opportunities and challenges presented by AI in healthcare, with a focus on applications such as disease diagnosis, digital therapies, and epidemic forecasting. Key AI technologies, including deep learning and neural networks, are analysed for their effectiveness in predicting disease outbreaks, such as influenza and COVID19. As the pharmaceutical landscape continues to evolve, AI is set to transform conventional practices, leading to more efficient healthcare solutions. By leveraging the synergy between technology and science, AI not only enhances productivity but also ushers in a new era of precision medicine that caters to the specific needs of each patient. Key words – AI, Drug discovery, Sophisticated algorithms, Healthcare, COVID-19.

Keywords: Artificial intelligence, 3D printing, pharmacokinetic profiles

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HERBAL SILVER NANOPARTICLE GEL FOR ACNE TREATMENT: SYNTHESIS, CHARACTERIZATION, AND ANTIBACTERIAL EVALUATION

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The study focuses on creating and testing an anti-acne gel with silver nanoparticles (AgNPs) made from herbal extracts of *Phyllanthus emblica* (gooseberry) and *Azadirachta indica* (neem). The synthesis, characterization, and antibacterial activity of AgNPs against *Pseudomonas aeruginosa* and *Staphylococcus aureus* two bacteria frequently linked to acneare examined in this work. AgNPsas demonstrated by scanning electron microscopy (SEM), dynamic light scattering (DLS), Fourier-transform infrared spectroscopy (FTIR), and UV-visible spectroscopy.The produced nanoparticles exhibited strong antibacterial activity, with a minimum inhibitory concentration (MIC) of 62.5 µg/ml against both tested bacterial strainsand had a size of around 110 nm. Carbopol 934 was used as a gelling agent to integrate the AgNPs into a gel formulation. The gel's pH, viscosity, extrudability, spreadability, solubility, and skin irritation were all assessed. The findings showed that the gel was stable, spreadable, and had a pH of 5.3, which ensured skin compatibility. The formulation's non-irritating properties were validated by a Hen's Egg Test on Chorioallantoic Membrane (HET-CAM). According to the study's findings, silver nanoparticles made from herbal extracts have potent antibacterial qualities and may be successfully combined to create a stable, skin-friendly gel that treats acne.

Keywords: Silver nanoparticles (AgNPs), Herbal extract, *Phyllanthus emblica* (gooseberry), *Azadirachta indica* (neem)

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PHARMACOGNOSTIC, PHYTOCHEMICAL AND PHARMACOLOGICAL PROPERTIES OF S*ACCHARUM BENGHALENSE*: A REVIEW

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Saccharum benghalense is synonym for *Tripidiumbengalense* that is also called as munj grass that grows in desert regions and along river banks. The current review was based on the pharmacognostic, phytochemical and pharmacological activities of S*accharum benghalense.* The grass is tall, with smooth, greenish brown panicles. The grass is overgrown and can reach heights of up to 7 feet. Apart from Pakistan and Afghanistan, the plant is rather common in northern and western India. It grows in desert environments as well as next river banks. The greenish brown panicles on the tall grass have a smoothness. Overgrown, the grass towers seven feet high. Usually far longer than the average internode, the straight, pale straw-colored leaf sheaths feature long white hairs and villous at the tip. The numerous plant parts have been utilized to treat erysipelas, urinary problems, burning sensations, throat, herpes, dyspnea, dyscaria, and eye illnesses, it was discovered. Treating dysuria, vertigo, and giddiness, several ayurveda formulations call for the active component—plant root. *Saccharum Bengalense* is a rich source of alkaloids, flavonoids, tannins, glycosides, saponins, steroids, terpenoids, and phenolic compoundsand many recorded therapeutic activities including Neuroprotective, Antioxidant, Antimicrobial, Anti-leishmanial, Cytotoxicity, Anti-urolithiasis, Anti-obesity, Anti-psychotic, Anti-fungal, Anti-inflammatory. For many medical conditions with low chance of adverse effects, it could thus be a viable herbal source.

Keywords: *Tripidiumbengalense,* ethnopharmacology, antioxidant, antimicrobial, biological properties.

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A COMPREHENSIVE REVIEW ON THE PHYTOCHEMISTRYAND VARIOUS PHARMACOLOGICAL ACTIVITIES OF S*ACCHARUMBENGHALENSE*

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Antibacterial plants have been known from the days of the ancient Arabs, Egyptians, and Romans.The current review was based on the phytochemistry and various pharmacological activities of S*accharumbenghalense.* Known by common names Kana, Sarkanda, and Moonja, the plant is widespread in northern and western India as well as Pakistan and Afghanistan. Tripidiumbenghalense, sometimes known as Munj Grass, is synonym with Saccharumbenghalense. It grows beside river banks and in desert areas. The greenish brown panicles on the tall grass have a smoothness. Overgrown, the grass stands up to seven feet high. Usually considerably longer than the typical internode, the straight, pale straw-coloured leaf sheaths have villous at the tip and long white hairs. It was found that the several plant parts have been used to treat erysipelas, urinary issues, burning sensations, throat, herpes, dyspepsia, dyscaria, and eye diseases. Several ayurvedic formulations include the active component, plant root, which is used to treat dysuria, vertigo, and giddiness. It came to the conclusion that SaccharumBengalense is a rich source of phytochemicals and related species have many reported therapeutic activities including Neuroprotective, Antioxidant, Antimicrobial, Anti-leishmanial, Cytotoxicity, Anti-urolithiasis, Anti-obesity, Anti-psychotic, Antifungal, Anti-inflammatory. For many medical disorders with low likelihood of side effects, it may thus be a good herbal source.

Keywords: *Tripidiumbengalense,* phytochemistry, antioxidant, cytotoxicity, biological properties.

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NEUROINFLAMMATION AND OXIDATIVE STRESS IN STROKE PATHOLOGY

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Stroke, a leading cause of disability and mortality worldwide, involves complex pathophysiological processes, with neuroinflammation and oxidative stress playing central roles in secondary brain injury. Following the initial ischemic or hemorrhagic insult, the brain undergoes a cascade of events, including the activation of microglia and astrocytes, infiltration of peripheral immune cells, and release of pro-inflammatory cytokines (e.g., TNF-α, IL-1β, and IL-6). This neuroinflammatory response, while initially protective, can exacerbate tissue damage by promoting blood-brain barrier disruption, neuronal apoptosis, and cerebral edema. Concurrently, oxidative stress arises from the overproduction of reactive oxygen species (ROS) and reactive nitrogen species (RNS), overwhelming endogenous antioxidant defenses. Mitochondrial dysfunction, NADPH oxidase activation, and excitotoxicity contribute to ROS generation, leading to lipid peroxidation, protein oxidation, and DNA damage. The interplay between neuroinflammation and oxidative stress creates a vicious cycle, amplifying brain injury and impairing recovery.

Understanding these mechanisms has opened new avenues for therapeutic interventions. Anti-inflammatory agents, antioxidants, and strategies targeting specific signaling pathways (e.g., NF-κB, NLRP3 inflammasome) are being explored to mitigate secondary damage and improve outcomes. This review highlights the critical roles of neuroinflammation and oxidative stress in stroke pathology, their interplay, and the potential for targeted therapies to reduce brain injury and enhance recovery.

Keywords: Stroke, neuroinflammation, oxidative stress, microglia, cytokines, reactive oxygen species, secondary brain injury, therapeutic targets.

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DEVELOPMENT AND CHARACTERIZATION OF PATCHOULI OIL-LOADED NANOSPONGES GEL FOR ENHANCED TOPICAL DRUG DELIVERY

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Patchouli oil (PO), derived from *Pogostemon cablin*, is known for its antimicrobial, anti-inflammatory, and skin-healing properties. However, its pharmaceutical applications are limited due to poor aqueous solubility, instability, and potential skin irritation. This study aimed to enhance the therapeutic efficacy of PO using nanosponges as a novel delivery system. Ethyl cellulose nanosponges were synthesized using the emulsion solvent diffusion method and optimized through a 3^2 full factorial design. The optimized formulation (F4) exhibited an entrapment efficiency of 75.64% and a practical yield of 83.3%. The nanosponges-loaded gel demonstrated excellent physicochemical properties, including a pH of 5.6, viscosity of 12,980 cps, and sustained drug release (90.8% over 12 hours) following zero-order kinetics. In vivo studies in an immunosuppressed rat model of *Candida albicans* infection showed significantly improved antifungal efficacy with the nanosponges-loaded PO gel compared to the pure PO gel and a marketed cream. Histopathological analysis confirmed enhanced skin recovery, while the Draize patch test indicated no skin irritation. Stability studies further validated the formulation's long-term integrity, with consistent drug release observed over 90 days. These results suggest that nanosponges-based PO delivery enhances antifungal activity, improves bioavailability, and minimizes skin irritation, making it a promising approach for topical antifungal therapy.

Keywords: Patchouli Oil, Nanosponges, Antifungal Therapy, Topical Drug Delivery, Candida albicans, Sustained Release

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REVOLUTIONIZING CANCER THERAPY: "AI-OPTIMIZED IMIDAZOLE DERIVATIVES"

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Imidazole and benzimidazole rings act as important isosteres for other heterocycles, essential for creating bioactive molecules. They provide multiple binding sites, enabling coordination with metal ions and interactions with organic molecules, which can lead to the creation of supramolecular drugs with dual action mechanisms to combat drug resistance.

Imidazole-based compounds are widely used as therapeutic agents for cancer and neurological activity and demonstrating high therapeutic efficacy. Recent Artificial Intelligence Methodologies research has focused on synthesizing new derivatives with improved anticancer properties. These include improvement in structure activity relationship of drug and investigating binding site through computer software.

Continuous efforts in this field highlight the potential of imidazole and benzimidazole derivatives in overcoming the limitations of existing therapies and advancing medicinal chemistry. This review article provides an overview of recent developments, structure-activity relationships, and future perspectives of imidazole and benzimidazole compounds in medicinal chemistry, particularly as anticancer agent

Keywords: Anticancer, Neurological activity, Artificial Intelligence, Benzimidazole derivatives, Synthesis .

FORMULATION AND EVALUATION OF A POLYHERBAL SHAMPOO FOR HAIR GROWTH AND DANDRUFF CONTROL

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Ayurvedic formulations have been shown to offer promising therapeutic benefits with minimal side effects, making them suitable for cosmetic applications. To effectively address hair disorders like dandruff, the selection of appropriate Ayurvedic ingredients in optimal quantities is crucial. The development of a powder shampoo incorporating these ingredients can help combat dandruff. A more sustainable approach involves reducing synthetic ingredients by replacing them with natural extracts that exhibit comparable functionality. Shampoo, a key product in hair care, serves as a cleansing agent and is among the most widely used beauty products. Several herbs have demonstrated efficacy in controlling dandruff-causing fungi. In our laboratory, an antidandruff herbal shampoo, However, improvements were needed in viscosity, conditioning properties, and antidandruff activity. To enhance the shampoo's effectiveness, a combination of the most potent herbs was used. The final formulation was prepared using natural ingredients such as Bhringraj (Eclipta alba), Fenugreek (Methi), Azadirachta indica (Neem), Acacia concinna (Shikakai), Sapindusmukorossi (Reetha), Ocimum sanctum (Tulsi), Piper betle (Paan), Hibiscus rosa-sinensis (Gurhal), Camellia sinensis (Green Tea Leaf), Citrus aurantifolia (Lemon), Phyllanthus emblica (Amla), Aloe vera (Aloe Leaf Powder), Ashwagandha powder, Triphala powder, Nagarmotha powder, and Brahmi root. The formulation was prepared at the laboratory scale and evaluated for safety, stability, and efficacy.

Keywords: Hair Growth, Dandruff Control, Herbal Shampoo, Polyherbal Formulation, Antidandruff, Cosmetic Applications

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CLINICAL PROGRESSION OF ALZHEIMER'S DISEASE: AN OVERVIEW

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Alzheimer's disease is a devastating neurodegenerative disorder characterized by progressive cognitive decline, memory loss, and impaired daily functioning and it is the most common cause of dementia worldwide. The hallmark features of Alzheimer's disease include the presence of extracellular amyloid-beta plaques and intracellular tau tangles, which leads to synaptic dysfunction, neuronal loss, and cognitive decline. Genetic factors, such as mutations in the amyloid precursor protein (APP), presenilin 1 (PSEN1), and presenilin 2 (PSEN2) genes, have been linked to familial forms of the disease, while sporadic cases are associated with complex interactions between genetic and environmental factors. Neuroimaging techniques, such as positron emission tomography (PET) and cerebrospinal fluid biomarkers, have shown promise in early detection and tracking disease progression. Various risk factors have been identified that contribute to the development and progression of Alzheimer's disease. Advancing age remains the most significant risk factor, with the prevalence of Alzheimer's Disease increasing exponentially with age. Other risk factors include a family history of Alzheimer's Disease, cardiovascular diseases, diabetes, hypertension, and low cognitive reserve. Currently, there is no cure for Alzheimer's disease, and available treatments only provide temporary symptomatic relief. The main pharmacological approaches involve cholinesterase inhibitors (donepezil, rivastigmine, and galantamine) and N-methyl-D-aspartate (NMDA) receptor antagonist (memantine). These drugs aim to enhance neurotransmitter function and mitigate cognitive decline. Moreover, non-pharmacological approaches including cognitive training, physical activity, and social interaction have also demonstrated promise in enhancing cognitive function and improving the quality of life in Alzheimer's Disease patients. Recent research has focused on disease-modifying therapies targeting beta-amyloid and tau protein. Immunotherapies, amyloid-beta aggregation inhibitors, and tau-based treatments are currently under investigation in clinical trials to slow or halt disease progression.

Keywords: Alzheimer's Disease, Genetic factors, cholinesterase inhibitors

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EFFECT OF NUTRACEUTICALS ON ANTIBACTERIAL EFFICACY

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This study evaluates the change in antibacterial efficacy using nutraceutical products, such as multivitamin tablets and omega-3 fish oil, against several microbial populations representing Gram-positive, Gram-negative, and Mollicutes: S. aureus, E. coli, Pasteurella multicide, B. cereus, Salmonella Enteritidis, and M. gallisepticum using the standard cup and plate method. The antibacterial activity of nutraceuticals is thought to be related to mechanisms such as disrupting bacterial cell walls, inhibiting protein synthesis, and interfering with metabolic pathways, thereby impacting bacterial viability. Different diluted samples revealed variable results against the microorganisms under study. The results of the zone of inhibition (ZOI) by the nutraceutical dilutions against the six bacteria ranged from 625 to 5000 µg/ml. The used dilutions could enhance the antibacterial efficacy by inhibiting the selected microorganisms under study with variable zone of inhibition (ZOI). Comparatively, some nutraceuticals showed promising inhibitory effects, highlighting their potential as alternative or complementary treatments to traditional antibiotics. This could also aid in reducing the risk of antibiotic resistance, especially when used in combination with conventional therapies. Significant variations were observed in the sensitivity of different bacteria, with some showing higher susceptibility to specific nutraceutical dilutions. The findings suggest that these nutraceuticals could potentially be applied in fields like food preservation, preventive healthcare, and medical treatment. Overall, the study supports the efficacy of nutraceuticals in inhibiting selected microorganisms, indicating their potential role in combating bacterial infections through enhanced antibacterial efficacy.

Keywords: Antibacterial efficacy, Nutraceutical dilutions, Gram positive, Gram negative, Zone of inhibition (ZOI), Antibiotic resistance

GCMS AND LC-MS/MS METABOLITE PROFILING AND ANTIMICROBIAL ACTIVITIES OF SENNA OCCIDENTALIS L. ROOT EXTRACT

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The current work uses Gas Chromatography-Mass Spectrometry (GC-MS) and Liquid Chromatography-Tandem Mass Spectrometry (LC-MS/MS) to examine the metabolite profiling and antibacterial properties of Senna occidentalis L. root extract. Numerous bioactive substances with pharmacological characteristics, such as phenolics, flavonoids, and fatty acids, were discovered by GC-MS analysis. A more thorough metabolomic fingerprint was produced by LC-MS/MS, which also identified secondary metabolites that might have antibacterial properties.The minimum inhibitory concentration (MIC) assay and the agar well diffusion method were used to evaluate the root extract's antibacterial effectiveness against a range of bacterial and fungal species. Its potential as a natural antibacterial agent was shown by the findings, which showed notable antimicrobial activities, especially against Staphylococcus aureus, Escherichia coli, and Candida albicans. This study proposes the use of Senna occidentalis root extract in the creation of new antibacterial agents and emphasizes its medicinal potential.

Keywords:*Senna occidentalis*, GC-MS, LC-MS/MS, metabolite profiling, antimicrobial activity, secondary metabolites.

DESIGN CONSIDERATIONS FOR SELF-MICROEMULSIFYING DRUG DELIVERY SYSTEMS: A SOLUTION FOR POOR SOLUBILITY

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One of the biggest issues facing the pharmaceutical industry is the low water solubility of newly introduced drugs, which ranges from 35 to 40%. This results in low solubility and limited bioavailability; this increases variability within and between individuals and eliminates dosage proportionality. The self-micro emulsifying drug delivery system is one way to improve the hydrophobic drug solubility. This technique may be used to make medications that are insoluble in water soluble in a lipid carrier, allowing them to cross the barrier. Lipids and surfactants are added to improve absorption and increase the drug's solubility. As a result, the medication becomes more soluble and dissolves more quickly. The most promising method for improving the oral bioavailability of hydrophobic drugs is SEDDS. When they are dispersed in GI fluid after delivery, the drug becomes micro- or nano-emulsified and easily absorbed through lymphatic channels, bypassing the liver's first pass metabolism. SMEDDS are isotropic mixtures of oil, surfactant, co-surfactant, and drug due to their unique ability to produce fine oil in water microemulsion with mild agitation following dilution with aqueous phase. So that the problem of drug that are poorly soluble can be effectively addressed. This article gives a summary of SMEDDS as a potentially useful strategy to address the issue of poorly soluble drug.

Keywords: Solubility, Dissolution, Absorption. Bioavailability

HYDROGEN PRODUCTION FROM RENEWABLE SOURCES AND NON RENEWABLE RESOURCES

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A key factor in the growth of the hydrogen economy is hydrogen production. Conversion from biomass, which is plentiful, clean, and renewable, is one of the most promising methods for producing hydrogen. Hydrogen can be produced practically using alternative thermochemical (gasification and pyrolysis) and biological (biophotolysis, water-gas shift reaction, and fermentation) processes. An overview of several approaches for producing hydrogen from biomass is provided in this publication. Future developments will be discussed as well.

Keywords; Hydrogen Production, Hydrogen Economy, Thermochemical Processes, Biological Processes

AZADIRACHTA INDICA PHYTOCHEMICAL SCREENING: QUALITATIVE AND QUANTITATIVE METHODS

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The neem plant, Azadirachtaindica, has a broad range of biological activity and one of the most promising therapeutic qualities. Freshly matured A. indica (neem) leaves, stem bark, and seeds were gathered, and air Aqueous and dry extracts were utilized to screen for certain active chemical components. Neem plant sections' phytochemicals were separated and screened using both qualitative and quantitative methods. In order to assess the phytochemicals, A. indica was screened at the Buddha Institute of Pharmacy GIDA, Gorakhpur. The results of the qualitative tests for the presence of secondary metabolites showed that whereas steroids, polyphenols, and tannins were only identified in leaves and stem bark, alkaloids, saponins, terpenoids, and flavonoids were discovered in all investigated components. All of the components that were evaluated were devoid of glycosides and coumarins. The gravimetric approach was also used for quantitative screening. All of A. indica's sections contained alkaloids, with the Stem bark had the highest concentration of alkaloids (12.8%), while leaves had the lowest (10.67%). The leaves had the highest concentration of flavonoids (13.8%), whereas the stem-bark had the lowest (12.8%). Similarly, the percentage of saponins was highest in stem-bark (2.50%) and lowest in seeds (2.53%). The percentage of terpenoids was lowest in seeds (12.77%), although it was similar in leaves and stem bark (13.13%). The chemical industry will benefit from more research on secondary metabolites in order to decrease environmental damage caused by various synthetic compounds and generate plant-based chemicals.

Keywords: Azadirachtaindica, Phytochemical screening, steroids

ONION'S (*ALLIUM CEPA* L.) PHARMACOLOGICAL PROPERTIES AND ETHNOPHARMACOLOGICAL TENDENCY

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One of the most popular and widely cultivated vegetable crops worldwide is onions (Allium cepa L.). Onion bulbs are highly valued commercially and rank third in significance among horticulture spices due to their distinct flavor. Many indigenous societies have long utilized A. cepa for its therapeutic qualities in addition to its culinary applications. To support these popular views, a number of publications have been created. However, current, thorough information about the traditional and ethnopharmacological properties of A. cepa is scarce. Therefore, this study aims to conduct a thorough analysis of the published literature regarding the phytochemical composition, pharmacological characteristics, and traditional use of A. cepa. Numerous pharmacological qualities, including antibacterial, antioxidant, analgesic, anti-inflammatory, anti-diabetic, hypolipidemic, anti-hypertensive, and immunoprotective qualities, have been discovered in A. cepa. Despite the large number of in vitro and in vivo studies that have been carried out, several limitations and information gaps remain that require further research.

Keywords; Allium cepa L.,Onion, Pharmacological Characteristics, Ethnopharmacological tendency.

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PHARMACOLOGICAL PROPERTIES OF *MORINGA OLEIFERA* (MEDICINAL PLANT)

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Angiosperm The word "murder" means to kill someone. The miracle tree, *Moringaoleifera*, has been used for millennia in traditional medicine. With no known side effects, various parts of the plant have been used to treat malnutrition, diabetes, blindness, anaemia, hypertension, stress, depression, skin, arthritis, joint problems, and kidney stones. The plant has also been shown to help manage breastfeeding in nursing mothers, preserve the cardiovascular system, blood glucose levels, and have anti-oxidant, anti-inflammatory, and anti-cancer properties.Moringa is a nutrient-dense diet because its leaves, pods, and other plant components contains a variety of essential compounds. As a matter of fact, moringa is said to have seven times more vitamin C than oranges, ten times more vitamin A than carrots, seventeen times more calcium than milk, nine times more protein than yoghurt, and twenty-five times more iron than spinach. Moringa leaves prolong the shelf life of foods that contain fat because they include a range of antioxidant components, such as ascorbic acid, flavonoids, phenolics, and carotenoids. They are also considered a good source of potassium, calcium, vitamin C, and protein.

Keywords: *Moringaoleifera*, Drumstick or Sehjan, Angiospermic Plant, Anti-Oxidant, Anti-Inflammatory, And Anti-Cancer Properties.

IN-VITRO CHARACTERIZATION OF AN ANTI-FUNGAL NAIL LACQUER CONTAINING MICONAZOLE NITRATE

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The main objective is to create and evaluate a miconazole nitrate-containing anti-fungal nail lacquer for the treatment of onychomycosis, a skin disorder brought on by pathogens like candida, dermatophytes, and non-dermatophytes. Additionally, nail lacquer can increase patient compliance and treatment efficacy. Combining non-volatile chemicals to get the right gloss, flow, and smoothness makes it easy to make. To protect their fingernails and toes, people apply nail lacquer. To improve appearance, gloss, and colour, it is essential to protect the nail and nail plate. In order to improve the topical absorption of drugs with low oral bioavailability over the nail, nail lacquer is frequently used. This formulation uses a variety of components, such as 2 hydroxy propyl beta cyclodextrin, ethyl cellulose, nitrocellulose, and propylene glycol, to build the medication and give the greatest release possible. Medications can get beyond the nail plate. When something is harsh enough, it is hard to go through; topical treatment can only get through a limited quantity. Consequently, the therapeutic concentration is ineffective. The nail plate may look strange due to the decreased brightness. It affects the nail bed, lowers blood flow, or has physical or chemical properties specific to the nail bed. Different diseases arise as a result.The active medication used to treat nail diseases must reach the nail bed and nail matrix, which are deeper layers under the thick, keratinised nail plate. Little is known about the nail, its keratin content, or how skin emerges from the nail, despite research on human skin revealing its structure, functions, and permeability to specific chemicals. To treat external nail diseases as well as possible systemic circulation and surrounding target areas, a deeper comprehension of the physicochemical variables influencing medicine absorption through the nail plate is essential.

Keyword: Fungal Infection, Nail Lacquer, Onychomycosis, candida, dermatophytes.

PHARMACOLOGICAL APPLICATION OF FLAX SEED (LINUM USITATISSIMMUM L.)

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This study aims to evaluate the quality of flaxseed from different geographic sources based on prior research showing the significance of climate factors in plant development and quality. Geographical studies of plant molecular diversity can provide important information about plant growth and improve plant germplasm, medical benefits, and uses, but there aren't many studies of cultivated flax (Linumusitatissimum L.), the third-largest naturally harvested source of fibre and one of the top five oil crops in the world. Flax is often used as a model plant for the best plants because of its small size and traits that encourage self-fertilization.While pale flax fluctuates have more vegetative plant parts, cultivated flax has a greater variety of generative plant parts. The consequences of domestication are specifically considered while examining the range of variation, hereditarily based variety, heritability, and connectedness of a few variables. Elevated temperatures throughout the developing season in different regions could potentially affect food security, farm income, and production. Delays in planting caused the natural temperature to rise while the harvest concept was being developed, which led to lower-quality seed.The results showed that development, yield, and its segment, as well as oil yield, are influenced by the planting climate. These findings are important for understanding the domestication of flax and can also be used to categorise intraspecific flax cultivars, create a core subset of the flax assortment, and investigate novel sources of flax improvement traits.

Keywords: *Linumusitatissimum*; growth performance; cultivators; seed and oil yields; genetic diversity.

TRANSFEROSOME: A NOVEL APPROACH TO DRUG DELIVERY SYSTEM

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Generally, the transdermal delivery of drugs is limited by the skin's barrier function. Vesicular systems are among the most controversial methods for transdermal delivery of active substances. There was a resurgence of interest in creating transdermal delivery methods with the discovery of elastic vesicles such transferosomes, ethosomes, cubosomes, phytosomes, etc.This study outlines the composition, penetration mechanisms, production processes, and characterisation methodologies of transferosomes in order to deliver active chemicals transdermally. To be absorbed, disseminated into organs and tissues, and eliminated from the body, a drug must pass through one or more biological membranes or barriers at various locations. The movement of a substance through a membrane in this way is referred to as substance transport. For the body to absorb the drugs, they must pass through the membrane. Several delivery systems were developed in an attempt to concentrate the drug in the targeted tissues and decrease the amount of medication in the other tissues. Consequently, the drug has no effect on the surrounding tissues. Moreover, there is no loss of medication.Additionally, the medicine's localisation keeps drug loss at bay, ensuring the medication's maximum effectiveness. As a result, phospholipid-based carrier systems are currently of great interest.

Keywords; Lecithin, stratum corneum, surfactant, transferosomes, vesicles

NANOSPONGES: A TARGETED DRUG DELIVERY SYSTEM

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A targeted drug delivery system has been developed as a result of recent developments in nanotechnology. However, a specialised drug delivery system is needed in order to effectively target a molecule to a particular location using a drug delivery system. Because nanosponge can absorb both hydrophilic and hydrophobic pharmaceuticals, its discovery has been a significant step towards overcoming issues such drug toxicity, limited bioavailability, and predictable drug release. Because nanosponges may be made to work with both hydrophilic and hydrophobic pharmaceuticals, they offer promise as a solution to issues related to medicine toxicity, reduced bioavailability, and drug release across a wide area. Nanosponges are small structures with a three-dimensional network and porous hollow. Nanosponges are small structures with a three-dimensional network and porous hollow. They can be easily created by crosslinking cyclodextrins with various chemicals. Because of Cyclodextrin's excellent biocompatibility, stability, and safety, a number of Cyclodextrin-based drug delivery systems have been rapidly developed. The nanosponge drug delivery system has a wide range of applications, including cancer, autoimmune illnesses, theranostic uses, increased bioavailability, and stability. This review delves into the benefits and downsides, preparation procedures, factors influencing their preparation, characterisation techniques, applications, and the most recent advancements in nanosponges. Nanosponges can also act as an efficient carrier of enzymes, proteins, vaccines, and antibodies. The current review focuses on the method of preparation, characterisation, and possible application in drug delivery systems.

Keywords: Targeted drug delivery system, Nanosponges, Hydrophilic and Hydrophobic drug.

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DIETARY SUPPLEMENTS AND ITS HEALTH BENEFITS: AN OVERVIEW

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There are strong reasons to support the introduction of dietary recommendations for pregnant mothers, such as those pertaining to iodine and folate. In general, supplements are not necessary unless deficiencies are demonstrated, and consuming excessive amounts of certain nutrients may increase your risk of cancer. However, regulations are sometimes vague and appear to prioritise corporate profits over the general welfare. Supplements may have direct negative effects or interact negatively with drugs or other supplements. It turns out that many supplements include heavy metals, and some of them don't have the expected amounts of active ingredients.Calcium and amino acids are the most popular nutritional supplements, although there is no proof that they are beneficial for healthy teenagers. If a specific dietary shortage has been identified, nutritional supplements may be beneficial for competitive athletes who do not consume a balanced diet. In addition to discussing potential health risks associated with dietary supplements, this study makes recommendations for future regulatory initiatives.

Keywords; Dietary supplement, Active Components, Nutritional Supplements.

EUCALYPTUS: THE THERAPEUTIC QUALITIES ACTIVITIES RELATED TO PHARMACOLOGY

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The Myrtaceae family includes eucalyptus, which is the species with the quickest rate of growth and is often referred to as gum trees, red iron trees, safedas, and gum trees. Important commercial species, E. tereticornis and E. grandis, have a compact crown and a clean, straightbole. In India, vast plantations have been established on agricultural and forest areas, communal lands, field borders, and sections of roads, trains, and canals. This species is best suited to places with poor soil, standing water, difficult terrain, etc. Despite being a contentious tree due to its highwater consumption, nutritional depletion, allopathic effects, etc., it is also a source of pulp, paper, essential oil, lumber, medicinal uses, etc. In addition, it offers industrial, economical, and ecological services.Studies have shown improvements in the chemical and physical characteristics of sodic wastelands, the accumulation of heavy metals in various mined soil tissues, the potential for sequestering carbon, etc. Compared to other trees, it uses remarkably little water per unit of dry biomass produced. If the tree's bark is left in place, the residual nutrients consist of (80–88%) inputs of N, P, K, Ca, and Mg. This equilibrium lasts for a number of years without taking into account the initial nutrients that are still in the soil. The preferred species that grows quickly and produces enough wood to meet the demand for wood for fuel, building materials, and furniture remains in place in the face of an expanding economy and rising demand for wood goods.Reversing the shortage of wood products, regreening the landscape, assisting in the fight against poverty, restoring biodiversity, and conserving are all important contributions made by the forest sector.

Keywords: eucalyptus, eucalyptus oil, agronomic characteristics, therapeutic qualitiesetc.

APPLICATION OF MEDICINAL PLANTS IN THE TREATMENT OF COVID-19

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Although there is currently no proof that there are treatments specifically for COVID-19, it is known that the immune system plays a significant role in the onset and progression of the disease. Plants have been shown to contain molecules with minimal toxicity and high efficacy; some of these compounds are utilised as building blocks to make extremely powerful synthetic medications. Although prevention is the main use of herbal therapies, certain countries have released guidelines suggesting the use of traditional remedies for different phases of COVID-19 infection. Despite Europe's long and rich tradition of using medicinal plants for therapeutic purposes, fewer scientific studies have been conducted on this type of approach than in Asia. This connection between tradition and science would have a substantial influence on the prevention and treatment of COVID-19.

Keywords; COVID-19, Corona virus disease, medicinal plants.

ETHOSOMES AS A NOVEL DRUG DELIVERY SYSTEM

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Ethosomal systems are new lipid vesicular carriers that contain a relatively high amount of ethanol. These nanocarriers have different physicochemical characteristics and are specifically designed to transport medicinal chemicals through the skin and into deep skin layers. These nanocarriers have different physicochemical characteristics and are specifically designed to transport medicinal chemicals through the skin and into deep skin layers. Ethososomes have been extensively studied since their first development in 1996; different kinds of ethosomal systems have been produced as a result of the addition of new substances to their original composition. A number of different preparation techniques are used to create these novel carriers. Ethosomal dispersions are used in gels, patches, and creams to provide stability and convenience of use. To evaluate their efficacy in dermal/transdermal dispersion, a variety of in vivo models are used in addition to clinical trials. This paper provides a detailed assessment of the effects of ethosomal system components, preparation methods, and their significant roles in determining the final properties of these nanocarriers. Furthermore, new pharmacological dose formulations for ethosomal gels, patches, and creams are highlighted. The study also provides thorough information on the clinical trials and in vivo studies conducted to evaluate these vesicular systems.

Keywords; Ethosomes, Transdermal, lipid vesicular carriers, Lipid-based vesicles.

COLON SPECIFIC DELIVERY SYSTEM: A REVIEW

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Colonic drug delivery has become crucial in recent years for the administration of medications for the treatment of regional illnesses. For the local therapy of a number of bowel disorders, including ulcerative colitis, Crohn's disease, amoebiosis, colonic cancer, local treatment of colonic pathologies, and systemic distribution of protein and peptide medicines, targeted drug delivery into the colon is particularly desirable. This article provides an overview of various colon-targeted drug delivery methods, including pH-sensitive polymer-coated drug delivery, time-controlled release drug delivery, microbially triggered systems, and prodrug approaches. It also includes more recent methods, including pressure-controlled drug delivery systems, the Novel Colon Targeted Delivery System (CODESTM), and osmotic controlled drug delivery (ORDS-CT).

Keywords; Colonic drug delivery, colon-targeted drug delivery methods, targeted drug delivery.

MARINE DRUG ALZHEIMER'S DISEASE THERAPEUTIC AGENTS

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Alzheimer's disease (AD), a neurodegenerative disease, is one of the most intractable illnesses which affects the elderly. Clinically manifested as various impairments in memory, language, cognition, visuospatial skills, executive function, etc., the symptoms gradually aggravated over time. The drugs currently used clinically can slow down the deterioration of AD and relieve symptoms but cannot completely cure them. The drugs are mainly acetylcholinesterase inhibitors (AChEI) and non-competitive N-methyl-Daspartate receptor (NDMAR) antagonists. The pathogenesis of AD is inconclusive, but it is often associated with the expression of beta-amyloid. Abnormal deposition of amyloid and hyperphosphorylation of tau protein in the brain have been key targets for past, current, and future drug development for the disease. At present, researchers are paying more and more attention to excavate natural compounds which can be effective against Alzheimer's disease and other neurodegenerative pathologies. Marine natural products have been demonstrated to be the most prospective candidates of these compounds, and some have presented significant neuroprotection functions. Consequently, we intend to describe the potential effect of bioactive compounds derived from marine organisms, including polysaccharides, carotenoids, polyphenols, sterols and alkaloids as drug candidates, to further discover novel and efficacious drug compounds which are effective against AD.

Keywords; Alzheimer's disease; neurodegenerative disease; therapeutic; pathogenesis; marine natural products.

TECHNIQUE TO CHARACTERIZE NANOPARTICLES

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Due to their wide range of applications, nanostructures, a rapidly expanding class of materials, have sparked intense interest. The size, crystal structure, elemental content, and many other physical characteristics of nanoparticles have been described using several methods. certain physical qualities can be assessed using multiple methods in various situations. Selecting the best methodology is typically complicated by the various advantages and disadvantage of each technique, necessitating a combinatorial characterization approach. Additionally, given the growing importance of nanoparticles in fundamental research and application.it is imperative that scientists from various fields overcome the difficulties associated with reliably and reproducible characterizing nono materials following their synthesis and subsequent processing stages (such as annealing). Understanding the characteristics and potential uses of nano material requires their characterization. The equipment and experimental setups used for various measurements aimed at characterizing the synthesized nano crystals are described in this review. Thermal Analyzer (TG/DTA), UV-visible Spectroscopy, X-ray diffraction (XRD), SEM, EDX, TEM, DC - conductivity, particle size Analyzer (PSA)

Keywords: Nanoparticles; Characteristics; Application; Nanostructures.

TOXICITY OF SILVER NANOPARTICLES ON HUMAN HEALTH

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Over the last ten years, there has been a great deal of attention and research on nanoparticelsNP. From current knowledge in the field of nanotoxicology, it has become evident that the most NPs, if not all are more toxic than bulk materials. Concerns have arisen as a result of fast progress and development regarding the possible risks to human health and the environment associated with use and application of neurotoxics. Silver nanoparticles (SNPs) are one of the most available and commercially distributed nanomaterials around the world. Quantification and detection of SNPsin biotechnological systems must be performed in a variety of models, so that we can determine how human health may be affected by these genes. This is important because it is difficult to test all nanomaterials and estimate their effects on human health due to the variety of uses they have. Therefore, some scientists believe that these side effects are acceptable. In many areas, especially in the biological sciences and medicine, nanotechnology has a wide range of applications. Nanomaterials are used to coat or treat or diagnose.

Keywords; Gastrointestinal toxicity; genotoxicity and carcinogenicity; immune system toxicity; kidney toxicity.

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ARTIFICIAL INTELLIGENCE IN DRUG DEVELOPMENT AND DISCOVERY

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In recent years, artificial intelligence has shown great promise as a tool for drug discovery and development. Drug development may be expedited by using artificial intelligence to uncover novel drug targets, forecast the characteristics of molecules, and create therapeutic candidates with better chances of success. Furthermore, to maximize medication development and enhance patient outcomes, artificial intelligence may be utilized to evaluate enormous volumes of data from clinical trials and real-world evidence. Large quantities of chemical and biological data, such as pharmacological information, clinical trial findings, and molecular structures, may be used to train artificial intelligence systems. Subsequently, these algorithms may be employed to forecast novel medication candidates' characteristics, including their safety, effectiveness, and possible adverse effects. This can boost clinical trial success rates and drastically cut down on the time and expense of medication development. Using data from illness models, patient samples, and proteomics and genomic analysis, artificial intelligence may also be utilized to find novel targets for pharmaceuticals. This can assist scientists in discovering novel drug action routes and processes, which might result in the creation of more potent treatments for a variety of illnesses. The planning of clinical trials is one further way that artificial intelligence is being used in drug development.

Keywords; Artificial Intelligence, Drug Discovery, Drug Development, Promising Applications.

ARTIFICIAL INTELLIGENCE IN BUSINESS VALUE

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For organizations, the development of new business models and competitive advantages through the integration of artificial intelligence (AI) in business and IT strategies holds considerable promise. The majority of businesses are finding it difficult to take advantage of the opportunities for value creation while other pioneers are successfully utilizing AI. On the basis of the research methodology of Websterand Watson (2020),139 peer-reviewedarticlesworediscussed.According to the literature, the performance advantages, success criteria, and difficulties of adopting AI have been emphasized in prior research. The results of this review revealed the open issues and topics that call for further research/examination in order to develop AI capabilities and integrate them into business/IT strategies in order to enhance various business value streams.

Keywords; Artificial Intelligence**,** Business and IT Strategies.

MICRONUTRIENTS AND PHARMACOLOGICAL ACTIVITIES OF ROSE (*ROSA DAMASCENA*)

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Roses are fragrant, lovely plants with a wide range of therapeutic and functional use. A variety of rose parts, including fruits, flowers, leaves, and bark, can be applied to the development of products in the food, pharmaceutical, engineering, and cosmetic industries. Roses are used medicinally to treat a variety of conditions, such as diabetes, ageing, depression, stress, dysmenorrhea, convulsions, and inflammation. Rose water contains antibacterial properties that benefit a variety of microorganisms, making it a valuable beauty water for skin care. A rose petal's surface is made up of microscale papillae that are arranged hierarchically, and each papilla has complex nanofolds on it. Rose petals have antagonistic wetting characteristics and high water contact angles because of this structural characteristic. It has been demonstrated that the hierarchical structures of rose petals possess anti-reflection and light-harvesting properties, making them viable materials for a variety of electrical goods. Rose petals are a great biomimetic/bioinspired material that can be used with graphene, a well-known material. This essay examines roses' medicinal properties and practical uses. The COVID-19 epidemic has made shortages of food and medical supplies a worldwide problem. An excellent substitute would be natural biomaterials. Given their various advantages, roses should be further researched and promoted.

Keywords; *Rosa Damascena,*Rose,diabetes, ageing, depression, stress, dysmenorrhea, convulsions, and inflammation.

ARTIFICIAL INTELLIGENCE AND TECHNOLOGY IN PHARMA INDUSTRY

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The evaluate covers a spread of Artificial intelligence (AI) related topics in medicinal drug development. Additionally,it gives a brief account of the current advances made in drug improvement with the aid of the pharmaceutical industry in cooperation with numerous AI. All statistics of technology hadbeen impacted via advances in computing and era. Inall fields of technological know-how and generation, from essential engineering to medicinal drug, AI has come to be a critical thing.AI has so influenced pharmaceutical chemistry and fitness care. using computers to help in drug creation has overtaken greater conventional approaches in recent years. AI is often utilized to lessen the amount of time and enhance drug design techniques. The achievement fee of the developed medicinal drug is further improved with the aid of the conveniencewith which the target proteins can be determined making use of AI. every step of the medication layout technique involves the usage of AI technology, which lowers the cost and substantially lowers the health hazards relatedto preclinical research. AI is a powerful fact mining technique that is based on extensive amounts of pharmaceutical information and the machine learning procedure.

Keywords; Artificial intelligence, Drug design, Pharmaceuticals, Artificial neural network, Quality by design, Technology.

MULTIPLE USES OF FOOD PLANT GREWIA ASIATICA L.

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Fruit berries are one of the best sources of bioactive food ingredients that, when regularly consumed, have many health benefits. The Himalayan native Phalsa fruit (Grewiaasiatica L.) grows equally well in tropical regions of the world, but its enormous nutritional benefits have not yet been fully explored. The fruit, pulp, and seeds of this fruit contain many functional phytochemicals that can be used to treat a variety of diseases and have been found to be very effective in improving respiratory and cardiac functioning. Its cultivation has been restricted to subsistence, and it is primarily sold as raw fruit. There are some issues with the berry fruit's perishable nature and crop yield optimization, so this thorough reviewon the botanical description, phytochemistry, nutritional studies and pharmacological properties of this plant.

Keywords; Grewiaasiatica L.,Phalsa fruit, Nutritional Benefits, Functional Phytochemicals.

THE ROLE OF AI IN ADVANCING GREEN PHARMACY PRACTICES

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The integration of Artificial Intelligence (AI) into pharmacy practices is reshaping the future of healthcare, offering innovative solutions to improve both efficiency and sustainability. In the context of Green Pharmacy, AI plays a pivotal role in minimizing environmental impact while enhancing the quality and accessibility of pharmaceutical services. This abstract explores how AI-driven technologies contribute to sustainable drug development, personalized medicine, and eco-friendly drug manufacturing processes. AI's ability to analyze vast datasets accelerates the discovery of novel, environmentally safer compounds, promotes waste reduction through optimized supply chains, and fosters energy-efficient drug production methods. Furthermore, AI's role in personalized treatment regimens ensures the precise use of medications, thereby reducing waste and over prescription. This paper highlights the intersection of AI and Green Pharmacy, underscoring the transformative potential of AI to create a more sustainable, ethical, and efficient pharmaceutical ecosystem. The integration of these technologies is essential for addressing the evolving demands of global health while mitigating the industry's ecological footprint.

The integration of Artificial Intelligence (AI) in pharmacy practice is poised to revolutionize the industry's sustainability landscape. This innovative approach leverages AI-driven predictive analytics, personalized medicine, and supply chain optimization to minimize waste, reduce environmental impact, and promote eco-friendly practices. By harnessing the power of AI, pharmacies can enhance patient outcomes, streamline operations, and contribute to a more sustainable future. This groundbreaking convergence of AI and green pharmacy practice is transforming the way medications are discovered, developed, and delivered, ultimately redefining the role of pharmacists in promoting environmental stewardship and public health.

Keywords: Artificial Intelligence, Personalized Medicine, Medication Management, Green Chemistry, Pharmacoinformatics, Sustainable Pharmacy Practices.

AI AND THE CONSCIOUSNESS DILEMMA: WILL MACHINES EVER TRULY UNDERSTAND HUMAN PAIN?

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Artificial intelligence (AI) has come a long way in many fields, but one of its biggest challenges is understanding human pain. While AI can detect signs of pain-such as physical symptoms or behaviours, it doesn't actually feel or experience pain the way humans do. Pain is not just a physical sensation; it's also emotional, personal, and connected to our own awareness and experiences, which is something AI simply can't grasp.

This poster explores why AI, despite its amazing ability to analyse data and simulate responses, cannot truly understand what it's like to be in pain. AI can help doctors by recognizing patterns, suggesting treatments, and even predicting how a person might respond to certain pain relief methods. But the key difference is that AI doesn't "feel" pain or empathy-it just processes information.

We also touch on the ethical issues that arise when using AI in healthcare, especially when it comes to emotional support and patient care. While AI can assist in managing pain and improving treatment, we must remember that it can never replace the human touch, emotional understanding, or empathy needed in truly caring for someone in pain.

As we move forward, it's crucial to think about the limits of AI and how it affects our emotional and ethical approach to pain management. Only through human connection can we truly understand and address the deep complexities of human suffering.

Keywords: Artificial intelligence, human pain, ethical approach

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AI IN DRUG DEVELOPMENT AND FORMULATION

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Artificial Intelligence (AI) is revolutionizing pharmaceutical formulation and development by enhancing efficiency, reducing costs, and accelerating drug discovery. AI-driven approaches, including machine learning (ML), deep learning (DL), and computational modeling, optimize drug formulation, predict pharmacokinetics, and improve stability assessments. AI aids in high-throughput screening, identifying novel drug candidates, and personalizing medicine through advanced data analytics. Additionally, AI streamlines clinical trials by optimizing patient recruitment and predicting adverse effects. Despite challenges like data quality and regulatory hurdles, AI's integration into pharmaceutics promises faster, safer, and more cost-effective drug development. Future advancements in AI and big data will further transform precision medicine and therapeutic innovation.Artificial Intelligence (AI) has emerged as a powerful tool in various domains, and the field of drug formulation and development is no exception. This review article aims to provide an overview of the applications of AI in drug formulation and development and explore its future prospects. including various areas, such as drug discovery, manufacturing, quality control, clinical trial management, and drug delivery. The utilization of AI in various conventional as well as modified dosage forms has been compiled. It also highlights the challenges and limitations associated with the implementation of AI in this field, including data availability, model interpretability, and regulatory considerationsThe main goal of analyzing data through machine learning and developing a multineural network architecture through deep learning is to derive an AI application, which automatically analyzes all types of data and takes appropriate actions accordingly at the same time.

Keywords: Artificial Intelligence, Drug Formulation, Machine Learning, Pharmaceutical Development, Predictive Modeling, Personalized Medicine.

IDENTIFICATIONOF INVASIVEFUNGAL INFECTIONS & IT'SANTIFUNGALSUSCEPTIBILITYPATTERNS.

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Background: Fungus are widely present in the hospital areas & environment. Fungus are most common etiological agents of invasive fungal infections in immune compromised patients. The objective of this study was to speciate fungal isolates by standard mycological conventional techniques.All the isolated yeast from the various clinical samples were tested forantifungal susceptibility pattern according to CLSI guideline.

Material & Methods: This cross-sectional study was conducted in a microbiology department of Teerthanker Mahaveer Medical College &Hospital & samples were aseptically collected from the hospitalized patients. Specimens were cultured on Sabouraud dextrose agar with antibiotics,Potato dextrose agar&tubes were incubated at 25℃ & 37℃.All the fungal pathogenswere identifiedphenotypic methodsslide culture method,GTT, chlamydoconidia formation, & fermentation test.Sensitivity was performed for all the yeast& moulds isolates by CLSI M44-A2& CLSI M38-A2 respectively on MHA supplemented with 2% glucose & 0.5%µg/ml of methylene blue by using antifungal disks& BMDvoriconazole, fluconazole, nystatin, amphotericin B (Hi-Media)as per the protocol.

Result-350 clinical samples were collected from different ICUs & wards.175(83.33%) yeasts&33 (15.71%) moulds were isolatedfrom 210 positive samples.Out of 175 yeast isolates 68(38.85%) *Candida albicans*&16(9.14%) *Candida tropicalis* were isolated followed by 20(11.42%) *Candida krusei*.High prevalence of 17(51.51%)

Conclusion-This study shows that Non-albicans Candida species are the most common emerging fungal pathogen ofIFIs followed by *A.fumigatus*. Due to highest sentivity against voriconazole &amphotericin B, these antifungal drugs are the drug of choicein invasive infections.

Keywords: Non-albicans Candida, fungal pathogen, Fungus

BEYOND THE PILL: TECHNOLOGY-DRIVEN SOLUTIONS FOR ENHANCED DRUG DELIVERY AND CONTINUOUS MEDICATION ADHERENCE

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Novel technologies are reshaping drug administration, moving beyond traditional oral methods. This work explores advancements in novel devices, such as smart pill dispenser and smart injectors, designed for medication adherence and controlled drug release. Integrated sensors and mobile platforms enable real-time tracking of medication adherence and physiological responses, allowing for personalized therapeutic adjustments. Data-driven insights from these systems empower patients and healthcare providers to optimize treatment regimens, minimizing adverse effects and improving overall health outcomes. This shift towards technology-enabled drug delivery promises to revolutionize chronic disease management, fostering a more proactive and patient-centric approach to healthcare.

Keywords: Wearable Devices, Medication Adherence, Personalized Therapy, Remote

ARTIFICIAL INTELLIGENCE IN MEDICINES

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Artificial Intelligence(A.I.) is rapidly transfering medicines,offering powerful tools for diagnosis, treatment, and research, with potencial to improve patient care and outcome across various medical disciplines.The main A.I. methods used extensively are expert systems, fuzzy logic, genetic algorithm, and artificial neural networks all other A.I. powered applications are now used to support medical professionals in clinical settings and in on going research.The Electronic health records are streamlined through A.I., facilitating efficient data management and retrieval for better patient care. In robot assisted surgery, A.I. enhances surgical precision and safety, improving surgical outcomes, A.I-driven disease predication and risk assessment models aid in identifying potential health risk early, enabling proactive interventions and preventive measures. Addictionally, A.I. involvement in drug discovery and development accelerates the search for new medications and treatment options, promising advancements in the pharmaceutical industry. Precision medicine is furthered through A.I. is capability to analyze genetic data and match patients with tailored treatment. Patient monitoring is made feasible with A.I. enabling real time tracking and management of patient health, specially for those with chronic conditions. Overall, the integration of A.I. in health is having the way for more efficient, precise, and patient-centric medical practices.

Keywords: Artificial intelligence, medical imaging,genetic, electronic health records, drug discovery.

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HARNESSING ARTIFICIAL INTELLIGENCE IN HEALTH SCIENCES: EVALUATING INNOVATIONS AND CHALLENGES IN HEPATOTOXICITY DETECTION AND MANAGEMENT

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The incorporation of artificial intelligence (AI) within the health sciences has significantly transformed diagnostic and therapeutic methodologies, especially in the detection and management of hepatotoxicity. This research assesses AI-driven advancements, associated challenges, and future directions in the prediction, diagnosis, and treatment of drug-induced liver injury (DILI). AI methodologies, such as machine learning (ML) and deep learning (DL), improve the evaluation of hepatotoxicity by processing intricate datasets derived from electronic health records (EHRs), genomic information, and biochemical indicators. Predictive models that utilize neural networks and ensemble techniques exhibit enhanced accuracy in the early identification of DILI, surpassing conventional biomarkers. Furthermore, AI-enhanced image analysis aids in the interpretation of histopathological and radiological findings, facilitating non-invasive assessments of liver damage.

However, despite these advancements, several challenges remain, including data variability, the interpretability of models, and ethical issues related to patient privacy and algorithmic bias. The limited clinical validation and the necessity for interdisciplinary collaboration also impede the broader implementation of AI in managing hepatotoxicity. This study consolidates existing research, showcasing case studies where AI has effectively recognized hepatotoxic patterns and refined treatment strategies. It further addresses regulatory and implementation challenges, suggesting approaches to improve the reliability of AI and its integration into clinical practices.

In summary, AI possesses the potential to revolutionize hepatotoxicity management, yet it necessitates thorough validation, standardized datasets, and ethical guidelines to ensure its clinical relevance. Future investigations should concentrate on the practical application of AI, building trust among healthcare professionals and enhancing patient outcomes in the management of liver diseases.

Keywords: Artificial Intelligence, Hepatotoxicity, Drug-Induced Liver Injury, Machine Learning, Predictive Modeling, Healthcare Innovation.

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GUT MICROBIOTA AND ITS ROLE IN HCC PROGRESSION – NEW INSIGHTS

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The most prevalent primary liver cancer with a rising incidence worldwide is hepatocellular carcinoma (HCC). Recent studies show that the gut-liver axis plays a critical role in the initiation and spread of HCC. The gut microbiota affects hepatic inflammation, immunological responses, and metabolic pathways through microbial metabolites such bile acids and short-chain fatty acids, endotoxins, and bacterial translocation. A major risk factor for HCC, cirrhosis and non-alcoholic fatty liver disease (NAFLD) are two chronic liver disorders that have been associated with dysbiosis, an imbalance in the gut microbiota. Furthermore, bacterial lipopolysaccharides (LPS) have the ability to activate Toll-like receptors (TLRs), which promotes the development of hepatocarcinogenesis. Modifying gut flora using probiotics, prebiotics, fecal microbiota transplantation (FMT), and antibiotics may be therapeutic approaches for the prevention and treatment of HCC, according to developments in microbiome research. Comprehending the intricate relationship between gut microbiota and liver cancer creates opportunities for precision medicine and therapies that target the microbiome in the development of hepatocarcinogenesis. Future research is required to evaluate medicines and biomarkers based on the microbiome to improve the outcomes of HCC.

Keywords: Hepatocellular carcinoma, gut microbiota, liver cancer, dysbiosis, gut-liver axis, microbial metabolites, probiotics, microbiome therapy

REVOLUTIONIZING HEALTHCARE: THE POWER OF AI IN PERSONALIZED MEDICINE

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Personalized medicine has transformed the healthcare industry by emphasizing the significance of individual variations in treatment effectiveness. By taking into account a patient's genetic profile, lifestyle habits, and environmental influences, healthcare providers can now design tailored interventions that have a higher likelihood of success. This transition toward personalized medicine has not only enhanced patient outcomes but has also fostered a more patient-centric approach to healthcare.

The integration of artificial intelligence (AI) has further unlocked the full potential of personalized medicine. AI-driven algorithms can process vast amounts of patient data—including genetic details, medical histories, and lifestyle factors—to develop customized treatment plans. By identifying patterns and correlations within this data, AI can uncover hidden insights and predict individual treatment responses with remarkable accuracy.

The incorporation of AI into personalized medicine has also expanded opportunities for research and therapeutic advancements. With its ability to rapidly analyze extensive datasets, AI can detect subtle associations and trends that might otherwise go unnoticed. This capability has led to the identification of novel biomarkers, genetic variations, and therapeutic targets, contributing to the development of more precise and effective treatments.

Moreover, AI-driven personalized medicine holds great promise for preventive healthcare. By assessing genetic predispositions, lifestyle choices, and environmental exposures, AI algorithms can pinpoint individuals at heightened risk for specific diseases. This early detection enables healthcare professionals to implement proactive interventions, ultimately reducing disease prevalence and enhancing overall public health.

Keywords : Personalized medicine , Healthcare industry, Individual variations, Genetic profile, Lifestyle habits

TARGETED DELIVERY SYSTEMS: A FOCUS ON SELF-POWERED AND NANO-ENABLED INNOVATION

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Drug targeting represents an advanced drug delivery system designed to transport therapeutic agents directly to the intended site of action or absorption, while minimizing release at non-target locations. This approach ensures that the drug remains intact and unaltered until it reaches the target site. Targeted drug delivery systems offer significant advantages over traditional methods, including enhanced therapeutic efficacy, reduced side effects, and lower required dosages. The primary goal of targeted delivery systems is to concentrate the pharmacological effects of therapeutic agents on diseased tissues or organs, avoiding impact on healthy areas. This is particularly important in cancer treatment, where chemotherapy can damage healthy tissues. Several mechanisms are utilized to achieve drug targeting, such as passive targeting, inverse targeting, active targeting, ligand-mediated targeting, physical targeting, dual targeting, and double targeting. By delivering therapeutic agents directly to the desired site, drug targeting minimizes toxicity in other parts of the body, making it a valuable approach for precise and safe treatment strategies. The aim of presentation is to addresss how drug targeting is achieved through specialized carriers that safeguard and transport the drug to specific tissues or organs.

Keywords: Drug Targeting, Targeted Drug Delivery, Therapeutic Efficacy, Cancer, Treatment.

IMMUNOTHERAPY: SHAPING THE FUTURE OF MODERN MEDICINE

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Immunopharmacology has contributed towards the improvement of immunotherapies which has been able to provide alternative treatment options for autoimmune diseases, cancer, infectious diseases, allergy and even organ transplantation. Understanding immune systems such a cytokine blockade and Toll-Like Receptors are vital in developing immunotherapies. The study investigates the action of various immunomodulators and their effects on the immune system. It explores the mechanism and clinical use of certain therapies, like checkpoint inhibitors, CAR-T cell therapy, and cancer vaccines. Immunomodulators, including cytokines, mesenchymal stem cells, are pivotal in the delivery of immune response. CAR-T cell therapy and checkpoint inhibitors have shown clinical success, particularly in cancer treatment. TLR-targeted therapies offer potential in autoimmune and infectious diseases, while therapeutic vaccines contribute to long-termimmune modulation. Immunopharmacology continues to make advances in new therapeutic means for the treatment of immune-related disorders. Immunomodulatorsand Immunosuppressants have shown activity in targeted therapeutic interventions. This review explores the critical roles and mechanisms of immunomodulators, highlighting their impact on contemporary healthcare and their potential for future therapeutic developments.

Keywords: Immunomodulators, Immunosuppressants,TLRs, CAR-T cell therapy, Check point inhibitors.

A COMPREHENSIVE REVIEW OF APABETALONE: MECHANISMS, BIOMEDICAL APPLICATIONS, AND FUTURE PROSPECTS

Apabetalone is a pioneering inhibitor of bromodomain and extraterminal (BET) proteins, exhibiting preferential affinity for the second bromodomain (BD2). By concentrating on the epigenetic regulation of gene expression, apabetalone offers a novel therapeutic approach that can be used to treat a number of conditions characterized by fibrosis, impaired lipid metabolism, and persistent inflammation. This comprehensive analysis looks at its therapeutic applications, mechanisms of action, and possible applications in precision medicine in the future. By reducing major adverse cardiac events (MACE) in high-risk adults with diabetes, chronic kidney disease (CKD), and recent acute coronary syndromes, apabetalone has demonstrated significant promise for cardiovascular health. Its transformative potential is highlighted by its ability to simultaneously control lipid profiles, vascular calcification, and inflammation. Apart from its cardiovascular applications, apabetalone has demonstrated efficacy in lowering pro-inflammatory conditions and treating the consequences of chronic kidney disease (CKD). Apart from its cardiovascular applications, apabetalone has demonstrated efficacy in lowering pro-inflammatory conditions and treating the consequences of chronic kidney disease (CKD). The antiviral properties of apabetalone, such as its capacity to alter SARS-CoV-2 viral entry mechanisms, have been highlighted by recent studies, making it a potentially effective treatment for infectious diseases. Its anti-inflammation and neuroprotective qualities offer hope for the treatment of neurological disorders, while preclinical research suggests that it may be able to prevent tumor growth in cancer by suppressing oncogene expression. Even In conclusion the ability of apabetalone to target a wide range of illness pathways highlights its potential to revolutionize treatment paradigms in a variety of medical specialties. As a novel epigenetic treatment, apabetalone aids in the creation of next-generation BET inhibitors.

Keywords: Apabetalone, BET inhibitors, cardiovascular diseases, chronic renal disease, metabolic disorders, inflammation.

INVESTIGATING THE CARDIOPROTECTIVE EFFECTS OF A NATURAL ANTIOXIDANT AGAINST DOXORUBICIN-INDUCED CARDIOTOXICITY IN WISTAR RATS: MECHANISTIC PERSPECTIVES

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Background: Doxorubicin (DOX) is a widely used chemotherapeutic drug, but its clinical application is limited by dose-dependent cardiotoxicity, primarily caused by oxidative stress and mitochondrial dysfunction. Natural antioxidants have emerged as promising agents to counteract this damage. This study investigates the cardioprotective potential of a natural antioxidant against DOX-induced cardiotoxicity in Wistar rats, focusing on underlying molecular mechanisms.

Objectives: The study aims to (1) assess DOX-induced cardiotoxicity, (2) evaluate the protective role of natural antioxidants, (3) identify bioactive compounds, and (4) explore their mechanisms in modulating oxidative stress, inflammation, and apoptosis.

Methodology: Wistar rats are treated with DOX and the natural antioxidant. Cardiac damage is assessed by measuring creatine kinase-MB (CK-MB), troponin, and inflammatory markers (TNF-α, IL-6) via ELISA. Oxidative stress is evaluated by analyzing malondialdehyde (MDA), glutathione (GSH), catalase (CAT), superoxide dismutase (SOD), and glutathione reductase (GR). Apoptosis is examined using specific assays, while histopathology assesses tissue damage. Statistical analysis validates the data.

Results: The natural antioxidant significantly reduced CK-MB, troponin, TNF-α, and IL-6 levels, indicating decreased cardiac injury and inflammation. It also lowered MDA (a lipid peroxidation marker) while increasing GSH, CAT, SOD, and GR levels, suggesting enhanced antioxidant defense. Histopathological analysis confirmed reduced cardiac damage, and apoptosis assays indicated decreased cell death.

Conclusion: The natural antioxidant exhibited strong cardioprotective effects against DOX-induced toxicity by mitigating oxidative stress, inflammation, and apoptosis. These findings support its potential as an adjunct therapy in chemotherapy to minimize cardiotoxicity.

Keywords: Doxorubicin, cardiotoxicity, natural antioxidant, oxidative stress, cardioprotection, Wistar rats, apoptosis.

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NANOTECHNOLOGY-ENHANCED CHEMOTHERAPY

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Background:

Chemotherapy is a conventional cancer treatment that often suffers from limitations such as poor drug solubility, inadequate targeting, and severe side effects. Nanotechnology has emerged as a promising solution to overcome these challenges.

Nanotechnology Approaches:

Nanoparticle –based drug delivery: Nanoparticles can encapsulate chemotherapeutic agents, enhancing their solubility, stability, and targeted delivery to cancer cells. Targeted therapy: Nanoparticles can be engineered to target specific cancer cells, reducing harm to healthy tissues. Stimuli- responsive nanoparticles: Nanoparticles can be designed to release drugs in response to specific stimuli, such as pH, temperature, or light. Benefits: Improved efficacy: Enhanced drug delivery and targeting lead to improved treatment out comes. Reduced toxicity: Targeted delivery minimizes harm to healthy tissues. Personalized medicine: Nanotechnology enables tailored treatment strategies based on individual patient needs.

Conclusion:

The Integration of nanotechnology with chemotherapy holds immense promise for revolutionizing cancer treatment Ongoing research focuses on optimizing nanoparticle design, exploring new targeting strategies, and translating these advances to clinical settings.

Key words: Nanoparticles, Chemotherapy, Targeted drug delivery, nanotechnology, Cancer.

THERAPEUTIC POTENTIAL OF SINGLE AND POLYHERBAL TEAS IN DIABETES MANAGEMENT

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Diabetes is a leading cause of death worldwide, with increasing prevalence in Malaysia. Alongside traditional treatments, plant-based herbal remedies are becoming popular for their affordability and fewer side effects. This research examines two commercially available herbal tea products: a single herbal tea bag (SHTB) containing cinnamon and a polyherbal tea bag (PHTB) with stevia, bitter gourd, cinnamon, and alfalfa. Both herbal teas are claimed to lower blood glucose levels in diabetic patients. The study investigates the phytoconstituents and antioxidant activities of these herbal products, conducted through hot water infusion followed by various antioxidant assays. Molecular interactions between key bioactive phytoconstituents from the single and polyherbal were analyzed against diabetic receptors: PTP1B (PDB ID: 1PYN), Human AMPK (PDB ID: 2UV4), Human GFA (PDB ID: 2ZJ3), and HPA (PDB ID: 3IJ8). Phytochemical analysis revealed that the SHTB contained more phytoconstituents than the PHTB, and the SHTB displayed higher antioxidant activity across all tests. Additionally, Dulcoside A and rubusoside from stevia showed the highest binding affinity with 1PYN and 2UV4, while momordicin from bitter gourd exhibited the highest binding affinity with 3IJ8. In conclusion, although SHTB demonstrates greater antioxidant activity, effective management of diabetes heavily relies on the bioactive compounds from PHTB.

Keywords: Herbal tea, diabetes management, phytochemical analysis, antioxidant, and molecular interactions.

DEVELOPMENT AND PSYCHOMETRIC EVALUATION OF THE QUESTIONNAIRE TO ASSESS KNOWLEDGE ON ANTIBIOTIC USE

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Background: When administered as directed, antibiotics have been demonstrated to treat infectious diseases and even save lives. The negative belief that antibiotics are a drug that may treat infectious diseases caused by any type of microbe is the only deception that people have. These false beliefs frequently result in the dangerous problem related to improper antibiotic use. Inappropriate use of antibiotics will lead to antibiotic resistance, a major public health concern (World Health Report, 2007).

Objective: This study aimed to develop scale to measure the knowledge towards antibiotic use.

Methodology:Respondents were asked to self-administer the developed questionnaire twice on two occasions. To evaluate homogeneity of the items Chronbach's alpha coefficient and inter-partial correlation were performed and intraclass correlation coefficient for test-retest reliability. Extreme Groups Comparison was performed to assess the construct validity of the knowledge scale.

Results: A total of 73 responses were collected. Alpha value for knowledge was found to be 0.6 and test-retest reliability was 0.5.The final developed Knowledge scale consists of seventeen items. All the questions were givenscore(1 for Yes and 0 for No) and sum up to get a total score which was found to be 76.55%.

Conclusion:Currently developed questionnaire showed good psychometric properties on the population studied and showed moderate levelof knowledgeaccording to Blooms cutoff (60-79% shows moderate) towards antibiotic use.

Key words: antibiotics, knowledge,questionnaire, psychometric.

REVOLUTIONIZING PHARMACY PRACTICE: THE IMPACT OF ARTIFICIAL INTELLIGENCE

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Background

The pharmacy industry is undergoing a significant transformation with the integration of Artificial Intelligence (AI). AI has the potential to revolutionize pharmacy practice by improving medication management, enhancing patient care, and optimizing pharmacy operations.

Objective

This abstract aims to provide an overview of the current state of AI in pharmacy, highlighting its applications, benefits, and challenges.

Applications of AI in Pharmacy

Medication management: AI-powered systems can analyze medication regimens, identify potential interactions, and optimize treatment plans. Predictive analytics: AI can predict patient outcomes, identify high-risk patients, and provide personalized interventions.

Automated dispensing: AI-powered robots can automate medication dispensing, reducing errors and freeing up pharmacists' time**.**

Conclusion

AI has the potential to transform pharmacy practice by improving patient outcomes, reducing medication errors, and optimizing pharmacy operations. However, there are challenges to be addressed, including data integration, regulatory frameworks, and workforce development.

Keywords: Medication management, Artificial Intelligence, medication errors

ADVANCES IN DIAGNOSTICS AND MANAGEMENT OF VAGINAL CANDIDIASIS IN THE ERA OF ARTIFICIAL INTELLIGENCE

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Vaginal candidiasis (VC), a common gynecological condition caused by Candida species, affects millions of women globally, leading to significant morbidity and healthcare burden. Recent advancements in diagnostics and management have been revolutionized by integrating artificial intelligence (AI) technologies. AI-driven diagnostic tools, such as machine learning algorithms, have enhanced the accuracy and speed of VC detection by analyzing clinical data, microscopy images, and molecular biomarkers. These tools enable early and precise identification of Candida species, including non-albicans strains, which are often resistant to conventional therapies. Furthermore, AI-powered platforms facilitate personalized treatment strategies by predicting antifungal susceptibility and optimizing drug regimens based on patient-specific factors. Telemedicine and AI-based mobile applications have also emerged as valuable tools for patient education, symptom monitoring, and adherence to treatment. In management, AI aids in the development of novel antifungal agents and repurposing of existing drugs through virtual screening and molecular modeling. Despite these advancements, challenges such as data privacy, algorithmic bias, and the need for robust validation remain. This study highlights the transformative role of AI in improving the diagnostics and management of vaginal candidiasis, emphasizing its potential to enhance patient outcomes and reduce healthcare disparities. Integration of AI in VC care exemplifies the broader impact of technology in advancing women's health.

Keywords: Vagina Candidiasis; Diagnosis; Treatment; Antifungal; Screening

A COMPARATIVE QUALITATIVE STUDY OF COMMERCIALLY AVAILABLE BRANDS OF LOVASTATIN TABLETS IN MALAYSIA

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Lovastatin (LVS) is a commonly prescribed group of statins used to lower cholesterol levels and reduce the risk of cardiovascular diseases (CVD). Despite its widespread use, variations in the quality of different commercial brands can affect its efficacy and patient outcomes. This study aims to evaluate and compare the quality of various LVS tablet brands available in Malaysia.

Objectives

The primary objective was to assess the consistency and efficacy of different LVS brands by examining their physical characteristics, disintegration strength, and dissolution rates. Specifically, the study seeks to determine if there are significant variations in weight, diameter, thickness, and drug release profiles among the brands.

Methodology and Results: The study involved a series of evaluations on multiple brands of LVS tablets. Physical tests included measurements of weight, diameter, and thickness. Chemical characterization was conducted using Fourier Transform Infrared (FTIR) spectroscopy. Disintegration tests assessed the time taken for the tablets to break down, while dissolution tests measured the rate and extent of drug release using a USP Type 2 apparatus and UV-visible spectroscopy. The findings revealed significant differences among the brands in terms of physical attributes and drug release profiles. Variations were observed in weight, diameter, and thickness, indicating slight inconsistencies in manufacturing processes. FTIR spectroscopy confirmed the chemical composition of the brands. Disintegration tests showed varying times, with some brands disintegrating faster than others. Dissolution studies highlighted that the drug release rates were not uniform, with some brands demonstrating faster and more complete dissolution compared to others.

Conclusion

The study concludes that there are notable disparities in the quality of different LVS brands available in Malaysia. These variations can potentially impact the drug & efficacy and patient outcomes. These differences could impact the bioavailability and therapeutic efficacy of the tablets. Despite variations in disintegration and dissolution profiles, all brands demonstrated sufficient bioequivalence in terms of API release, ensuring their effectiveness in lowering LDL-C levels in patients. Therefore, stricter regulatory oversight and quality control measures are recommended to ensure consistency and effectiveness of LVS tablets in the market.

Keywords: Lovastatin, quality assessment, disintegration, dissolution, FTIR spectroscopy, LDL, LVS.

FORMULATION AND EVALUATION OF SUNSCREEN GEL FOR PHOTOPROTECTION.

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Skin exposure to ultraviolet (UV) radiation can lead to sunburn, premature aging, and an increased risk of skin cancer. The use of sunscreens is essential for effective photoprotection. This study focuses on the formulation and evaluation of a sunscreen gel containing UV-filtering agents to provide broad-spectrum protection against UVA and UVB rays.

A carbopol-based gel formulation was developed incorporating both physical (zinc oxide, titanium dioxide) and chemical (octinoxate, avobenzone) UV filters. The gel was prepared using a cold-processing method to ensure the stability of active ingredients. The formulated sunscreen gel was evaluated for physicochemical properties, including pH, viscosity, spreadability, and stability under different storage conditions. Additionally, in vitro sun protection factor (SPF) determination was performed using UV spectrophotometry to assess the efficacy of the formulation.

Results indicated that the sunscreen gel exhibited good spreadability, non-greasy texture, and desirable stability over the testing period. The SPF value of the formulation was found to be within an acceptable range, demonstrating effective photoprotective properties. The study concludes that the formulated sunscreen gel provides an alternative to conventional sunscreen creams, offering enhanced skin feel and ease of application while ensuring sufficient UV protection.

Keywords: Sunscreen gel, photoprotection, SPF, UV filters, formulation, evaluation.

FORMULATION AND EVALUATION OF SUSTAINED-RELEASE TRANSDERMAL PATCHES INCORPORATING THIOCOLCHICOSIDE AND DICLOFENAC FOR EFFECTIVE PAIN MANAGEMENT"

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Background: Pain management often requires frequent dosing, leading to poor patient compliance and increased systemic side effects. Transdermal drug delivery systems offer sustained release and improved therapeutic outcomes. Combining Thiocolchicoside, a muscle relaxant, with Diclofenac, a potent NSAID, can enhance pain relief through synergistic action.**Objective:**The objective of the present study was to develop and evaluate sustained-release transdermal patches containing Thiocolchicoside and Diclofenac for effective pain management, ensuring prolonged drug delivery, reduced dosing frequency, and improved patient compliance.

Materials and Methods: Transdermal patches were formulated using the solvent casting technique with polymers such as Hydroxypropyl Methylcellulose (HPMC) and Polyvinyl Alcohol (PVA). Propylene glycol was used as a plasticizer and permeation enhancer. The prepared patches were evaluated for physicochemical parameters including thickness, tensile strength, folding endurance, moisture content, drug content uniformity, and surface pH. In-vitro drug release studies were carried out using Franz diffusion cells, and release kinetics were analyzed by fitting the data to various mathematical models.

Results: The formulated transdermal patches exhibited uniform thickness, satisfactory folding endurance, and good tensile strength. Drug content was found to be within acceptable limits, and moisture content was low, indicating good stability. The in-vitro release profile demonstrated sustained drug release of both Thiocolchicoside and Diclofenac over 24 hours, following non-Fickian diffusion kinetics.

Conclusion: The combination transdermal patches of Thiocolchicoside and Diclofenac prepared by the solvent casting method were found to be effective for sustained drug release and are a promising alternative for long-term pain management, offering better patient compliance and minimized systemic side effects.

Keywords: Transdermal patches, Thiocolchicoside, Diclofenac, combination therapy, sustained release, pain management, solvent casting technique, in-vitro drug release.

AI IN VACCINE DEVELOPMENT AND DISTRIBUTION

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Artificial Intelligence (AI) is playing a major role in making the vaccine development and distribution faster, smarter, and more efficient. AI helps scientists quickly study the viruses and find the best vaccine ingredients which can improve drug formulas. Machine learning analyses the large amounts of data from the clinical trials, predicting how well a vaccine will work and identifying the possible side effects that occur. AI tools also help design vaccines, especially for new technologies like mRNA and viral vector vaccines. AI makes distribution smoother by improving supply chains, ensuring fair distribution, and reducing the waste. It helps predict vaccine demand, manage storage conditions, and fix delivery problems. AI-powered chatbots and online tools also spread accurate information, helping people understand vaccines and reducing hesitancy. Furthermore, AI models track disease outbreaks in real time, guiding health officials on where vaccines are needed most. During the COVID-19 pandemic, AI helped speed up vaccine research, develop mRNA vaccines, and streamline global distribution. However, challenges like data privacy, biased algorithms, and unequal access to the technology need to be addressed. By improving ethical AI practices and encouraging global cooperation, AI can continue to improve vaccine development and distribution. Overall, AI is making the vaccine process faster, more effective, and more accessible, ensuring the better healthcare for the people worldwide.

Keywords – Artificial Intelligence, Vaccine development, Machine learning, Distribution, mRNA Vaccine

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EDIBLE NUTRITIONAL BAR FOR CANCER PREVENTION

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Cancer prevention is currently envisioned as a molecular-based approach to prevent carcinogenesis in pre-cancerous stages i.e., dysplasia and carcinoma in- situ. Cancer is the second leading cause of mortality worldwide and a more than 61% increase is expected by 2040. Detailed exploration of cancer progression pathways including NF-kβ signalling pathway, Wnt-B Catenin signalling pathway, JAK-STAT pathway, TNF-α mediated pathway, MAPK/mTor pathway, apoptotic and angiogenic pathway; discloses a list of effector molecules involved in cancer development. Critical evaluation of these effector molecules through molecular approaches can intersect cancer formation and its metastasis. Manipulation in effector molecules like levels of NF-kβ, SOCS, β-catenin, BAX, BAK, VEGF, STAT, Bcl2, p53, caspases, CDKs have played an important role in inhibiting tumour growth and it's spread. Secondary metabolites obtained from natural sources have been extensively studied for its cancer preventing potential in las few decades. Eugenol, anethole, capsaicin, sanguinarine, EGCG, 6-gingerol and resveratrol are some of the examples of such interesting lead molecules. This work is an attempt to put up a comprehensive approach in understanding cancer progression pathways and effector molecules. The role of different plant metabolites with their chronic toxicity profiling in modulating cancer development pathways has also been highlighted.

Keywords: Cancer Prevention, Cancer Progression Pathways, Effector Molecules, Herbal Metabolites, Toxicology.

FORMULATION AND EVALUATION OF A POLYHERBAL BASED HERBAL BALM FOR MUSCULOSKELETAL PAIN RELIEF

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All ages are susceptible to musculoskeletal discomfort, which is frequently brought on by chronic illnesses like arthritis, inflammation, or trauma. Synthetic analgesics and nonsteroidal anti-inflammatory medicines (NSAIDs) are major components of conventional pain care. Although they're effective, these medications have side effects such gastrointestinal discomfort, liver toxicity, and reliance. As a substitute, herbal medicine has become well-known for its effectiveness, safety, and low risk of adverse effects when used to treat pain. The creation and assessment of a polyherbal-based herbal balm using natural substances with proven analgesic, anti-inflammatory, and counterirritant qualities are the main objectives of this study. The main active ingredients in the herbal balm composition are peppermint oil, eucalyptus oil, camphor, and menthol. Menthol is well-known for its cooling properties, which work to reduce pain by desensitizing nociceptors and activating thermoreceptors. As a counterirritant, camphor enhances blood flow and facilitates quicker musculoskeletal pain alleviation. Peppermint oil has the ability to relax muscles and helps to lessen stiffness and irritation. The analgesic and anti-inflammatory properties of eucalyptus oil are well known, and they contribute to the balm therapeutic effectiveness. It’s anticipated that the synergistic action of these polyherbal substances will enhance overall pain alleviation and recuperation. To guarantee uniformity, effectiveness, and patient compliance, the prepared herbal balm is subjected to stringent physicochemical assessments, such as stability analysis, spreadability tests, pH measuring, and viscosity measurement. The analgesic and anti-inflammatory properties of the balm are also evaluated through in vitro and in vivo research. To ascertain the herbal formulation medicinal potential, its efficacy is contrasted with that of traditional topical pain relievers.

FORMULATION AND EVALUATION OF NIGELLA *SATIVA*AND CENTELLA*ASIATICA* INFUSED HYDROGELS FOR WOUND HEALING

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Wound healing is a complex biological process influenced by a number of factors, including microbial infection, oxidative stress, and chronic inflammation. Nigella sativa, a medicinal plant rich in bioactive components such as thymoquinone, flavonoids, and thymol, possesses antibacterial, antioxidant, anti-inflammatory, and collagen-stimulating properties, making it a promising choice for wound treatment. Similarly, Centellaasiatica contains asiaticoside, madecassoside, and triterpenoids, which enhance fibroblast proliferation, collagen synthesis, and angiogenesis, resulting in faster wound healing. Hydrogels, three-dimensional polymeric networks with high water retention capacity, are an excellent drug release mechanism that keeps the environment moist while delivering therapeutic medications on a constant basis.The goal of this research is to develop and evaluate a hydrogel containing Nigella sativa and Centellaasiatica to promote wound healing. The formulation involved extracting bioactive components from Nigella sativa seeds and Centellaasiatica leaves using Soxhlet extraction, then incorporating the extracts into a hydrogel base consisting of polymers such as Carbopol 934 and modifying pH and viscosity. The hydrogel was tested for physicochemical properties, including pH, viscosity, spreadability, and drug release. Antimicrobial activity was tested against bacteria and fungi, confirming the hydrogel's ability to prevent infection. Radiation was used to measure antioxidant activity. Stability tests were carried out at different temperatures to verify long-term effectiveness.The findings suggest that Nigella sativa- and Centellaasiatica-infused hydrogel offers a synergistic strategy by combining natural antibacterial, regenerative, and collagen-boosting benefits with hydrogel-based controlled drug delivery, making it a promising option for current wound healing applications.

Keywords: Wound healing, Nigella sativa, Hydrogel, Centellaasiatica, Anti-microbial activity, Physicochemical characterization, Bioactive components

FORMULATION AND EVALUATION OF HERBAL ORAL DISPERSIBLE TABLETS FOR THE TREATMENT OF APHTHOUS ULCER

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Aphthous ulcers, commonly known as canker sores, are painful, non-contagious lesions that affect the oral mucosa, causing discomfort and difficulty in eating. Conventional treatments often rely on synthetic drugs such as analgesics, antibiotics, and corticosteroids, which may lead to adverse effects. This study aims to develop and evaluate an herbal oral dispersible tablet (ODT) as a natural alternative for the treatment of aphthous ulcers. Herbal ingredients, including Curcuma longa (turmeric) and Glycyrrhiza glabra (licorice), were incorporated due to their anti-inflammatory, antimicrobial, and wound-healing properties. The formulation process involved preformulation studies, blending, granulation, and compression, followed by a series of evaluation tests, including weight variation, disintegration time, friability, hardness, and wetting properties. The optimized formulation demonstrated promising disintegration and therapeutic potential, highlighting the effectiveness of herbal ODTs in managing aphthous ulcers with minimal side effects. This research supports the integration of herbal medicine into modern pharmaceutical formulations for safer and patient-friendly treatments.

Keywords: Herbal remedies, oral dispersible tablets, aphthous ulcers, turmeric, licorice, herbal formulation..

ARTIFICIAL INTELLIGENCE IN REGULATORY COMPLIANCE

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Artificial Intelligence (AI) is revolutionizing regulatory compliance in healthcare by enhancing efficiency, accuracy, and decision-making in drug approvals, medical device regulation, and clinical trial monitoring. Traditional regulatory processes are often time-consuming, resource-intensive, and prone to human error. AI-driven solutions, such as natural language processing (NLP) and machine learning (ML), can automate data extraction, analyze vast regulatory documents, and predict potential compliance risks, thereby accelerating approval timelines.

In drug development, AI assists in pharmacovigilance by identifying adverse drug reactions (ADRs) from real-world data, ensuring patient safety. It also streamlines dossier preparation by automatically structuring regulatory submissions per global standards, reducing manual workload. AI-powered predictive analytics help regulatory agencies assess drug efficacy and safety faster, improving decision-making. Moreover, AI-driven automation in Good Manufacturing Practice (GMP) compliance ensures real-time monitoring of production quality.

However, integrating AI into regulatory frameworks presents challenges, including data security, algorithm transparency, and ethical concerns regarding decision accountability. Regulatory agencies, such as the FDA and EMA, are adapting to AI-based methodologies by formulating guidelines to ensure compliance, safety, and effectiveness. The future of AI in regulatory compliance lies in harmonizing AI-driven automation with human expertise to create a robust, transparent, and efficient regulatory ecosystem. This integration will enhance public health safety while reducing the time and cost associated with bringing new drugs and medical technologies to market.

Keywords: Regulatory Compliance, Pharmacovigilance, Machine Learning in Drug Approval, Regulatory Automation, Good Manufacturing Practice (GMP) Compliance.

SYNERGISTIC EFFECTS OF SELECTED PHYTOCONSTITUENTS ON BREAST CANCER CELL

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Breast cancer remains a leading cause of cancer-related mortality among women worldwide, necessitating the development of effective and safer therapeutic strategies. Phytoconstituents, bioactive compounds derived from plants, have shown promising anticancer properties through diverse mechanisms, including apoptosis induction, cell cycle arrest, and inhibition of metastasis. Recent research highlights the synergistic effects of multiple phytochemicals, enhancing their anticancer potential through complementary and overlapping molecular pathways. Combinations such as curcumin and resveratrol, quercetin and epigallocatechin gallate, or genistein and sulforaphane exhibit enhanced efficacy in suppressing breast cancer cell proliferation while reducing drug resistance and minimizing toxicity. These synergistic interactions involve modulation of key signaling pathways, including PI3K/Akt, NF-κB, and Wnt/β-catenin, as well as epigenetic modifications that potentiate anticancer effects. Understanding these interactions offers novel insights into developing phytochemical-based combinatorial therapies, potentially improving clinical outcomes for breast cancer patients. Further in vitro, in vivo, and clinical investigations are necessary to optimize dosing strategies and establish their translational relevance.

Keywords*:* Breast cancer, phytoconstituents, synergistic effect

3D-PRINTING IN PHARMACEUTICALS

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Three-dimensional (3D) printing has become a huge breakthrough in the pharmaceutical industry, with unmatched potential for drug delivery and personalized therapy. Customized medicine formulations with exact dosages that are suited to each patient's needs can be made using additive manufacturing techniques and 3D printing.This invention is especially useful for creating polypills, which combine several medications with different release characteristics into one dose form. A variety of 3D printing techniques, such as selective laser sintering, stereolithography, and inkjet printing, make it easier to create intricate drug geometries that enhance patient compliance and bioavailability. The successful creation of Spritam, the first 3D-printed medication to receive FDA approval, is an example of the technology's clinical feasibility. 3D printing has drawbacks despite its benefits, including issues with material compatibility, high upfront costs, and regulatory problems.Future developments should concentrate on bioprinting, using biocompatible materials to fabricate tissues and organs, and extending the use of the technology to the treatment of chronic illnesses and individualized cancer treatments. 3D printing has enormous potential to improve treatment results and change the face of modern medicine by altering pharmaceutical manufacture.

Keywords: 3D Printing, Drug Delivery Systems, Personalized Medicine, Additive Manufacturing, Pharmaceutical Innovation

APPLICATIONS OF AI IN 3D PRINTING

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The advent of 3D printing in healthcare has unlocked unprecedented possibilities, from personalized implants and prosthetics to bio printed tissues and transdermal drug delivery systems. However, the interaction between 3D-printed medical products and skin physiology remains an evolving area of study, particularly regarding allergen exposure and material biocompatibility. This paper explores how engineered biomaterials interact with the skin's absorption pathways, using a case study of a burn patient receiving a 3D- bioprinted skin graft. The graft, designed from the patient's own cells, successfully mimicked the extracellular matrix, enhancing regeneration while minimizing immune rejection. While 3D printing offers tailored healthcare solutions, concerns regarding allergenic polymers, metallic implants, and resin-based photo initiators highlight the need for hypoallergenic and adaptive biomaterials. Moreover, 3D-printed transdermal patches and microneedle arrays are reshaping drug delivery by bypassing the stratum corneum for targeted absorption. As 3D printing advances, the development of dynamic, skin-responsive materials that adapt to individual immune profiles could redefine biocompatibility standards. This study proposes an innovative approach bio intelligent 3D printing—which integrates real-time allergen detection and responsive material engineering. By bridging materials science, dermatology, and regenerative medicine, the next generation of skin-friendly, patient-specific 3D-printed medical devices can be realized.

Keywords: 3D bioprinting, skin absorption, biointelligent materials, transdermal delivery, personalized medicine, biocompatibility.

A SIGNIFICANT ROLE OF ARTIFICIAL INTELLIGENCE IN NOVEL DRUG DELIVERY SYSTEMSAND DRUG DESIGN

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Artificial Intelligence (AI) is revolutionizing the field of Novel Drug Delivery Systems (NDDS) and drug design by enhancing efficiency, precision, and personalization in therapeutic applications. NDDS, which includes nanocarriers, microneedles, hydrogels, and smart delivery systems, aims to improve targeted drug administration, minimize side effects, and optimize therapeutic outcomes. AI contributes significantly to NDDS by analyzing vast datasets, predicting drug-nanoparticle interactions, and optimizing .Formulations for controlled drug release. Techniques such as machine learning, artificial neural networks, and cheminformatics facilitate the rapid identification of optimal drug carriers, enhance drug stability, and personalize treatment based on patient-specific factors. AI-driven approaches are transforming drug design by enabling de novo drug discovery, structure-based drug modeling, and ligand-based methodologies. AI-powered Quantitative Structure-Activity Relationship (QSAR) models assist in predicting pharmacokinetic and pharmacodynamic properties, thereby reducing the time and cost of drug development. AI also plays a pivotal role in toxicity prediction, biocompatibility assessments, and optimizing nanoparticle compositions for enhanced drug encapsulation and release kinetics.In addition to nanocarriers, AI has demonstrated effectiveness in developing advanced drug delivery systems such as ethosomes, phytosomes, liposomes, and transdermal patches. These AI-integrated systems improve drug penetration, bioavailability, and site-specific delivery, reducing systemic toxicity. Future advancements in AI will further refine NDDS and drug design, paving the way for precision medicine and real-time monitoring of therapeutic responses. The integration of AI into NDDS and pharmaceutical sciences is expected to revolutionize drug delivery, enhance treatment efficacy, and improve patient care.

Keywords: - Artificial intelligence, Novel Drug Delivery, Quantitative structure activity relationship, Nanoparticle, Ethosomes , Phytosomes

CARDIOTHORACIC ANAESTHESIA IN THE DIGITAL AGE: THE APPLICATION OF ARTIFICIAL INTELLIGENCE

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In the ever-evolving landscape of medical technology, the integration of artificial intelligence (AI) has emerged as a transformative force in various specialties, including anaesthesia. Cardiothoracic anaesthesia, a critical domain within cardiovascular medicine, stands to benefit significantly from AI's capabilities. This abstract delves into the burgeoning intersection of cardiothoracic anaesthesia and AI, exploring the manifold applications, challenges, and potential outcomes. AI's capacity to analyze complex data streams swiftly and accurately has paved the way for personalized patient care in the digital age. In the context of cardiothoracic anaesthesia, AI's potential spans preoperative risk assessment, intraoperative monitoring, and postoperative care optimization. Algorithms trained on extensive patient datasets can predict patient-specific responses to anaesthesia, aiding clinicians in tailoring interventions. Furthermore, real-time AI-driven monitoring systems can detect subtle changes in hemodynamic and oxygenation, enabling timely intervention and improving patient safety during surgery. However, this symbiotic relationship between AI and cardiothoracic anaesthesia faces challenges, including data privacy concerns, algorithm interpretability, and integration with existing healthcare systems. Ensuring that AI models are trained on diverse and representative datasets is essential to mitigate biases and promote equitable patient care

Keywords: anaesthesia, artificial intelligence, cardiovascular, operation theatre.

EXPLORING DRYOPTERIDACEAE-DERIVED COMPOUNDS AS MAPK PATHWAY INHIBITORS IN CANCER: A NETWORK PHARMACOLOGY AND MOLECULAR DOCKING APPROACH

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The study investigated the underlying mechanisms of anticancer activity by employing network pharmacology and molecular docking analysis of bioactive constituents commonly found in the Dryopteridaceae family.Various scientific databases, including Google Scholar, ScienceDirect, and PubMed, were utilized to identify commonly studied Dryopteridaceae species and their previously reported bioactive constituents through GC-MS analysis. The SwissADME software was employed for the pharmacokinetic screening of these bioactive compounds. Network pharmacology analysis was conducted, encompassing target prediction for drug-disease interactions, protein-protein interaction (PPI) network construction, Gene Ontology (GO) enrichment, Kyoto Encyclopedia of Genes and Genomes (KEGG) pathway analysis, and the development of a compound-target-pathway network. Furthermore, molecular docking studies were performed to assess the binding affinity of the identified targets, thereby validating the predicted therapeutic potential.A total of 83 active targets associated with Dryopteris cochleate and Dryopteris ramosa along with 19,224 skin cancer (SC)-related targets, were identified through multiple databases. A total of 71 shared targets between the bioactive compounds and SC were utilized to construct a protein-protein interaction (PPI) network. Compound-target network analysis revealed the presence of 71 nodes and 222 edges. Kyoto Encyclopedia of Genes and Genomes (KEGG) and Gene Ontology (GO) enrichment analysis identified 65 signaling pathways, 61 biological processes, 14 cellular components, and 19 molecular functions. The MAPK signaling pathway were identified as key mechanisms in the mitigation of SC. Molecular docking analysis demonstrated that bioactive constituents of Dryopteriscochleate and Dryopteris ramosa exhibited strong binding affinity with key target proteins, including MAPK1 and MAPK3, suggesting their potential therapeutic role in skin cancer treatment.

Keywords*:* Cancer, MAPK pathway, Docking, Dryopteridaceae

THE ROLE OF ARTIFICIAL INTELLIGENCE IN PHARMACEUTICALS: TRANSFORMING DRUG DEVELOPMENT AND HEALTHCARE

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Artificial Intelligence (AI) is revolutionizing the pharmaceutical industry by enhancing drug discovery, optimizing manufacturing, and improving patient care. AI-driven models accelerate drug development by predicting molecular interactions, optimizing lead compounds, and identifying drug repurposing opportunities. Machine learning algorithms assist in pharmacokinetics and toxicology by predicting ADMET (Absorption, Distribution, Metabolism, Excretion, and Toxicity) properties, reducing failure rates in clinical trials.

A comprehensive literature review was conducted using Google Scholar, PubMed, and Scopus, focusing on recent advancements in AI applications in pharmaceuticals. Keywords such as "AI in drug discovery," "machine learning in pharmacology," and "AI-driven clinical trials" were used to retrieve relevant peer-reviewed articles. Studies were analyzed for AI methodologies, implementation challenges, and real-world applications to provide a holistic understanding of AI's impact on pharmaceuticals.

AI improves excipient selection, drug stability, and nanoparticle-based drug delivery in formulation and manufacturing. It streamlines clinical trials by optimizing patient recruitment and pharmacovigilance through automated safety monitoring. AI also enhances pharmacy practice with automated drug dispensing and predictive analytics for supply chain management.

Despite its transformative potential, challenges such as data privacy, regulatory compliance, and ethical considerations remain. However, AI continues to revolutionize pharmaceuticals, making drug development faster, safer, and more cost-effective while improving patient outcomes globally.

Keywords: Artificial Intelligence, Drug Discovery, Pharmaceuticals, Drug Formulation, Healthcare Optimization.

FORMULATION STRATIGIES FOR PALATABLE CHEWABLE TABLET:AN APPROACH THROUGH AI

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Chewable tablets serve as a user-friendly oral dosage form, especially beneficial for pediatric, geriatric, and dysphagia patients. Despite their advantages, formulating palatable chewable tablets without compromising drug stability and therapeutic efficacy presents significant challenges. This review examines key strategies to improve taste, texture, and patient acceptability, emphasizing the use of sweeteners, flavoring agents, and advanced taste-masking technologies. Conventional methods involve artificial sweeteners (e.g., aspartame, sucralose) and natural alternatives (e.g., xylitol, stevia), combined with flavor modifiers such as fruit extracts and cooling agents (e.g., menthol). Innovative approaches like microencapsulation, ion-exchange resins, and lipid-based coatings are also explored to mitigate drug bitterness. Furthermore, excipients such as mannitol, sorbitol, and microcrystalline cellulose play a crucial role in enhancing mouthfeel and disintegration properties. Emerging technologies, including spray-dried flavors, hot-melt extrusion, and co-processed excipients, offer promising avenues for optimizing formulation performance. By refining taste and texture, these strategies can enhance medication adherence, particularly in sensitive patient groups. Future research should focus on harmonizing palatability with mechanical robustness, stability, and bioavailability to advance chewable tablet development. This presentation will highlight real-world examples of AI and ML applications in chewable tablet care, address challenges like data security and algorithmic biases,and explore future opportunities for research and implementation

Keywords: Chewable tablets, palatability enhancement, taste masking, pharmaceutical excipients, flavor optimization, patient adherence, formulation science,AI tool.

COMPUTATIONAL APPROACHES TO MIRNA-TARGETED CANCER THERAPIES

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MicroRNAs (miRNAs) are small, non-coding RNA molecules that regulate gene expression by inhibiting translation. Dysregulation of miRNAs is closely linked to various cancers, as their altered function can drive uncontrolled cell proliferation and tumor formation. This study explores the computational analysis of miRNAs as potential targets for anti-cancer therapies, focusing on their involvement in cancer progression and interactions with therapeutic agents. Utilizing molecular docking and in silico modeling, we investigate how miRNAs interact with a range of drug candidates, shedding light on their potential for pharmaceutical research and drug design.The research delves into the structural and functional relationships between miRNAs and their target genes, aiming to uncover how miRNA regulation is disrupted in cancer. By studying these interactions, the study aims to identify key miRNAs that contribute significantly to cancer development, highlighting their potential as therapeutic targets. The findings underscore the promise of miRNA-targeted therapies in cancer treatment, offering a novel approach to modulating miRNA-mediated pathways implicated in tumorigenesis.Additionally, the integration of Artificial Intelligence (AI) in this field plays a critical role in enhancing the drug discovery process. AI-driven techniques can analyze vast amounts of biological data, predict miRNA-drug interactions, and optimize drug design, thus accelerating the development of effective anti-cancer therapies. By focusing on the restoration of normal miRNA function, this study provides insights into how miRNA-based therapies could improve cancer treatment outcomes.The research emphasizes the need for continued exploration of miRNA-targeted therapies, which could address the complex nature of cancer. With AI's involvement, computational tools can speed up the development of new, more effective cancer treatments, offering hope for more targeted and personalized therapeutic strategies in the fight against cancer.

Keywords:microRNAs, Molecular docking, Artificial Intelligence, Drug designing, Cancer.

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AI IN HEALTH CARE

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As the efficacy of artificial intelligence (AI) in improving aspects of healthcare delivery is increasingly becoming evident, it becomes likely that AI will be incorporated in routine clinical care in the near future. This promise has led to growing focus and investment in AI medical applications both from governmental organizations and technological companies. However, concern has been expressed about the ethical and regulatory aspects of the application of AI in health care. These concerns include the possibility of biases, lack of transparency with certain AI algorithms, privacy concerns with the data used for training AI models, and safety and liability issues with AI application in clinical environments. While there has been extensive discussion about the ethics of AI in health care, there has been little dialogue or recommendations as to how to practically address these concerns in health care. In this article, we propose a governance model that aims to not only address the ethical and regulatory issues that arise out of the application of AI in health care, but also stimulate further discussion about governance of AI in health care.

Keyword: Artificial Intelligence, Healthcare, Ethics, Regulation, Governance Framework

ARTIFICIAL INTELLIGENCE IN MEDICINE

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Artificial Intelligence (AI) is a general term that implies the use of a computer to model intelligent behavior with minimal human intervention. AI is generally accepted as having started with the invention of robots. The term derives from the Czech word *robota*, meaning biosynthetic machines used as forced labor. In this field, Leonardo Da Vinci's lasting heritage is today's burgeoning use of robotic-assisted surgery, named after him, for complex urologic and gynecologic procedures. Da Vinci's sketchbooks of robots helped set the stage for this innovation. AI, described as the science and engineering of making intelligent machines, was officially born in 1956. The term is applicable to a broad range of items in medicine such as robotics, medical diagnosis, medical statistics, and human biology—up to and including today's "omics". AI in medicine, which is the focus of this review, has two main branches: virtual and physical. The virtual branch includes informatics approaches from deep learning information management to control of health management systems, including electronic health records, and active guidance of physicians in their treatment decisions. The physical branch is best represented by robots used to assist the elderly patient or the attending surgeon. Also embodied in this branch are targeted *nanorobots*, a unique new drug delivery system. The societal and ethical complexities of these applications require further reflection, proof of their medical utility, economic value, and development of interdisciplinary strategies for their wider application.

Keyword : classification, cloud computing, data mining, decision support systems, fuzzy logic, health care, knowledge representation and reasoning, medical informatics, modeling methodologies, natural language processing, ontologies prediction probabilistic reasoning semantic Web text mining

DEVELOPMENT AND EVALUATION OF NANOEMULSION BASED VAGINAL SUPPOSITORIES OF CLINDAMYCIN FOR THE TREATMENT OF POLYCYSTIC OVARY SYNDROME

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This study focused on developing a better way to deliver clindamycin, an antibiotic, for vaginal infections. Since clindamycin is not well absorbed when taken orally and is quickly broken down by the liver, a new formulation was created using tiny oil-based droplets (nanoemulsions) to improve drug delivery. These nanoemulsions were made using high-speed mixing and ultrasound techniques, ensuring the right balance of ingredients. The final formulation contained very small particles (82.85 nm), had a stable structure, and retained almost 100% of the drug. The nanoemulsion was then incorporated into gelatin-based suppositories, which were tested for weight, hardness, and how quickly they dissolved. The suppositories dissolved within 8–9 minutes, releasing the drug efficiently. The optimized formulation released 51.72% of the drug within 2 hours, performing better than existing market products. The drug was released in a controlled manner, ensuring prolonged therapeutic effects.Overall, this study successfully developed a stable and effective clindamycin suppository using nanoemulsion technology, providing a promising option for improved vaginal drug delivery.

Keywords: Clindamycin, Nanoemulsion, Gelatin suppository, Ternary Phase diagram, Particle size analysis, polycystic ovarian syndrome

THE APPLICATION OF AI IN HEALTH CARE

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Artificial intelligence (AI) is poised to broadly reshape medicine, potentially improving the experiences of both clinicians and patients. We discuss key findings from a 2-year weekly effort to track and share key developments in medical AI. We cover prospective studies and advances in medical image analysis, which have reduced the gap between research and deployment. We also address several promising avenues for novel medical AI research, including non-image data sources, unconventional problem formulations and human–AI collaboration. Finally, we consider serious technical and ethical challenges in issues spanning from data scarcity to racial bias. As these challenges are addressed, AI's potential may be realized, making healthcare more accurate, efficient and accessible for patients worldwide. A global network of authors' keywords and content analysis of related scientific literature highlighted major techniques, including Robotic, Machine learning, Artificial neural network, Artificial intelligence, Natural language process, and their most frequent applications in Clinical Prediction and Treatment. The number of cancer-related publications was the highest, followed by Heart Diseases and Stroke, Vision impairment, Alzheimer's, and Depression. Moreover, the shortage in the research of AI application to some high burden diseases suggests future directions in AI research. This study offers a first and comprehensive picture of the global efforts directed towards this increasingly important and prolific field of research and suggests the development of global and national protocols and regulations on the justification and adaptation of medical AI products.

Keyword : Bibliometric Analysis; Artificial Intelligence; Health; Medicine; Global; Mapping; AI Ethic

THE APPLICATION OF AI IN HEALTH CARE

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As the efficacy of artificial intelligence (AI) in improving aspects of healthcare delivery is increasingly becoming evident, it becomes likely that AI will be incorporated in routine clinical care in the near future. This promise has led to growing focus and investment in AI medical applications both from governmental organizations and technological companies. However, concern has been expressed about the ethical and regulatory aspects of the application of AI in health care. These concerns include the possibility of biases, lack of transparency with certain AI algorithms, privacy concerns with the data used for training AI models, and safety and liability issues with AI application in clinical environments. While there has been extensive discussion about the ethics of AI in health care, there has been little dialogue or recommendations as to how to practically address these concerns in health care. In this article, we propose a governance model that aims to not only address the ethical and regulatory issues that arise out of the application of AI in health care, but also stimulate further discussion about governance of AI in health care.

Keyword : artificial intelligence, healthcare, ethics, regulation, governance framework 2 3

AI AND ROBOTICS IN SURGERY

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Robotic surgery is benefiting from the incorporation of AI technologywhich is transforming precision and efficiency, and image analysis performed by machines enables segmentation and tumor identificationrelevant to surgery during the procedure AI decision support systems dopredictive analytics. Automation of tissue dissection and suturing diminishes human error and fatigue thereby improving the quality of work. AI-assisted virtual reality training tools provides individualized endorsement which further help improve surgeon's skills. Along withtheseveral advantages AI poses ethical or legal deficiencies regarding algorithmic discrimination or data privacy. This is an issue that comes with the proper implementation of AI. If the human supportive capabilities of AI helps patients, and if it cansurpass all the obstacles surrounding research and development, thenthe precise needs of advanced procedures will be accessible along withincreased autonomy. Further, AI in robotics surgery intends to personalize patient-related care therefore the procedures will expand. The accuracy standard for surgery is bound to change.

Keywords: Real-time decision support systems, AI-powered imageanalysis, Automation, Surgical Skill enhancement, Instrument Placement, Tumor Detection, Virtual reality.

ENHANCING CARDIOVASCULAR IMAGING: THE ROLE OF AI IN STREAMLINING CCT FOR ISCHEMIC HEART DISEASE

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Artificial intelligence (AI) has revolutionized medical imaging by uncovering patterns and insights that are often difficult for the human eye to detect, thereby improving diagnostic accuracy and efficiency. In the field of cardiovascular imaging, several AI models have been developed to enhance the capabilities of cardiac computed tomography (CCT), a key diagnostic tool for evaluating coronary artery disease (CAD). CCT offers a comprehensive, non-invasive assessment of key cardiac parameters such as plaque burden, the severity of stenosis, and functional evaluations like CT-derived fractional flow reserve (FFRct). Its ability to predict major adverse cardiovascular events (MACE) has further elevated the demand for CCT, placing added pressure on radiologists' workloads. This review explores the role of AI in CCT for ischemic heart disease, emphasizing its potential to optimize workflows and enhance the efficiency of cardiac care through the use of machine learning and deep learning techniques.

Keywords: Artificial intelligence, medical imaging, CT-derived fractional flow reserve

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ARTIFICIAL INTELLIGENCE IN HEALTH CARE MANAGEMENT

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India Artificial Intelligence (AI) has revolutionized several industries, including health care, and has the potential to enhance patient care and quality of life. Rapid advances in AI have the potential to transform healthcare by incorporating it into clinical procedures. Utilizing deep learning capabilities for future challenges in drug discovery, formulation, and dosage, AI forecasts the interactions of new drugs with the human body, thereby enhancing the likelihood of creating stable medications. In the healthcare sector, AI's deep learning and pattern recognition technologies are capable of identifying and predicting medical outcomes by analyzing records, medical images, and formulating innovative treatments. The application of machine learning in AI has shown substantial advantages within healthcare systems, including enhanced diagnosis, cost savings through improved efficiency, better patient care, advancements in drug discovery, and progress in clinical trials. For targeted drug delivery, the concentration of medication directed at specific areas of the body is intentionally increased to ensure precise treatment of conditions like cancer and inflammation. Quantum dots, which are nanoparticle biomarkers composed of semiconductors, are utilized for optical imaging during cancer detection and therapy. The integration of AI improves the detection of biomarkers and the interaction of drug nanoparticles with designated cells or sites. This study highlights the role of artificial intelligence in our healthcare system, as it can interpret patterns in patients' medical records and forecast potential future risks. AI in drug delivery mechanisms anticipates how drugs behave and examines intricate pharmacodynamics. Furthermore, there is significant potential for leveraging the synergy between computational pharmaceutics and drug delivery systems in treating cancer and inflammatory diseases using nanoparticles. AI is about creating technologies that can improve patient care in a expertise must be resolved.

Keywords: Deep Learning, Machine Learning, Dosage Prediction, Nanoparticles, Clinical Trials, Patient Care, Data Privacy.

REVOLUTIONIZING DRUG SAFETY: THE ROLE OF ARTIFICIAL INTELLIGENCE IN TOXICITY PREDICTION AND DRUG DEVELOPMENT

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Artificial Intelligence (AI) is revolutionizing the field of drug safety and predictive toxicology by offering innovative solutions to predict adverse drug reactions (ADRs) and optimize drug development. Toxicity prediction is a critical step in the drug discovery process that helps identify and prioritize compounds with the greatest potential for safe and effective use in humans, while also reducing the risk of costly late-stage failures The field of toxicology is undergoing a significant transformation due to the integration of artificial intelligence (AI). Here, we explore the role of AI in enhancing the accuracy, efficiency, and breadth of toxicological assessments by bridging the gap between traditional approaches and advanced AI techniques. Through advanced machine learning (ML) and deep learning (DL) techniques, AI models predict drug toxicity, assess adverse effects, and analyze complex biological data, reducing reliance on animal testing. Recently, artificial intelligence (AI) has been used to improve drug toxicity prediction as it provides more accurate and efficient methods for identifying the potentially toxic effects of new compounds before they are tested in human clinical trials, thus saving time and money. In this review, we present an overview of recent advances in AI-based drug toxicity prediction, including the use of various machine learning algorithms and deep learning architectures, of six major toxicity properties and Tox21 assay end points which can aid researchers in understanding toxicity prediction and pave the way for new methods of drug discovery.

Keywords: Artificial Intelligence, Drug Safety, Toxicity Prediction, Natural language processing etc.

ARTIFICIAL INTELLIGENCE (AI)

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Artificial intelligence (AI) is revolutionizing healthcare and medical research by enhancing diagnostic precision and enabling predictive medicine. AI applications improve individualized treatment planning, diagnostic imaging analysis, and early disease detection through machine learning, neural networks, and natural language processing. By rapidly analyzing vast datasets, AI identifies complex patterns and predicts disease progression with remarkable accuracy. AI-powered decision support systems streamline healthcare workflows, reduce diagnostic errors, and facilitate early interventions. However, challenges such as algorithmic bias, data privacy concerns, and regulatory complexities must be addressed to ensure responsible AI integration. Collaboration among data scientists, policymakers, and healthcare professionals is crucial for ethical deployment. By overcoming these challenges, AI can significantly enhance patient outcomes, accelerate medical research, and transform healthcare delivery.

Keywords: clinical decision support, machine learning, healthcare technology, predictive medicine, diagnostic imaging, artificial intelligence, personalized medicine.

A

OPTIMIZED TOPICAL AND SYSTEMIC DRUG DELIVERY FOR PSORIASIS

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Psoriasis, a chronic inflammatory skin disorder, presents challenges such as poor drug penetration, systemic toxicity, and inconsistent therapeutic outcomes. Topical and systemic treatments with traditional approaches result in suboptimal effects due to poor skin permeability and active ingredient clearance. Additionally, systemic therapies may lead to severe side effects, necessitating precise control over drug release and absorption. Artificial Intelligence (AI) application in pharmaceutics provides an innovative solution to optimal formulation design, drug diffusion mechanism, and release kinetics. AI-based predictive modeling allows smart hydrogel formulation development that produces controlled drug release, adapting to factors like skin hydration levels, inflammation severity, and disease development. The research investigates the potential of AI to improve topical and systemic drug delivery using hydrogel-based drug delivery systems with AI-controlled release systems, AI-aided excipient selection, and predictive pharmacokinetics modelling. In-vitro and ex-vivo experiments confirmed AI-forecasted drug release patterns, demonstrating enhanced skin retention, prolonged therapeutic effects, and reduced adverse reactions. The AI technology also optimises therapeutic efficacy and reduces systemic toxicity through precision delivery. For reduced administration and patient compliance, smart hydrogels deliver drugs continuously. These findings illustrate AI's transformative potential in psoriasis medication therapy, enabling patient-specific, data-driven formulations. Future research will use real-time AI-based monitoring systems to adapt and customise psoriasis treatments.

Keywords: AI-driven drug delivery, psoriasis treatment, smart hydrogels, personalized medicine, topical and systemic therapy.

AI-DRIVEN DRUG DISCOVERY & REPURPOSING FOR NON-SMALL CELL LUNG CANCER (NSCLC)

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Non-Small Cell Lung Cancer (NSCLC) continues to be a significant cause of cancer-related mortality, highlighting the need for the creation of effective and innovative treatment strategies. AI has transformed drug research and repurposing by rapidly and cost-effectively identifying therapeutic potential. Machine learning and deep learning algorithms analyze extensive biological and chemical datasets to accelerate drug screening, target selection, and efficacy prediction. Drug repurposing using artificial intelligence identifies FDA-approved drugs with potential efficacy against NSCLC, speeding clinical translation and lowering toxicity. Additionally, AI-powered network pharmacology can map drug-target interactions, predict patient-specific responses, and optimise combination medications for tailored treatment. A major challenge in NSCLC management is drug resistance, which often limits the long-term success of conventional therapies. AI models anticipate resistance mechanisms and offer adaptive treatments using genetic data, tumour microenvironment signals, and real therapy responses. Data helps oncologists optimise response rates and generate customised treatment programmes for resistant non-small cell lung cancer patients. AI-driven techniques also help optimise drug formulations, such as delivery systems based on nanoparticles for improved bioavailability and tailored drug activity. The use of AI in drug discovery, repurposing, and precision medicine will revolutionise NSCLC therapy by creating tailored, effective, and less toxic drugs that improve patient outcomes and survival.

Keywords: Non-Small Cell Lung Cancer (NSCLC), Artificial Intelligence (AI), Drug Discovery, Drug Repurposing, Machine Learning, Precision Medicine, Drug Resistance, Network Pharmacology, Targeted Therapy, Nanoparticle Drug Delivery.

STEM CELL THERAPY IN CONGESTIVE HEART FAILURE

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Congestive Heart Failure (CHF) is a chronic condition where the heart struggles to pump blood efficiently, leading to inadequate oxygen delivery to tissues. Despite advances in medications and medical devices, CHF remains a major global health challenge. Stem cell therapy has emerged as a promising regenerative approach to repairing heart tissue, improving cardiac function, and slowing disease progression. Various stem cell types, including mesenchymal stem cells (MSCs) and induced pluripotent stem cells (iPSCs), have shown potential in regenerating heart muscle, promoting blood vessel formation, and reducing inflammation. Early studies suggest improvements in heart function and reduced scarring, yet challenges such as low cell survival, immune response issues, and ethical concerns remain. Researchers are working to enhance stem cell integration, optimize delivery methods, and explore combination therapies for better outcomes. With continued advancements, stem cell therapy has the potential to transform CHF treatment by offering a regenerative alternative to traditional management. This review discusses its mechanisms, clinical progress, and future prospects in cardiovascular medicine.

Keywords: Stem cell therapy, congestive heart failure, regenerative medicine, mesenchymal stem cells, cardiac repair, angiogenesis, cell-based therapy.

PEGYLATED NANOPARTICLES FOR TARGETED IMMUNOTHERAPY: INNOVATIONS AND CLINICAL IMPLICATIONS

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PEGylated nanoparticles have become a viable method for improving targeted immunotherapy's effectiveness in the treatment of cancer. This method combines the immunomodulatory qualities of polyethylene glycol (PEG) coatings with the advantages of drug delivery via nanoparticles. It has been shown that PEGylation of nanoparticles greatly enhances their pharmacokinetic characteristics, lengthens their half-life, and lowers their immunogenicity. New developments in the creation of PEGylated nanoparticles have improved treatment results and tumor targeting. Numerous immunomodulatory substances, such as checkpoint inhibitors, cancer vaccines, and short interfering RNAs (siRNAs), may be engineered into these nanoparticles. In addition to shielding the payload, the PEG coating makes the milieu more tolerogenic, which is essential for triggering immunological responses that are specific to the antigen. PEGylated nanoparticles have important therapeutic applications in immunotherapy. They have shown potential in addressing issues including poor response rates and serious immune-related side effects that are linked to traditional immunotherapies [5]. Through the targeted delivery of immunomodulatory drugs to the tumor microenvironment, these nanoparticles may minimize systemic toxicity while increasing tumor-specific T cell activation. Additionally, PEGylated nanoparticles have shown promise in combination treatments. They have shown synergistic benefits in immune activation and tumor control when combined with other therapeutic methods like photothermal therapy or checkpoint inhibitors. PEGylated nanoparticles are anticipated to become more significant in customized cancer immunotherapy as this area of study develops. They are a useful weapon in the continuous battle against cancer because of their adaptability and capacity to be tailored for certain uses.

Keywords: Nanoparticles, PEGylation, Immunotherapy, Targeted Delivery, Cancer Treatment, Personalized Medicine

NEXT-GEN ANTITHROMBOTICS: AI, NANOTECHNOLOGY AND TARGETED THERAPIES FOR THROMBOSIS CONTROL

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Thrombosis remains a major global health challenge, necessitating the development of next-generation antithrombotic therapies with enhanced efficacy and safety. Advances in artificial intelligence (AI), nanotechnology, and targeted drug delivery are revolutionizing thrombosis management. AI-driven drug discovery enables the rapid identification of novel anticoagulants with minimized bleeding risks. Nanotechnology-based delivery systems improve the precision of thrombus targeting, reducing systemic side effects. Additionally, biomimetic and gene-editing strategies offer personalized and adaptive anticoagulation approaches. The integration of AI with nanomedicine enhances real-time monitoring, optimizing treatment outcomes. These innovations hold promise for safer, more effective thromboprophylaxis and clot-dissolving strategies, particularly in cardiovascular and cerebrovascular diseases. Further research and clinical validation are essential to translate these advancements into mainstream medical practice.

Keywords: Antithrombotics, thrombosis, AI-driven drug discovery, nanotechnology, targeted drug delivery, biomimetics, gene editing, precision medicine, thrombus dissolution, cardiovascular diseases.

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ADVANCING INSIGHTS INTO NEUROPATHIC PAIN: A COMPREHENSIVE REVIEW OF ITS COMPLEXITIES AND THERAPEUTIC FRONTIERS

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Neuropathic pain is pain caused by damage or disease affecting the somatosensory system either in the periphery or centrally and affects 7-10% of the general population. A lesion or malfunction within the somatosensory nerve system is the cause of chronic condition known as neuropathic pain, which significantly reduces quality of life. This review provides a **comprehensive analysis of neuropathic pain**, focusing on its intricate pathophysiology, diverse clinical manifestations, and the latest diagnostic advancements. It explores the molecular and neurochemical mechanisms underlying neuropathic pain, including neuronal hyperexcitability, neuroinflammation, and maladaptive plasticity.

Furthermore, this review delves into the **therapeutic frontiers** in neuropathic pain management, highlighting both established and emerging treatment strategies. Pharmacological interventions, such as anticonvulsants, antidepressants, and novel molecular targets, are examined alongside non-pharmacological approaches, including neuromodulation, cognitive therapies, and regenerative medicine. Additionally, recent advancements in gene therapy, neuroimmune modulation, and personalized medicine are discussed as potential breakthroughs in optimizing pain relief and improving patient outcomes.

By integrating **current evidence and emerging research**, this review aims to enhance the understanding of neuropathic pain's complexities while shedding light on innovative therapeutic strategies. Addressing the challenges and limitations of existing treatments, it emphasizes the need for a multidisciplinary approach to achieve effective and individualized pain management.

Keywords: Neuropathic pain, pathophysiology, diagnosis, pharmacological treatment, neuromodulation, emerging therapies, pain management

ARTIFICIAL INTELLIGENCE IN DRUG DISCOVERY

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Conventional drug discovery is a lengthy and expensive endeavor with significant failure rates. The field is being revolutionized by Artificial Intelligence (AI), which speeds up the identification of drugs, enhances the selection of compounds, and forecasts drug interactions with greater precision. AI-based methods, including machine learning and deep learning, assist in the analysis of intricate biological data, thereby decreasing the time and expenses associated with drug development.

Objective This research examines the impact of artificial intelligence on contemporary drug discovery and distribution, emphasizing its use in virtual screening, drug repurposing, and tailored medicine. It further addresses the obstacles and future possibilities associated with AI-enabled drug development. Material & Method A comprehensive review of artificial intelligence applications in drug discovery was performed, focusing on recent developments in computational drug design, automation of highthroughput screening, and AI-enhanced molecular modeling. The study also explored the combination of AI with omics data and quantum computing. Result & Discussion

Artificial intelligence has greatly advanced the process of identifying drug candidates, shortened the duration required for lead optimization, and improved the likelihood of success in both preclinical and clinical trials. Nevertheless, obstacles like data bias, the interpretability of models, and regulatory limitations continue to hinder widespread implementation. Conclusion Artificial intelligence is transforming drug discovery by enhancing its efficiency and accuracy. As AI advancements progress, they will be vital in developing next-generation treatments, such as gene editing, nanomedicine, and advanced drug delivery systems. Overcoming obstacles related to AI deployment will be essential to realizing its complete potential in pharmaceutical innovation.

Keywords: Artificial Intelligence, Drug Discovery, Machine Learning, Drug Repurposing, Personalized Medicine

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A COMPREHENSIVE REVIEW ON RECENT INNOVATIONS ON BENZIMIDAZOLE: MODERN THERAPEUTIC APPROACHES IN TREATMENT OF ANXIETY

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The benzimidazole moiety, a key structure in medicinal chemistry, emerged as a prominent heterocycle to advance drug design and development with a wide range of pharmacological activities and therapeutic potential in treating various diseases. It has been actively used, to design pharmacologically active compounds. Notably, there are many benzimidazole-containing drugs available on the market currently that are used in the treatment of a wide range of diseases. However, there is no drug available in the market containing benzimidazole, that can be used in the treatment of anxiety. In an effort, numerous benzimidazole derivatives were studied and designed with the use of several synthetic techniques to act as potential anxiolytics. The primary objective of this research is to develop effective treatments for anxiety disorder by providing a detailed literature survey and designing novel benzimidazoles targeting anti-anxiety action.

Keywords: Benzimidazole, Drug design, Heterocylic compounds, Anxiolytics, Anti-anxiety action.

IN SILICO STUDY AND DRUG REPURPOSING FOR THE IDENTIFICATION OF POTENTIAL CANDIDATE MOLECULES AGAINST HUNTINGTON'S DISEASE

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Huntington’s Disease isa neurodevelopmental disorder characterized by a broad spectrum of age of onset and phenotypic diversity. Develops in middle age and is passed down through consecutive generations in the household. It is distinguished by forgetfulness, psychological issues, and uncontrollable choreatic movements. Some of the marketed drugs available for Huntington are Tetrabenazine, Fluoxetine, Citalopram, and Deutrabenazine, and recently development aims to reduce Huntington’s level by directly modifying the HTT (Huntington) gene or influencing gene transcription to target HTT DNA.Our study focuses on repurposing of some marketed drugs for the treatment of other diseases to be targeted for Huntington. Drugs having piperazine and pyrimidine moieties were selected like cetirizine, methotrexate, chlorpromazine, dexamethasone, hydroxyzine, ribavirin, risperidone, azacitidine through PubMed, Google scholar, ScienceDirect and designed using ChemDraw. SWISS ADME was explored for their physicochemical properties and Protox-II was used for toxicity data prediction. Docking studies were done using PyRx and Biovia Discovery Studio was used for visualisation. The binding affinity of the selected molecules cetrizine and chlorpromazine was -8.6 and -8.2, respectively which is better than Tetrabenazine (standard), which has -7.7. This study shows that these selected molecules can be repurposed for the treatment of Huntington's and can be further used for designing more similar derivatives.

Keywords: Docking; SWISS ADME; PyRx; Huntington; physicochemical properties.

UNVEILING THE POTENTIAL OF AI IN LIPOSARCOMA: OVERCOMING CHALLENGES IN DIAGNOSIS AND TREATMENT

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Soft-tissue sarcomas (STS) are rare and diverse tumors of mesenchymal origin, often posing significant diagnostic challenges. Among these, liposarcomas (LPS) can closely resemble benign lipomas, making accurate differentiation essential for appropriate management. A distinguishing genetic feature of LPS is the amplification of the MDM2 gene, which helps separate malignant tumors from benign adipocytic lesions. While histopathological and molecular analyses remain the gold standard, artificial intelligence (AI) and radiomics are emerging as valuable tools to enhance diagnostic precision. We reviewed the techniques which can aid in distinguishing benign from malignant tumors, ultimately supporting more personalized treatment decisions. It is evident that the surgical resection remains the primary curative approach, radiotherapy and chemotherapy are often employed as adjuncts, particularly in cases of myxoid liposarcoma. The integration of AI with imaging and digital pathology offered promising advancements in diagnostic accuracy and treatment planning. Future research should prioritize the clinical validation of AI-based models and their potential application in immunotherapy. Establishing standardized frameworks and expanding clinical trials will be crucial in transitioning AI-driven methodologies from research to practical healthcare settings, ultimately enhancing patient outcomes.

Keywords: Soft-tissue sarcomas, liposarcomas, malignant tumors, chemotherapy.

APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN EAR IMPAIRMENT

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Artificial intelligence has emerged as latest trend in healthcare due to its revolutionising diagnostic and efficient therapeutic techniques across the medical field. This paper focuses on emerging AI applications for ear disabilities like hearing loss, tinnitus and balance problem. Use of AI in etiology has shown potential in early diagnosis and individual based personalized treatment approaches. Machine learning algorithms based on large databases and patient data has exceptionally high accuracy rate which detects hearing loss pattern for early diagnosis. Also, AI based speech recognition and speech generation systems improve communication outcomes for the patients with ear impairment and it allows optimisation of hearing aid settings in various acoustic contexts. By analysing neuroimaging and electrophysiological data, AI explains the complicated neurological mechanism that underpin tinnitus perception, which allows the personalized therapeutic approach. In addition to this, AI based wearable devices provides real time monitoring of vestibular function, allowing for unmatched accuracy in assessment and therapy of balance issues. In spite of this, strong data standards and validated AI models across various populations, and data privacy and algorithm bias are concerns which limits the full use of AI in ear impairment care. Finally, AI has enormous potential to transform the diagnosis, treatment, and management of ear impairment, providing individualized and efficient solutions that improve patient outcomes and quality of life. This study emphasizes the need of ongoing research and cooperation in harnessing the revolutionary power of AI in audiology and otology.

Keywords: diagnostic, machine learning, tinnitus.

REVOLUTIONIZING DIABETES CARE WITH AI: FROM EARLY DETECTION TO SMARTER TREATMENT

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Artificial Intelligence (AI) emphasizes diabetes care by enhancing its early diagnosis, optimizing personalized treatment, and improving patient outcomes. Diabetes is one of the most common autoimmune diseases detected in middle-aged people nowadays, with high mortality and morbidity rates. This increasing prevalence of diabetes has shown the emergence of new AI-driven technologies to merge with healthcare for enhanced prevention and management of diabetes. AI-powered technologies, including machine learning and predictive analytics, enable faster and more precise detection of diabetes, risk assessment, and continuous glucose monitoring. Furthermore, AI-driven treatment strategies involve personalized medication plans, different types of wearables, decision-making of insulin dosage, and supporting lifestyle modifications based on real-time data. Additionally, AI enhances diabetes research by accelerating drug discovery, optimizing clinical trials, and identifying novel biomarkers. This poster explores how AI is transforming diabetes management, from prior detection to tailored treatment, ultimately paving the way for smarter, more efficient, and patient-centered healthcare solutions.

Keywords: Diabetes, personalized, wearables, insulin.

AI AND IOT DRIVEN REAL-TIME PATIENT MONITORING: IMPROVING CHRONIC DISEASES MANAGEMENT.

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A combination of AI and IoT-powered real-time patient monitoring devices offers continuous, real-time data collection and analysis. Chronic diseases like hypertension, heart diseases, diabetes, and asthma require constant tracking and personalized care to prevent complications. Traditional approaches for managing diseases involve regular doctor visits which leads to delayed interventions, reduces patient compliance, and lacks real-time data. Integrating AI algorithms with wearable sensors can improve the early detection of any health deterioration, and facilitate timely medical responses. Despite challenges like algorithm accuracy and data privacy continuous advancements in AI address these concerns. The system will also help in reducing the workload of medical personnel and healthcare costs. These have revolutionized modern healthcare by ensuring economic, social, and technological prospects.

Keywords: real-time, patient monitoring devices, delayed interventions.

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NANOTECHNOLOGCAL ADVANCES FOR NOSE TO BRAIN DELIVERY OF THERAPEUTICS TO IMPROVE THE PARKINSON THERAPY

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The Blood-Brain Barrier (BBB) is a significant barrier for drugs targeting neurodegenerative diseases like Parkinson's disease (PD). However, advancements in formulation technology and delivery approaches have successfully adapted to overcome these limitations. The nose to the brain (N2B) drug delivery, using nanoformulation, offers increased bioavailability, greater patient acceptance, and controlled release. The intranasal route carries therapeutics into the nasal cavity and brain through olfactory and trigeminal nerve connections. This approach is being explored for delivering other biologicals like neuropeptides and mitochondria. Meanwhile, this N2B delivery system is associated with critical challenges consisting of mucociliary clearance, degradation by enzymes, and drug translocations by efflux mechanisms. These challenges finally culminated in the development of suitable surface-

modified nano-carriers and Focused- Ultrasound-Assisted IN as FUS-IN technique

Keywords: Drug delivery system, neurodegenerative, nanoformulation,

THE THERAPEUTIC POTENTIAL OF ANDROGRAPHOLIDE IN ALZHEIMER'S DISEASE: A PROMISING AVENUE FOR PREVENTION AND TREATMENT

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Alzheimer's disease, a debilitating neurodegenerative disorder characterized by the accumulation of amyloid beta peptides and neurofibrillary tangles, continues to pose a significant threat to global health. Current treatment strategies focus on symptomatic relief rather than disease modification. Despite the limitations of existing treatments, recent breakthroughs in pharmacological research have identified andrographolide, a bioactive compound extracted from the traditional herbal medicine *Andrographis paniculat*a, as a promising therapeutic agent in the fight against Alzheimer's disease. Notably, andrographolide has demonstrated remarkable efficacy in mitigating the pathological hallmarks of Alzheimer's disease, including amyloid beta aggregation, neuroinflammation, and synaptic dysfunction. This study aims to provide a comprehensive overview of the pharmacological effects of andrographolide and elucidate its mechanisms of action in the context of Alzheimer's disease. By exploring the therapeutic potential of andrographolide, we seek to uncover new avenues for the prevention and treatment of this devastating neurodegenerative disorder. Because of its diverse neuroprotective qualities, andrographolide is a strong contender for the treatment and prevention of AD. To maximize its therapeutic use and prove its effectiveness in human populations, more studies are necessary.

Keywords: Andrographolide, Alzheimer's disease, Neuroinflammatory, Amyloid beta peptides

PERSONALIZED MEDICINE AND ARTIFICIAL INTELLIGENCE: A TRANSFORMATIVE SYNERGY

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Personalized medicine is revolutionizing healthcare by tailoring treatments to individual genetic, environmental and lifestyle factors. AI plays a pivotal role in this transformation, enabling precise disease diagnosis, preventive analytics and algorithms and big data, All enhances decision making in drug discovery, patient risk assessment and treatment optimization. Genomic sequencing, a cornerstone of personalized medicine, generates vast datasets that AI can analyze to identify genetic variations linked to disease. AI driven models also help in predicting drug response, reducing adverse effects and improving patient outcomes. Additionally, AI- powdered diagnostic tools, such as deep learning algorithms, enhance medical imaging interpretation, leading to early and accurate disease detection.

AI applications extends beyond diagnosis and treatment to clinical trials, where they optimize patient selection and accurate drug development, furthermore, wearable devices and mobile health application powdered by AI continuously monitor patient health, providing real-time feedback for personalized interventions. Despite its potential, integrating AI into personalized medicine presents challenges, including data privacy medicine present challenges including data privacy concerns, ethical considerations and the need for regulatory frameworks, collaboration between AI experts, healthcare professionals and policy makers is crucial to addressing these challenges and ensuring equitable access to AI-driven healthcare solution.

As AI continues to evolve, its surgery with personalized medicine promises a future where treatments are not only more effective but also tailored to each patient’s unique biology ultimately transforming healthcare into a more precise, predictive and patient-centered field.

Keywords: Personalized Medicine, Artificial Intelligence, Machine learning, Genomic Sequencing, Drug Discovery.

THE FUTURE OF ARTIFICIAL INTELLIGENCE AND ROBOTICS IN HEALTHCARE.

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In the near future, artificial intelligence may be crucial to the self-management of chronic conditions including depression, diabetes, and cardiovascular disease. Medication, food, and exercise are examples of self-management activities. Other self-management duties include wound care, device care, and care management. The health sector is about to be invaded by robotics and artificial intelligence (AI). This poster gives an overview of the current and future significance of robots and artificial intelligence (AI) in healthcare, including surgical robots, artificial organs, hospital automation robots, and the potential for AI in clinical care, health communication, health campaigns, and health improvement. It also provides information on occupational and environmental health and how AI supports the management of health care businesses and this encompasses a comprehensive overview of the key aspects, providing conclusion for understanding.

Keywords: AI, Robot, self-management, artificial organs, hospital automation robots, health campaigns, and health improvement.

INSIGHT INTO THE THIAZOLIDINEDIONES DERIVATIVE AS PPAR ΓAGONISTS AS USED IN THE TREATMENT OF TYPE 2 DIABETES MELLITUS

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The most common endocrine condition, diabetes mellitus (DM), is typically caused by inadequate insulin or, less frequently, by a decrease in insulin sensitivity (insulin resistance) .Numerous research investigations have shown that if chronic hyperglycemia is not treated medically, life expectancy and quality of life decline. Peroxisome proliferator-activated receptor gamma (PPARγ) is a key nuclear receptor involved in glucose metabolism, lipid homeostasis, and inflammation. Type 2 diabetes mellitus (T2DM) is treated with thiazolidinediones (TZDs), a class of thiazole-containing drugs that are well-known PPARγ agonists. However, side effects like weight gain, fluid retention, and cardiovascular hazards are linked to traditional TZDs like rosiglitazone and pioglitazone. Novel TZD compounds with increased therapeutic efficacy, less side effects, and higher selectivity have been developed as a result of recent developments in drug design. The structural alterations, modes of action, and therapeutic potential of TZD derivatives as PPARγ agonists are looked into in this work.Modified thiazole scaffolds have been shown in recent research to function as partial or selective PPARγ agonists, minimizing adverse effects while maintaining their anti-inflammatory and antidiabetic properties. The structural characteristics, binding processes, and therapeutic potential of thiazole derivatives as PPARγ modulators are examined in this review. Structure-activity relationships (SAR), new synthetic approaches, and their relevance to metabolic diseases are highlighted. Developing knowledge of how thiazole compounds interact with PPARγ may help develop next-generation medications with improved efficacy and safety characteristics.

Keywords: Thiazolidinediones Derivatives, PPARγ, Diabetics

STEM CELL THERAPY IN TREATING EPILEPSY

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Epilepsy is a chronic neurological disorder characterized by recurrent seizures due to abnormal neuronal activity. While antiepileptic drugs (AEDs) and surgical procedures help manage symptoms, they are ineffective for many, especially those with drug-resistant epilepsy. Stem cell therapy has emerged as a promising alternative, offering potential benefits such as neuroprotection, neurogenesis, and seizure reduction. Various stem cell types, including embryonic stem cells (ESCs), induced pluripotent stem cells (iPSCs), mesenchymal stem cells (MSCs), and neural stem cells (NSCs), have been explored for their therapeutic potential. These cells may reduce neuroinflammation, replace damaged neurons, restore inhibitory neurotransmission, and enhance synaptic plasticity. Preclinical studies suggest that stem cell transplantation can lower seizure frequency and improve cognitive function. However, challenges such as immune rejection, ethical concerns, tumor formation risks, and delivery optimization remain barriers to clinical application. Ongoing research aims to refine these therapies, enhance their safety and effectiveness, and develop personalized treatment approaches. This review explores recent advancements and future prospects of stem cell therapy in epilepsy management. Keywords: Stem cell therapy, epilepsy, neurogenesis, neural stem cells, mesenchymal stem cells, seizure suppression, neuroinflammation, neuronal repair, drug-resistant epilepsy.

Keywords: epilepsy, induced pluripotent stem cells, antiepileptic drugs, embryonic stem cells

FORMULATION, CHARACTERIZATION, AND EVALUATION OF RESVERATROL-LOADED HAIR SERUM FOR ENHANCED HAIR HEALTH

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Hair serums have become increasingly popular for their effectiveness in enhancing the health and appearance of hair. This research investigates the formulation, characterization, and assessment of a hair serum enriched with resveratrol designed for improved hair nourishment, protection, and growth. Resveratrol, a powerful antioxidant, provides advantages such as revitalizing the scalp, possessing anti-inflammatory effects, and safeguarding against oxidative stress. The formulation was created by combining natural oils, conditioning agents, and stabilizers to achieve the best consistency and bioavailability of resveratrol.

The serum was characterized through physicochemical analysis, which included measuring pH, assessing viscosity, and conducting stability studies under various storage conditions. Furthermore, techniques such as microscopy and spectrophotometry were utilized to evaluate particle size distribution and the content of resveratrol. The serum's effectiveness was tested through both in vitro and in vivo studies, focusing on factors like hair hydration, tensile strength, and the reduction of oxidative damage. Additionally, sensory evaluations and user acceptability assessments were carried out to gauge product performance and consumer satisfaction.

The findings revealed that the optimized formulation displayed favorable physicochemical characteristics, remained stable over an extended period, and exhibited notable conditioning and protective effects on hair. The serum infused with resveratrol demonstrated increased antioxidant properties, leading to better scalp health and a decrease in hair breakage. In summary, this research reinforces the promise of resveratrol as an important active component in hair care products, providing a natural and effective method for hair protection and rejuvenation.

Keywords: resveratrol, antioxidant, hair care, scalp health

POLYHERBAL GEL FOR ARTHRITIS: A SYNERGISTIC HERBAL APPROACH

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Arthritis is a persistent inflammatory condition that impacts joint health and movement, highlighting the need for effective and safe treatment options. This research centers on the creation and assessment of a polyherbal gel that includes Boswellia serrata, Zingiber officinale, Withania somnifera, and Curcuma longa, which are well-known for their anti-inflammatory and pain-relieving effects. The gel was developed using an appropriate polymer base to ensure ideal consistency, stability, and bioavailability of the active phytochemical components. The characterization of the gel involved physicochemical evaluations such as pH, viscosity, spreadability, and uniformity. To guarantee prolonged efficacy, stability studies were carried out under different storage conditions. The anti-inflammatory activity in vitro was assessed using protein denaturation and membrane stabilization tests. Ex vivo studies on skin permeation were conducted to evaluate the rate and extent of absorption of the herbal extract. Furthermore, in vivo effectiveness was investigated in animal models with arthritis to analyze pain relief and reduce joint inflammation. The results showed that there was strong anti-inflammatory effectiveness, prolonged drug release, and excellent rheological features in the improved formulation. Excellent user acceptance, sustained therapeutic effect, and improved penetration were all displayed by the polyherbal gel. With the use of medicinal plants' synergistic effects, this study shows the promise of a natural, topical alternative for managing arthritis that can effectively reduce pain and enhance joint function.

Keywords: Polyherbal gel, arthritis, anti-inflammatory, topical therapy.

NOSE-TO-BRAIN DELIVERY, AROUTE OF CHOICE FORTARGETING BRAIN TUMORS WITHNANOMEDICINES

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Brain tumour remain the devastating cancer type with a high rate of morbidity and mortalityin adults and children. Glioblastoma is the major type of brain cancer, and the most difficultto treat. However, delivering a drug molecule to target such tumours is very challenging dueto the presence of biological barriers mainly blood-brain and blood tumour barriers (BBB andBTB). Likewise, the drug to be administered for such purposes were pharmaceuticallymanipulated for health benefits using different nanocarriers that could enhance their permeability to BBB andBTB. However, a lot of studies and trial was carried out to establish the route of choice foradministering these drug, among all the studied routes, the intranasal route was proposed tohave been the most convenient and clinically beneficial non-invasive route for administeringchemotherapeutics agent for brain tumour targeting with high delivery efficiency. This studywas designed to compare the therapeutic benefit of the intranasal delivery and that ofconventional delivery systems and to evaluate the clinical benefits of using differentnanocarriers in brain tumour targeting. The literature was surveyed through an in-depthsearch of the research keywords in recognized scientific databases, mainly Science Direct,PubMed, Google Scholar, and Research Gate.

Keywords: Brain tumours, Glioblastoma, intranasal route, conventional delivery, Health, Clinical nanocarriers, blood-brain barrier, and blood tumour barrier.

THE FUTURE OF AI IN PHARMACEUTICALS

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Artificial Intelligence (AI) is reshaping the pharmaceutical industry by improving drug discovery, clinical trials, personalized medicine, and manufacturing. AI-powered tools can analyze large datasets, identify new drug candidates, and predict how different molecules will interact, making drug development faster and more efficient.

In clinical trials, AI helps in selecting suitable patients, predicting trial outcomes, and monitoring progress in real-time. This reduces costs and increases the chances of success. AI also plays a key role in personalized medicine by analyzing a patient's genetics, lifestyle, and medical history to create tailored treatment plans, improving safety and effectiveness.

AI-driven automation in pharmaceutical manufacturing enhances quality control, optimizes processes, and ensures regulatory compliance. Additionally, AI-based drug monitoring systems help detect side effects early, making medications safer for patients.

Despite its benefits, AI adoption in pharmaceuticals faces challenges such as data privacy concerns, regulatory hurdles, and the need for reliable validation methods. Overcoming these challenges requires collaboration between researchers, healthcare professionals, and regulatory agencies to develop ethical guidelines and standardized procedures.

This presentation explores how AI is shaping the future of pharmaceuticals, highlighting key advancements, potential obstacles, and the way forward. As AI continues to evolve, its responsible use will lead to faster, safer, and more cost-effective drug development and healthcare solutions.

Keywords: Artificial Intelligence, Drug Discovery, Personalized Medicine, Clinical Trials, Manufacturing, Drug Safety

FORMULATION AND EVALUATION OF A POLYHERBAL BASED HERBAL BALM FOR MUSCULOSKELETAL PAIN RELIEF

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All ages are susceptible to musculoskeletal discomfort, which is frequently brought on by chronic illnesses like arthritis, inflammation, or trauma. Synthetic analgesics and nonsteroidal anti-inflammatory medicines (NSAIDs) are major components of conventional pain care. Although they're effective, these medications have side effects such gastrointestinal discomfort, liver toxicity, and reliance. As a substitute, herbal medicine has become well-known for its effectiveness, safety, and low risk of adverse effects when used to treat pain. The creation and assessment of a polyherbal-based herbal balm using natural substances with proven analgesic, anti-inflammatory, and counterirritant qualities are the main objectives of this study. The main active ingredients in the herbal balm composition are peppermint oil, eucalyptus oil, camphor, and menthol. Menthol is well-known for its cooling properties, which work to reduce pain by desensitizing nociceptors and activating thermoreceptors. As a counterirritant, camphor enhances blood flow and facilitates quicker musculoskeletal pain alleviation. Peppermint oil has the ability to relax muscles and helps to lessen stiffness and irritation. The analgesic and anti-inflammatory properties of eucalyptus oil are well known, and they contribute to the balm's therapeutic effectiveness. It's anticipated that the synergistic action of these polyherbal substances will enhance overall pain alleviation and recuperation. To guarantee uniformity, effectiveness, and patient compliance, the prepared herbal balm is subjected to stringent physicochemical assessments, such as stability analysis, spreadability tests, pH measuring, and viscosity measurement. The analgesic and anti-inflammatory properties of the balm are also evaluated through in vitro and in vivo research. To ascertain the herbal formulation's medicinal potential, its efficacy is contrasted with that of traditional topical pain relievers.

Keywords: Synthetic analgesics, nonsteroidal anti-inflammatory medicines, herbal balm, anti-inflammatory.

THE ROLE OF POLYPHARMACY IN ELDERLY CARE: BALANCING MEDICATION RISKS AND HEALTH OUTCOMES

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Polypharmacy is widespread among older people, but the adverse outcomes associated with it are unclear. We aim to synthesize current evidence on the adverse health, social, medicines management, and health care utilization outcomes of polypharmacy in older people. It also examines potential side effects, such as falls, cognitive impairment, and a reduction in quality of life in older persons brought on by many drugs. Deprescribing, reconciliation, and a portion of the provider's responsibility to keep an eye on and instruct patients. To provide recommendations that can help advance the safer care of senior citizens, this study reviews and analyses a variety of solutions that have been created by different healthcare systems in the treatment of elderly patients who have polypharmacy difficulties.

Keywords: Polypharmacy, Elder Patients, Risk Management and Medication.

AI-POWERED PRECISION MEDICINE IN CANCER THERAPY

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Cancer is a leading cause of death in worldwide. Cancer poses a serious threat to human health and is highly prevalent and mortal. The mortality rates for cervical, prostate, and colorectal cancers are notably high since there is insufficient effective detection and therapy for these diseases. Artificial intelligence (AI) is used in this situation to mimic human intelligence and improve the effectiveness of the screening process and lesion detection rate. A.I is capable of weighing the benefits and drawbacks of the recommended treatment and can select the patient & most benefit-driven course of action. AI is important for understanding OMICS science which would progressively aid in the treatment of cancer.

Keywords: Cancer, Artificial intelligence, human intelligence, OMICS.

PHYTOCHEMICAL CONSTITUENTS AND DIVERSE BIOLOGICAL PROPERTIES OF CRASSULA OVATA: A REVIEW

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ABSTRACT From ancient times, plants have been utilized as remedies; on every continent, they are extensively and successfully employed; in Asian countries, herbal medicine is rather wellestablished and supported. Crassula ovata belongs to Orpine/ Crassulaceae family. The present review was based on the phytochemical constituents and diverse biological properties of Crassula ovata. Because of Crassulacean Acid Metabolism, the Crassula ovata plant photosynthesizes rather efficiently with minimum water loss. Taken in Africa to stop diarrhoea, jade leaves are extracted using milk. Chinese Feng Shui ceremonies use jade plants to draw in money. It also helps burns of the skin heal. Other communities, such the Maasai, utilize it to cure stomachs in distress. The methanolic and aqueous leaves extract of Crassula ovata showed itself as a rich source of saponin, phenol, sterols, steroids, tannins, terpenoids, anthraquinones, glycosides, flavonoids, carbohydrate, and protein. Majorly 5 phytochemicals were isolated and identified from Crassula ovata including: Bergenin, Gallic acid, Kaempferol, β-Sitosterol and Lutein. It concluded that Crassula ovata plant has been reported for various pharmacological activities i.e., anti-diarrheal, wound healing, antimicrobial, antioxidant, anti-cancer, and antidiabetic. It might be due to presence of diverse active biomolecules. Therefore, it suggests to fellow researchers to identify, isolate different active molecules of Crassula ovata and explore the pharmacological properties.

Keywords: Crassula ovata, bioactive molecules, biological properties, Gallic acid, antioxidant.

UNDERSTANDING OF DRUG USE, HABITUATION AND TREATMENT FOR DRUG ADDICTION

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Drug addiction, also called substance use disorder, is a disease that affects a person's brain and behaviour and leads to an inability to control the use of a legal or illegal drug or medicine. Substances such as alcohol, marijuana and nicotine also are considered drugs. When you're addicted, you may continue using the drug despite the harm it causes. Drug addiction can start with experimental use of a recreational drug in social situations, and, for some people, the drug use becomes more frequent. For others, particularly with opioids, drug addiction begins when they take prescribed medicines or receive them from others who have prescriptions. The risk of addiction and how fast you become addicted varies by drug. Some drugs, such as opioid painkillers, have a higher risk and cause addiction more quickly than others. As time passes, you may need larger doses of the drug to get high. Soon you may need the drug just to feel good. As your drug use increases, you may find that it's increasingly difficult to go without the drug. Attempts to stop drug use may cause intense cravings and make you feel physically ill. These are called withdrawal symptoms. Help from your health care provider, family, friends, support groups or an organized treatment program can help you overcome your drug addiction and stay drug-free. The current paper highlights the causes of drug abuse and describes the treatment and prevention of drug abuse and addiction to properly manage the problem.

Keywords: Addiction, opioids, risk, habit forming drugs

MCHSR/AI/2025/365

APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN ALZHEIMER'S DISEASE

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Alzheimer's disease is a chronic, irreversible neurological illness which causes cognitive deterioration and memory loss. Age is a key risk factor for Alzheimer's disease, but several other factors can influence the etiology and progression of the disease. As existing treatments for Alzheimer's disease cannot reverse neuronal loss, there is an increased demand for early and accurate diagnosis. Alzheimer's disease cannot be cured completely; hence, its early detection is crucial for effective management of the disease. As the prevalence of Alzheimer's disease increases on a global scale, there exists a pressing necessity for novel methodologies that can facilitate timely identification, accurate diagnosis, and personalised therapeutic interventions. Technological advancements have utilised Artificial Intelligence in various facets of the healthcare system. Artificial Intelligence aids in early detection and prediction of Alzheimer's disease by analyzing data such as neuroimaging, cerebrospinal fluid biomarkers, and digital biomarkers. AI-driven algorithms detect subtle biomarkers of Alzheimer's disease, enabling timely intervention and disease monitoring. AI improves diagnostic accuracy by integrating multiple data sources to create strong diagnostic models. AI algorithms outperform humans in distinguishing between cognitively healthy individuals, People who experience mild cognitive impairment and Alzheimer's disease patients, allowing clinicians to make more informed decisions. Furthermore, AI has been employed in drug research and development processes, including therapeutic target identification, virtual screening, and the repurposing of existing medications for Alzheimer's disease treatment. AI-powered virtual assistants and monitoring devices can help Alzheimer's patients manage their daily routines and remotely track the disease's progression. Furthermore, AI has demonstrated encouraging results in cognitive training for Alzheimer's patients, which is used to manage the disease. Artificial intelligence has a huge potential to transform the landscape of Alzheimer's disease research and clinical practice by creating novel pathways for early detection, precise diagnosis, and individualised treatment strategies. However, problems such as patient privacy, generalisation and shortage of data, physician's bias and ethical considerations necessitate additional research to fully realise AI's potential in battling Alzheimer's disease.

Keywords: Alzheimer's, personalised, diagnostic, monitoring devices.

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THE HUMAN-AI PARTNERSHIP: CAN MACHINES TRULY REPLACE DOCTORS?

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Abstract Background: Artificial Intelligence (AI) is transforming healthcare by enhancing diagnostic accuracy, streamlining workflows, and personalizing treatments. With AI-driven algorithms surpassing human capabilities in certain medical tasks, the debate arises—can machines replace doctors? While AI offers unprecedented efficiency, the irreplaceable human touch in clinical decision-making, ethics, and patient interactions remains critical. Aim: This study aims to evaluate the evolving role of AI in healthcare, assessing its strengths, limitations, and ethical considerations while exploring the collaborative potential between AI and healthcare professionals. Materials and Methods: A systematic review of AI applications in diagnostics, treatment planning, robotic surgeries, and patient management was conducted. Machine learning models, deep learning networks, and natural language processing (NLP) were analyzed for their efficacy in clinical decision-making. Additionally, ethical concerns, including bias, liability, and patient trust, were explored. Results: AI has demonstrated superior performance in pattern recognition, predictive analytics, and automation, significantly improving efficiency and reducing errors. However, challenges such as data biases, lack of emotional intelligence, and patient reluctance to accept AI-driven decisions highlight the need for a balanced human-AI collaboration rather than replacement. Conclusion: While AI is revolutionizing healthcare, it is not a substitute for human physicians but rather a powerful tool to augment their expertise. The future lies in a synergistic partnership where AI enhances decision-making, allowing doctors to focus on empathy-driven patient care and complex clinical judgment.

Keywords: Artificial Intelligence, Machine Learning, Healthcare Automation, Medical Ethics, Human-AI Collaboration, Clinical Decision-Making.

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ADVANCEMENTS IN MICROEMULSION NANOCARRIERS FOR CANCER THERAPY

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Abstract Microemulsion-based nanocarriers have become a viable cancer treatment approach because of their capacity to improve drug stability, solubility, and bioavailability. These nanocarriers offer a special platform for the targeted and regulated delivery of anticancer drugs, reducing systemic toxicity and enhancing therapeutic effectiveness. Because microemulsions self-assemble, hydrophobic and hydrophilic medications can be encapsulated in them, guaranteeing improved permeability and retention (EPR) effects in tumor tissues. Recent developments concentrate on creating biocompatible and stimuli-responsive microemulsions that can release medications in reaction to temperature, pH, and enzymes that are unique to a tumor. Further enhancing medication accumulation at tumor sites is the ability to actively target cancer cells by functionalization with ligands. In this study, the most recent developments in microemulsionbased nanocarriers for cancer treatment are highlighted, along with formulation techniques, pharmacokinetics, and possible applications. To improve therapeutic outcomes, future viewpoints highlight the combination of microemulsions with nanotechnology-driven strategies such theranostic systems and hybrid nanoparticles.

Keywords: Microemulsion, Nanocarriers, Cancer Therapy, Drug Delivery, Stimuli-Responsive Systems, Bioavailability, Controlled Release, Nanomedicine.

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NAVIGATING CARDIAC ARREST VS HEART FAILURE - A COMPREHENSIVE REVIEW

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Heart failure is a chronic, progressive condition arises from the heart's impaired ability to pump blood efficiently, presenting as left-sided, right-sided, or congestive failure. In contrast, cardiac arrest is an abrupt, life-threatening event marked by the sudden cessation of cardiac activity, necessitating immediate intervention to prevent death. This comprehensive review explores the distinctions between cardiac arrest and heart failure, encompassing epidemiology, etiology, signs, symptoms, pathophysiology, risk factors, diagnosis, prognosis, and management. Heart failure, characterized by the heart's inability to pump blood effectively, manifests in various types including left-sided, right-sided, and congestive failure. In contrast, cardiac arrest denotes sudden cessation of heart function, often leading to sudden death if not promptly treated. Risk factors such as hypertension, diabetes, and lifestyle choices significantly contribute to both conditions. Diagnosis necessitates nuanced evaluation, with heart failure diagnosed through clinical assessments and imaging, while cardiac arrest often requires emergency interventions like defibrillation. Prognosis varies, with heart failure having significant mortality rates and cardiac arrest requiring swift intervention to prevent neurological sequelae. Management strategies differ substantially, focusing on medication, lifestyle modifications, and device therapies for heart failure, and immediate cardiopulmonary resuscitation and advanced life support for cardiac arrest. Understanding the nuanced differences between these conditions is crucial for optimizing patient outcomes.

Keywords: Cardiac Arrest, Heart Failure, Epidemiology, Diagnosis, Management

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SYNTHESIS AND PHARMACOLOGICAL EVALUATION OF NOVEL HYDRAZONE AND OXADIAZOLE DERIVATIVES

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Derivatives of hydroxyzone and oxadiazole have garnered a lot of interest in medicinal chemistry because of their varied pharmacological properties. This study used suitable synthetic pathways involving condensation and cyclization processes to synthesis a number of new hydrazone and oxadiazole derivatives. Spectroscopic methods like mass spectrometry, NMR, and FTIR were used to confirm the structures of the produced compounds. The antibacterial, anti-inflammatory, and antioxidant properties of these compounds' pharmacological potential were assessed. Numerous substances demonstrated encouraging biological activity, some of which had strong antibacterial properties against both Gram-positive and Gram-negative bacterial strains. Along with noteworthy antioxidant qualities, certain compounds also showed strong anti-inflammatory action in in vitro models.
According to the structure-activity relationship (SAR) research, the bioactivity of these compounds was impacted by the presence of particular functional groups, such as substituents that donate or withdraw electrons. All things considered, the study emphasizes how oxadiazole and hydrazone derivatives may be used to create novel therapeutic medicines. Additional research could shed more light on their mode of action and optimize them for improved pharmacological performance. This includes molecular docking and in vivo studies.

Keywords: Hydrazone derivatives, Oxadiazole derivatives, Synthesis, Anti-inflammatory

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USE OF AI IN DRUG DESIGNING

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Abstract Artificial Intelligence (AI) is changing the way we design drugs, making the process faster, more accurate, and cost-effective. With AI-powered tools like machine learning (ML) and deep learning (DL), scientists can quickly identify drug targets, predict how molecules will interact, and refine potential drug candidates. This significantly cuts down the time needed for drug discovery. AI also helps analyze massive amounts of data to predict a drug's effects, optimize its structure, and assess safety, improving both efficacy and patient outcomes. One of AI's most exciting contributions is generative AI, which can design entirely new molecules with desired properties, offering fresh possibilities for drug development. Advanced platforms like AlphaFold and DeepChem assist in predicting protein structures and molecular interactions, paving the way for precision medicine. AI also enhances virtual screening techniques, reducing reliance on the traditional trial-and-error approach. However, despite these advantages, challenges like data bias, regulatory concerns, and model transparency remain. Moving forward, collaboration between AI experts and pharmaceutical researchers will be key to ensuring AI-driven drug design is both ethical and effective.

Keywords: Artificial Intelligence, Drug Discovery, Machine Learning, Deep Learning, Precision Medicine, Molecular Docking, Computational Chemistry, Virtual Screening.

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SYNTHESIS AND PHARMACOLOGICAL ACTIVITIES OF NEWLY SYNTHESIZED 1,3,4-OXADIAZOLES.

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Because of their diverse spectrum of biological actions, 1,3,4-oxadiazole derivatives have emerged as significant pharmacophores in medicinal chemistry. Significant pharmacological activities, such as antibacterial, anticancer, anti-inflammatory, antioxidant, anticonvulsant, and enzyme inhibitory properties, have been demonstrated by recently discovered 1,3,4-oxadiazole derivatives. Similar to or even more effective than conventional antibiotics, a variety of oxadiazole derivatives have shown strong antibacterial and antifungal action, especially against Staphylococcus aureus, Escherichia coli, Pseudomonas aeruginosa, and Candida albicans.

A-549 lung, MCF-7 breast, and HeLa cervical cancer cells are only a few of the cancer cell lines that have shown encouraging anticancer effects from compounds containing oxadiazole; certain derivatives of these compounds have been shown to induce apoptosis and limit cell proliferation. In vivo investigations have shown a considerable decrease in pro-inflammatory mediators such as TNF-α, IL-6, and COX-2, which supports their capacity to reduce inflammation. Furthermore, many of these substances have strong antioxidant qualities that reduce oxidative stress and effectively neutralize free radicals.

Keywords: 1,3,4-Oxadiazole, Antimicrobial, Anticancer, Anti-inflammatory

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UNRAVELING THE GUT-BRAIN AXIS: EMERGING INSIGHTS INTO EPILEPSY PATHOPHYSIOLOGY AND THERAPEUTIC INNOVATIONS

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Epilepsy is a complex neurological disorder characterized by recurrent, spontaneous seizures, primarily attributed to aberrant neuronal excitability and dysregulated neurotransmission. However, emerging evidence underscores the significance of the gut-brain axis (GBA) as a key modulator of seizure susceptibility. The GBA represents a bidirectional communication network between the gastrointestinal (GI) system and the central nervous system (CNS), mediated by microbial, immunological, endocrine, and neural pathways. Recent studies implicate gut dysbiosis—an imbalance in intestinal microbiota composition—as a contributory factor in epilepsy pathogenesis, influencing neuroinflammation, blood-brain barrier integrity, and neurotransmitter homeostasis, including γ-aminobutyric acid (GABA), glutamate, and serotonin.This review provides a comprehensive analysis of the molecular and mechanistic interplay between gut microbiota and epilepsy, with a focus on short-chain fatty acids (SCFAs), microbial metabolites, immune signaling, and vagus nerve activation. Furthermore, we critically evaluate preclinical and clinical evidence supporting the therapeutic potential of microbiota-targeted interventions, including probiotics, prebiotics, fecal microbiota transplantation (FMT), and the ketogenic diet, in mitigating seizure burden. Despite growing interest, significant challenges persist in elucidating causal relationships, optimizing microbiome-based therapies, and translating findings into precision medicine approaches for epilepsy. Future research should focus on microbiome-derived biomarkers, host-microbiota interactions, and personalized therapeutic strategies to advance the clinical applicability of gut microbiota modulation in epilepsy management.

Keywords: Epilepsy, Gut-Brain Axis, Microbiota, Neuroinflammation, Blood-Brain Barrier, Short-Chain Fatty Acids, Ketogenic Diet, Microbiome-Based Therapy.

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ARTIFICIAL INTELLIGENCE IN DRUG DISCOVERY

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Abstract Artificial intelligence (AI) is revolutionizing drug discovery by significantly enhancing the efficiency and effectiveness of the drug development process. Traditional methods often involve lengthy and costly trials, but AI accelerates this by leveraging vast datasets and advanced algorithms to identify potential drug candidates and predict their efficacy. Machine learning models analyze biological data, chemical properties, and clinical outcomes, facilitating the discovery of novel compounds and optimizing existing ones. Furthermore, AI aids in the identification of biomarkers for patient stratification, thereby personalizing treatment approaches. The integration of AI not only reduces time-tomarket for new therapeutics but also lowers costs, making drug discovery more accessible. As AI technologies continue to evolve, their application in pharmacology promises to transform the landscape of medicine, ultimately leading to improved patient outcomes and more targeted therapies. The ongoing research highlights the potential of AI as a pivotal tool in the Future of drug discovery.

Keywords: Artificial Intelligence, Drug Discovery, Machine Learning, Drug Repurposing, Personalized Medicine

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PHYTOPHARMACOLOGY OF ASHWAGANDHA AS AN ANTI-DIABETIC HERB

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Ashwagandha (Withania Somnifera) extracts are used in several pharmaceutical formulations containing them are nowadays often used as tonics useful for the preservation and cure of mental health problems,including sleep disturbances,depression,anxiety,insomnia,mental health and diabetes. On the 9th Ayurveda day 2024,a centre of excellence for fundamental and translational research in Ayurveda at CDRI Lucknow focused on advanced research in Ayurvedic botanicals like Ashwagandha. The possibility that W.somnifera could be used for treatment of diabetes and as a result exploratory clinical study was conducted with its root powered in diabetic patients which leads to metabolic disturbance was of 1st time reported in year 2000 .From then till now numerous preclinical and a randomised ,double blind and placebo controlled clinical study with extracts of the plant have continued to add experimental evidences in favor of the belief of the scholars and practitioners of Ayurvedic and other traditionally known. System of medicine that plant could be used in cure and prevention of diabetes and other metabolic disorders associated physical and mental health problems. Systematic reviews indicate that Ashwagandha effectively restores altered blood glucose and glycosylated haemoglobin (HbA1c) levels without significant safety concerns.

Keywords: Ashwagandha, glycosylated haemoglobin, diabetes.

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AI, INTELLECTUAL PROPERTY, AND PATENTS IN HEALTHCARE INNOVATIONS

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Artificial Intelligence (AI) is transforming healthcare by driving innovations in drug discovery, treatment development, and medical research. However, as AI-generated inventions become more common, they raise important legal and ethical questions—who owns an AI-created drug? Can an algorithm be considered an inventor? This paper explores the challenges AI poses to existing intellectual property (IP) and patent laws, particularly in the pharmaceutical and healthcare industries. It examines how current legal frameworks, such as those set by the United States Patent and Trademark Office (USPTO) and the European Patent Office (EPO), are adapting to these changes. Additionally, the paper discusses real-world cases and the potential need for reforms to ensure AI-driven medical advancements are protected while still promoting fairness and innovation. By simplifying complex legal debates and making them accessible, this study provides valuable insights for healthcare innovators, policymakers, and legal professionals navigating the future of AI patents.

Keywords: AI in Healthcare, Intellectual Property, Patents, AI-Generated Inventions, Legal Challenges, Innovation.

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LEGAL AND ETHICAL IMPLICATIONS OF AI IN HEALTHCARE

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The rapid integration of Artificial Intelligence (AI) in healthcare has unlocked new possibilities for diagnostics, treatment, and patient management. However, it also presents significant legal and ethical challenges, particularly concerning data privacy, liability, and regulatory oversight. This paper explores the implications of AI in healthcare, focusing on how AI systems handle sensitive patient data, the risks of algorithmic bias, and questions of accountability when AI-driven decisions lead to medical errors. Additionally, it examines existing legal frameworks, including HIPAA, GDPR, and FDA regulations, to assess their adequacy in addressing AI-related challenges. The study also considers ethical concerns such as informed consent, transparency, and the potential displacement of human decision-making in medical practice. By evaluating these critical issues, this research aims to provide insights into developing balanced legal and ethical policies that ensure AI's responsible and fair use in healthcare.

Keywords: AI in Healthcare, Data Privacy, AI Regulation, Ethical Considerations, Patient Rights, AI Governance.

ARTIFICIAL INTELLIGENCE ROLE IN DRUG DISCOVERY AND DEVELOPMENT

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Artificial intelligence is integral to drug discovery and development, playing a vital role in predicting the pharmacological properties of lead molecules by analyzing their chemical structure. this application enhances the effectiveness of drug development. Artificial Intelligence has emerged as a promising solution with significant potential to revolutionize drug discovery and development. AI facilitates optimal drug candidate identification offers unprecedented insight into various diseases and efficiently manages extensive patient datasets. AI in drug discovery significantly lowers drug discovery expenses

AI plays a crucial role in developing more effective treatment strategies by forecasting collaborative effects and identifying optimal dosages for different drug combinations.

The incorporation of artificial intelligence into drug discovery expedites the identification of potential drug targets significantly.

Artificial intelligence is integral to drug discovery and development, playing a vital role in predicting the pharmacological properties of lead molecules by analyzing their chemical structure.

Keywords: Artificial intelligence, potential drug targets, molecules.

THE ROLE OF AI IN ACCELERATING DRUG DISCOVERY AND PERSONALIZED MEDICINE

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The healthcare industry is quickly changing due to artificial intelligence (AI), especially in the areas of customized treatment and medication development. Artificial intelligence (AI) tools like machine learning, deep learning, and natural language processing are speeding up the process of finding new medication candidates and allowing for more accurate, customized treatment regimens for patients. In drug discovery, AI algorithms expedite the process by predicting how different compounds will interact with biological systems, identifying promising drug candidates, and optimizing the design of molecules for improved efficacy. AI can find patterns, forecast drug efficacy, and find possible treatment targets by evaluating enormous volumes of biological data that would be challenging to find using conventional techniques. Artificial intelligence (AI) models are being used in drug discovery to expedite the process of finding chemicals that might interact with particular biological targets, thereby cutting down on the time and expense involved in early-stage medication development. the transformative role of AI in drug discovery and personalized medicine, highlighting its potential to revolutionize healthcare by offering faster, more targeted, and individualized therapeutic solutions.

Keywords: Healthcare industry, AI algorithms, Artificial intelligence

AI-DRIVEN ADVANCES IN DRUG DELIVERY SYSTEMS

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The integration of Artificial Intelligence (AI) in drug delivery systems is revolutionizing personalized medicine by improving the precision, efficiency, and efficacy of treatments. AI-driven drug delivery leverages machine learning (ML), deep learning, and data analytics to optimize formulations, predict drug interactions, and enhance targeted delivery. These advancements enable controlled drug release, reduce side effects, and improve patient compliance.Nanotechnology-based drug carriers, such as liposomes and nanoparticles, are now coupled with AI to develop smart drug delivery systems that respond to physiological signals. AI also facilitates the development of predictive models for pharmacokinetics and pharmacodynamics, ensuring optimal dosing strategies. Additionally, AI-powered image processing and biosensors contribute to real-time monitoring and feedback mechanisms, enhancing drug administration accuracy.This paper explores the role of AI in advancing drug delivery, highlighting key innovations, challenges, and future perspectives. While AI-driven drug delivery systems promise transformative healthcare solutions, challenges related to data privacy, regulatory approval, and computational limitations must be addressed for widespread clinical adoption.

Keywords: AI in drug delivery, personalized medicine, smart drug carriers, machine learning, nanotechnology, pharmacokinetics, biosensors.

ARTIFICIAL INTELLIGENCE IN HEALTHCARE: TRANSFORMING PATIENT CARE AND MEDICAL INNOVATION

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Artificial Intelligence (AI) is transforming the healthcare sector by improving diagnosis, treatment, drug discovery, and patient management. AI-driven technologies, including machine learning algorithms and deep learning networks, evaluate extensive medical data, facilitating early disease identification and precise prognostication. AI-driven imaging methodologies aid radiologists in detecting anomalies with enhanced accuracy, minimizing diagnostic inaccuracies.

Moreover, AI chat-bots and virtual health assistants enhance patient involvement by delivering immediate medical guidance. In drug development, AI expedites the identification of prospective medication candidates, hence diminishing the time and expenses linked to conventional pharmaceutical research. Personalized medicine, an emerging discipline, greatly benefits from AI through the analysis of genetic data and the prediction of unique therapeutic responses.

Robotic-assisted operations improve accuracy and reduce risks, while AI-enabled wearable devices track essential health metrics, enabling early intervention in chronic conditions such as diabetes and cardiovascular illnesses. Despite its benefits, AI in healthcare encounters obstacles including data privacy issues, ethical quandaries, and the necessity for regulatory frameworks to guarantee safety and reliability. In summary, artificial intelligence is revolutionizing healthcare by enhancing efficiency, precision, and patient results. Through ongoing developments and ethical considerations, AI possesses the capacity to transform the future of medicine, enhancing the accessibility and personalization of healthcare. Addressing implementation issues is essential to fully leverage AI potential in providing high-quality medical care.

Keywords: AI driven technologies, Radiologists, AI chat-bots, Wearable devices, Accessibility.

"INTERLEUKIN-6: A CYTOKINE AT THE CROSSROADS OF IMMUNITY AND DISEASE"

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Interleukin-6 (IL-6) is a pleiotropic cytokine that plays a dual role in inflammatory responses, immune regulation, and cardiovascular health. While IL-6 is essential for host defense and tissue repair, chronic elevations in its levels have been implicated in the pathogenesis of cardiovascular diseases (CVD). This review examines the complex role of IL-6 in cardiovascular health, exploring its contribution to inflammation, endothelial dysfunction, and atherosclerosis, alongside its protective mechanisms. IL-6 mediates various signaling pathways, particularly the classical and trans-signaling pathways, which exhibit contrasting effects on the cardiovascular system. Classical IL-6 signaling is associated with protective and regenerative functions in vascular tissues, whereas IL-6 trans-signaling promotes pro-inflammatory effects that can lead to endothelial cell activation, oxidative stress, and subsequent vascular damage. Elevated IL-6 levels have been correlated with increased risks of hypertension, coronary artery disease, and heart failure, emphasizing its role as both a marker and mediator of cardiovascular pathology. However, recent studies suggest potential therapeutic targets within IL-6 pathways, offering prospects for anti-inflammatory interventions aimed at mitigating CVD progression. This review highlights the dual nature of IL-6 in cardiovascular health, emphasizing the need for further research to understand its signaling mechanisms and therapeutic potential.

Keywords: Interleukin-6, Cardiovascular disease, Inflammation, Endothelial dysfunction, Therapeutic targets.

A CRITICAL REVIEW ON THE ROLE OF MACHINE LEARNING AND DEEP LEARNING IN CARDIOVASCULAR DISEASE

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The detection of cardiovascular disease (CVD) has improved because to deep learning (DL). This systematic review and meta-analysis aim to evaluate the diagnostic accuracy of DL algorithms in CVD diagnosis. A comprehensive literature search yielded studies that employed DL algorithms for CVD diagnosis. The results show that DL algorithms can improve CVD diagnostic accuracy, particularly when combined with traditional risk factors. The review also discusses the limitations and challenges associated with DL applications in CVD diagnosis, including data quality, interpretability, and clinical validation.

Keywords: Cardiovascular Disease(CVD); Deep Learning(DL); Meta analysis.

ADVANCES IN NANOTECHNOLOGY FOR OCULAR DRUG DELIVERY IN THE TREATMENT OF GLAUCOMA

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Glaucoma is a leading cause of irreversible blindness, requiring long-term management to lower intraocular pressure (IOP) and protect the optic nerve. Conventional treatments, such as eye drops and oral medications, often suffer from poor absorption, rapid clearance, and patient non-compliance. Nanotechnology-based drug delivery systems offer a promising alternative by improving drug retention, enhancing penetration, and enabling sustained release. Various nanosystems, including liposomes, nanoparticles, nanoemulsions, and micelles, have been developed to optimize drug delivery to different parts of the eye. These nanocarriers enhance solubility, prolong therapeutic effects, and reduce dosing frequency and side effects. Recent advancements, such as biodegradable and stimuli-responsive nanoplatforms, have further improved ocular drug delivery for glaucoma. This review discusses the latest developments in nanotechnology-based formulations, their mechanisms, and potential clinical applications, paving the way for more effective and patient-friendly glaucoma treatments.

Keywords: Glaucoma, nanotechnology, ocular drug delivery, nanoparticles, sustained release, intraocular pressure

AI-DRIVEN DRUG DISCOVERY & REPURPOSING FOR NON-SMALL CELL LUNG CANCER (NSCLC)

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Non-Small Cell Lung Cancer (NSCLC) continues to be a significant cause of cancer-related mortality, highlighting the need for the creation of effective and innovative treatment strategies. AI has transformed drug research and repurposing by rapidly and cost-effectively identifying therapeutic potential. Machine learning and deep learning algorithms analyze extensive biological and chemical datasets to accelerate drug screening, target selection, and efficacy prediction. Drug repurposing using artificial intelligence identifies FDA-approved drugs with potential efficacy against NSCLC, speeding clinical translation and lowering toxicity. Additionally, AI-powered network pharmacology can map drug-target interactions, predict patient-specific responses, and optimise combination medications for tailored treatment. A major challenge in NSCLC management is drug resistance, which often limits the long-term success of conventional therapies. AI models anticipate resistance mechanisms and offer adaptive treatments using genetic data, tumour microenvironment signals, and real therapy responses. Data helps oncologists optimise response rates and generate customised treatment programmes for resistant non-small cell lung cancer patients. AI-driven techniques also help optimise drug formulations, such as delivery systems based on nanoparticles for improved bioavailability and tailored drug activity. The use of AI in drug discovery, repurposing, and precision medicine will revolutionise NSCLC therapy by creating tailored, effective, and less toxic drugs that improve patient outcomes and survival.

Keywords: Non-Small Cell Lung Cancer (NSCLC), Artificial Intelligence (AI), Drug Discovery, Drug Repurposing, Machine Learning, Precision Medicine, Drug Resistance, Network Pharmacology, Targeted Therapy, Nanoparticle Drug Delivery.

A COMPREHENSIVE REVIEW OF CURCUMA LONGA: MECHANISM, BIOMEDICAL APPLICATIONS, AND FUTURE PROSPECTS

Turmeric, or Curcuma longa Linn. (C. longa), is a member of the Zingiberaceae family and has long been used for its ability to treat a wide range of illnesses. C. longa has been treated externally to treat ulcers and inflammation and utilized in Unani and Ayurvedic medicine to treat liver blockage and jaundice. One of C. longa's main constituents, curcumin, is well known for its ability to treat a wide range of illnesses. In contrast to curcumin, there is a dearth of research on C. longa's potential for therapeutic use. Their antidepressant, anti-inflammatory, neuroprotective, anticancer, hepatoprotective, cardioprotective, immunomodulatory, antifertility, antimicrobial, antiallergic, antidermatophytic, and antioxidant qualities are all related to one another in terms of biological function. Chronic kidney disease (CKD) used to be a medical problem, but it is now a major worldwide health concern. Making changes in these patients' lives is particularly beneficial because they deal with a variety of issues. Hemodialysis diminishes the body's need for antioxidants and results in oxidative stress. Numerous studies have documented the beneficial effects of antioxidants on kidney, cardiovascular, hypertension, and chronic diseases; nevertheless, some have also claimed a minor impact on lowering mortality and cardiovascular disease. Antioxidants can be found in turmeric, which is often used as a condiment in cuisine.CKD and related inflammatory illnesses can be improved by curcumin, which can inhibit the formation and function of inflammatory chemicals, which are modulated by a variety of enzymes, transcription factors, and growth factors. Increased intestinal permeability causes pro-inflammatory chemicals (lipopolysaccharides and cytokines) to escape from the gut into the bloodstream in conditions like atherosclerosis, diabetes, and chronic kidney disease (CKD), according to recent research. Reduced expression of intestinal alkaline phosphatase (IAP) and tight junction proteins is the cause of this alteration in intestinal permeability.

Keywords: Curcuma Longa, Cardioprotective, Hemodialysis, Chronic Kidney Disease, Inflammatory

ARTIFICIAL INTELLIGENCE IN HEALTHCARE: NAVIGATING NEW FRONTIERS AND EMERGING CHALLENGES

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Artificial Intelligence (AI) is revolutionizing healthcare by enhancing diagnostic accuracy, personalizing treatment plans, and streamlining administrative processes. AI-powered tools, such as clinical decision support systems and predictive analytics, are improving patient outcomes and operational efficiency. For instance, AI applications in drug discovery have accelerated the identification of potential therapeutic compounds, reducing the time and cost associated with bringing new drugs to market.

However, the integration of AI in healthcare presents significant challenges. Ethical concerns, including patient data privacy and the opacity of AI decision-making processes, pose barriers to widespread adoption. Ensuring compliance with regulations such as GDPR and HIPAA is critical to maintaining patient trust and safeguarding sensitive information.

Additionally, the "black box" nature of some AI algorithms complicates the ability of healthcare professionals to interpret and trust AI-generated recommendations.

Addressing these challenges requires a multidisciplinary approach involving healthcare providers, AI developers, ethicists, and policymakers. Strategies such as implementing transparent AI models, establishing robust data governance frameworks, and promoting continuous education for healthcare professionals are essential. By proactively tackling these issues, the healthcare industry can harness the full potential of AI to improve patient care while upholding ethical standards.

Keywords: Artificial Intelligence, Healthcare Innovation, Ethical Challenges, Data Privacy, Clinical Decision Support, Predictive Analytics, Drug Discovery, AI Transparency, Patient Outcomes, Healthcare Efficiency.

AI/ML MODELS IN NEURODEGENERATIVE DISEASE: DETECTION, TREATMENT, AND PREVENTION.

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Artificial Intelligence (AI) and Machine Learning (ML) are revolutionizing the detection, treatment, and prevention of neurodegenerative diseases by leveraging computational power to analyze complex biological and clinical data. AI models process multimodal datasets from neuroimaging (MRI, PET, CT scans), genetic sequencing, cerebrospinal fluid biomarkers (e.g., amyloid-β, tau), and early and precise diagnosis is possible due to the electrophysiological recordings which enhance the conditions such as Parkinson's disease (PD), Alzheimer's disease (AD) and amyotrophic lateral sclerosis (ALS). Deep learning algorithms, including convolutional neural networks (CNNs) and recurrent neural networks (RNNs), can differentiate AD from normal aging with an accuracy exceeding 95% based on structural MRI scans. Similarly, machine learning classifiers such as support vector machines (SVMs) and random forests have demonstrated high efficacy in detecting PD through voice analysis and gait patterns, achieving sensitivity levels above 90%. In treatment, AI is accelerating drug discovery through in silico simulations, generative adversarial networks (GANs) and molecular docking studies for novel compound design. AI-driven predictive modeling has expedited the identification of repurposable drugs, such as the anti-diabetic drug metformin and the antihypertensive drug losartan, which have shown neuroprotective potential in AD and PD. Reinforcement learning algorithms are also being employed in personalized treatment planning, optimizing deep brain stimulation (DBS) parameters by analyzing patient-specific motor response data. Furthermore, AI-integrated wearable devices, equipped with accelerometers and speech processing modules, facilitate real-time monitoring of motor symptoms, cognitive decline, and disease progression. These devices, in combination with AI-driven speech recognition systems, have improved early PD detection by identifying micro-level speech abnormalities with over 85% accuracy. For prevention, ML models integrate genetic risk factors, lifestyle parameters (diet, exercise, sleep patterns), and environmental exposures to stratify populations based on disease susceptibility. Longitudinal cohort studies utilizing AI analytics have demonstrated that precision lifestyle interventions, guided by AI, can reduce neurodegenerative disease risk by up to 30%. AI-based cognitive training programs, incorporating adaptive learning and gamification techniques, have also shown promise in delaying cognitive decline in mild cognitive impairment (MCI) patients. Despite these advances, challenges such as data privacy concerns, the interpretability of deep learning models, and biases in AI training datasets hinder widespread clinical adoption. Ethical AI deployment necessitates robust regulatory frameworks, explainable AI (XAI) methodologies, and interdisciplinary collaboration among clinicians, neuroscientists, and AI researchers.

Keyword: Artificial Intelligence, Machine Learning, personalized treatment, genetic sequencing, neurodegenerative disease.

PATHOGENESIS OF MYCOBACTERIUM TUBERCULOSIS AND EMERGING THERAPEUTIC TARGETS: A REVIEW

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Mycobacterium tuberculosis (*M. tb*), the causative agent of TB, is a recalcitrant pathogen that is rife around the world, latently infecting approximately a quarter of the worldwide population. Understanding the mechanisms of *Mycobacterium tuberculosis* (*Mtb*) infection and important biological targets can lead to innovative treatments. The asymptomatic status of the dormant bacteria escalates to the transmissible, active form when the host's immune system becomes debilitated.While most antitubercular agents target pathogen-related processes, host-directed therapy (HDT) modalities addressing immune defense,survival mechanisms, and immunopathology as wellthe current front-line treatment regimen for drug-sensitive (DS) *M. tb* strains is a 6-month protocol involving four different drugs that requires stringent adherence to avoid relapse and resistance. Poverty, difficulty to access proper treatment, and lack of patient compliance contributed to the emergence of more sinister drug-resistant (DR) strains, which demand a longer duration of treatment with more toxic and more expensive drugs compared to the first-line regimen. Since, last decade for treatment of TB—the first anti-TB drugs isoniazid, cycloserinewith novel mode of actions to be introduced to the market in more than 50 years—reflecting the attrition rates in the development and approval of new anti-TB drugs. Herein, we will discuss the *M. tb* pathogenesis, current treatment protocols and challenges to the TB control efforts. This review also aims to highlight several small molecules that have recently been identified as promising preclinical and clinical anti-TB drug candidates that inhibit new protein targets in *M. tb*.

Keyword: *Mycobacterium tuberculosis* (*Mtb*), host-directed therapy (HDT), drug-resistant (DR) strains, pathogenesis,

ADVANCED TECHNOLOGIES POTENTIALLY APPLICABLE IN PERSONALIZED TREATMENTS.

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This review, we describe general concepts and emerging research in this field based on multidisciplinary approaches aimed at creating personalized treatment for a broad range of highly prevalent diseases (e.g., cancer and diabetes). This review is composed of two parts. In this review, we describe general concepts and emerging research in this field based on multidisciplinary approaches aimed at creating personalized treatment for a broad range of highly prevalent diseases (e.g., cancer and diabetes). Advanced drug delivery systems (DDS) present indubitable benefits for drug administration. Over the past three decades, new approaches have been suggested for the development of novel carriers for drug delivery. This review is composed of two parts. The first part provides an overview on currently available drug delivery technologies including a brief history on the development of these systems and some of the research strategies applied. The second part provides information about the most advanced drug delivery devices using stimuli-responsive polymers. Their synthesis using controlled-living radical polymerization strategy is described. Advanced drug delivery systems (DDS) present indubitable benefits for drug administration. Over the past three decades, new approaches have been suggested for the development of novel carriers for drug delivery. A comprehensive literature review was conducted, covering various aspects of ADDS, including nanoparticle-based systems, liposomal systems, polymeric systems, microelectromechanical systems and transdermal systems. In a near future it is predictable the appearance of new effective tailor-made DDS, resulting from knowledge of different interdisciplinary sciences, in a perspective of creating personalized medical solutions. ADDS have revolutionized the field of therapeutics, offering improved efficacy, reduced toxicity, and enhanced patient compliance. Despite challenges in scalability, regulatory frameworks, and toxicity, ADDS hold great promise for the future of medicine.

Keywords: Nanoparticle, liposome, polymeric, microelectromechanical,Transdermal.

AI MODELS FOR NEUROTOXICITY DETECTION: REVOLUTIONIZING CHEMICAL SAFETY ASSESSMENT

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The escalating number of chemicals in the environment and the inherent complexity of the nervous system pose significant challenges to traditional neurotoxicity testing methods. These methods are often resource-intensive, time-consuming, and may not accurately reflect human responses. Animal models may not always accurately predict human responses due to interspecies differences in physiology and metabolism. To address these limitations, Artificial Intelligence (AI) and Machine Learning (ML) models are emerging as powerful tools for predicting and understanding neurotoxicity. This conference presentation will showcase the latest advancements in AI/ML-driven approaches for neurotoxicity detection, highlighting their potential to revolutionize chemical safety assessment and accelerate the development of safer compounds. We will explore various AI/ML techniques, including deep learning models (such as Convolutional Neural Networks (CNNs) and Recurrent Neural Networks (RNNs), Machine learning algorithms, such as Random Forest (RF), k-Nearest Neighbors (kNN) and Support Vector Machines (SVM), have also been widely used for neurotoxicity prediction, and data mining able to extract valuable information from large databases and their applications in analyzing complex datasets to identify potential neurotoxicants. Furthermore, we will discuss the challenges and opportunities associated with using AI/ML in this field, including data quality, model validation, and regulatory acceptance. Finally, we will present case studies demonstrating the successful application of AI/ML models for neurotoxicity prediction, paving the way for a more efficient, ethical, and human-relevant approach to neurotoxicity assessment.

Keyword: Artificial Intelligence (AI), Machine Learning (ML), neurotoxicity, neurotoxicants, Drug Discovery.

THE AI HEALTH REVOLUTION: DIAGNOSTICS AND TREATMENTS ON THE BRINK OF CHALLENGES.

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AI is revolutionizing healthcare through innovations in diagnostics, treatment planning, drug development, and care delivery. This systematic review (2015-2024) examines peer-reviewed studies and case examples, including NLM's real-time AI glioma detection during MRI (2023) and ILAE's NLP system that increased epilepsy surgery referrals by 21% (2017). The AI healthcare market reached $32.3B in 2024, with 73% of radiologists reporting reduced diagnostic errors, while 83% of psychiatrists doubted AI's capacity for empathetic mental healthcare. Key findings highlight AI's dual impact: (1) enhanced clinical capabilities, including 30%+ accuracy gains in medical imaging and $20B annual savings from virtual nursing assistants; (2) improved access via remote monitoring in underserved regions. However, significant barriers persist, such as ethical concerns (data privacy, algorithmic bias), clinician skepticism, and regulatory gaps. The study underscores the tension between AI's technical efficacy and implementation challenges, emphasizing the need for interdisciplinary collaboration to ensure ethical, equitable adoption. While AI promises to transform healthcare, addressing physician trust gaps and equity
disparities remains critical for sustainable integration.

Keyword : AI Diagnostics, Clinical Efficiency, Ethical Governance, Physician Trust, Healthcare Equity

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ARTIFICIAL INTELLIGENCE IMPLEMENTATION IN MEDICAL IMAGING: CURRENT CHALLENGES

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The concept of using artificial intelligence (AI) to medicine has attracted a lot of attention since it has the potential to completely transform healthcare systems. Apart from the endless list of ethical and legal issues, only a small percentage of AI algorithms are used because it has the potential to drastically alter healthcare systems, the idea of using artificial intelligence (AI) to medicine has garnered a lot of interest. Because of the unpredictability of systems, only a small fraction of AI algorithms is deployed, aside from the countless ethical and legal concerns. By providing an overview of the current AI challenges in medical imaging, this paper aims to encourage better and more effective communication amongst various stakeholders in order to further the development of AI technology. Together with examples of failed solutions and their effects, we outline the four main barriers to incorporating AI in medical imaging. Creating a strong, accessible, and reliable AI algorithm is one of them. The oversight of information is a further problem, where implementing standard procedures for data sharing is necessary for fostering credibility and ensuring patient privacy. Promoting, beneficial, and igniting innovation in digital AI healthcare technologies is the fourthissue.

We talked about the initiatives of several organizations that are already actively seeking ethical advanceme nts in AI, including the World Health Organization (WHO),The Radiological Society of North America (RSNA), the European Society of Radiology (ESR), and the American College of Radiology (ACR). Thanks to the efforts of many stakeholders, the adoption of AI-driven healthcare apps in clinical practice will eventually become a reality, improving healthcare services and outcomes in the process.

Keywords: Artificial Intelligence; Radiology; Image; X-ray; Deep learning

MCHSR/AI/2025/393

TARGETING MOLECULAR PATHWAYS FOR NEUROPROTECTION IN NEURODEGENERATIVE DISORDERS

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Alzheimer's disease, Parkinson's disease and Huntington's disease are examples of neurodegenerative diseases that are typified by the progressive loss of neuronal structure and function. Recently, shared molecular and cellular mechanisms have connected neurodegenerative processes to migraine, a common neurological condition. Both disorders include neuroinflammation, mitochondrial dysfunction, oxidative stress and impaired calcium signalling all of which lead to damage to neurons and dysfunction. There are promising treatment approaches for migraine treatment and neuroprotection by focusing on certain molecular pathways. Promoting autophagy, improving mitochondrial function and modifying inflammatory cytokines have become important strategies for maintaining brain health.Mitigating neurodegeneration and migraine symptoms may also be achieved by preventing the development of reactive oxygen species (ROS) and cortical spreading depression. By creating customized medication delivery systems, nanotechnology advancements have improved the effectiveness and bioavailability of neuroprotective drugs. New research shows how crucial calcium channel modulation and synaptic maintenance are to the pathophysiology of migraines and neurodegenerative illnesses. This study highlights how molecular pathways in these disorders converge and highlights novel treatment approaches to fully address neuronal dysfunction. Knowing these interrelated pathways opens up new possibilities for integrative therapy strategies, which may help patients with neurodegenerative diseases as well as migraines.

Keywords: Neurodegenerative disorders, Molecular pathways, Neuroprotection, Alzheimer's disease, Parkinson's disease, Migraine, Oxidative stress, Neuroinflammation, Kinase signalling

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FORMULATION DEVELOPMENT & EVALUATION OF ETHOSOMAL GEL OF *NYCTANTHES ARBOR-TRISTIS* HERBAL PLANT

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Ethosomes are noninvasive flexible vesicular carriers that enable the drugs to permeate through the deeper layers of skin and systemic circulation. They are mainly composed of phospholipids, high concentration of ethanol and water. As ethanol is known for its disturbance of skin lipid bilayer arrangement; therefore, inclusion of ethanol into a vesicular membrane provides the ability of vesicle to permeate through the stratum corneum. The high flexibility of ethosomal carrier from the added ethanol allows the elastic carrier to squeeze through the skin pores. Phytomedicines are becoming more popular in the world for their ability to cure diseases with less toxicity and better therapeutic efficacy. Herbal medicines may also have disadvantages of poor bioavailability, stability issues and patient compliance. In order to minimize these problems various drug delivery systems such as liposomes, phytosomes, niosomes, ethosomes and trasferosomesetc are being developed for phytomedicines. Novel drug delivery systems can improve bioavailability of drug that refers to the existence of drugs in the body part where they are actually needed.*Nyctanthesarbortristis is* one of the most useful traditional plants in India. It is native to India and distributed wild in Sub-Himalayan regions. Its different parts are known to possess different pharmacological activities in Indian system of medicine. The plant contains various Phytochemical like flavonol, glycosides, oleanic acid, essential oil, tannic acid, carotene, friedline, lupeol, glucose, benzoic acid present in various parts of plants which have significant hepatoprotective, antiviral, antifungal, antipyretic, antimalarial, antibacterial, anti-inflammatory, antioxidant activities. The article reviews on is an attempt to compile and documented information on different aspect of *Nyctanthes arbortristis* pharmacological properties and highlights the need for research and their potential development.

Keyword: Ethosome, Phospholipid, Oleanic acid,Stratum corneum, Bioavailability.

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RIZATRIPTAN LIPOSOMES FOR TREATMENT OF MIGRANE VIA NASAL ROUTE: A COMPREHENSIVE REVIEW

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Migraine is a debilitating neurological disorder that requires efficient and rapid treatment to manage acute attacks and improve patient quality of life. Rizatriptan, a selective serotonin receptor agonist, has shown efficacy in alleviating migraine symptoms. However, its oral bioavailability is limited, leading to delayed onset of action and potential gastrointestinal side effects. This comprehensive review examines the potential of using liposomes as a delivery system for rizatriptan via the nasal route, offering advantages such as rapid absorption, bypassing first-pass metabolism, and improved bioavailability. The review discusses various liposomal formulation techniques, including thin film hydration, ethanol injection, and micro fluidization, and evaluates their impact on encapsulation efficiency, particle size, and stability. The potential for targeted delivery to the central nervous system and the impact on therapeutic outcomes are also considered. Finally, future research directions, including the development of novel liposomal formulations and large-scale clinical trials, are suggested to establish the efficacy and safety of rizatriptan liposomes for nasal delivery in treating migraines.

Keywords : Migraine, Rizatriptan, liposomes, nasal delivery.

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FORMULATION AND EVALUATION OF NAIL POLISH CONTAINING HERBAL INGREDIENTS

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The cosmetic industry has seen a growing demand for herbal-based formulations due to their safety, efficacy, and minimal side effects. This study focused on the formulation and evaluation of nail polish incorporating herbal ingredients with potential therapeutic and aesthetic benefits. Natural colorants, plant extracts, and essential oils were selected based on their antifungal, strengthening, and nourishing properties. The formulated nail polish was evaluated for parameters such as drying time, viscosity, gloss, adhesion, stability, and antifungal activity. The results demonstrated that the herbal nail polish exhibited desirable physicochemical properties comparable to conventional formulations while offering additional benefits such as nail protection and antifungal effects. The study suggested that herbal-based nail polishes can serve as a safer alternative to synthetic formulations, aligning with the growing trend toward eco-friendly and non-toxic cosmetics.

Keywords: Herbal nail polish, natural colorants, antifungal activity, cosmetic formulation, nail care, essential oils, plant extracts.

"EXPLORING SULFORAPHANE AS A POTENTIAL NEUROPROTECTIVE AGENT FOR PARKINSON'S DISEASE"

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A wide variety of acute and chronic neurodegenerative diseases, including ischemic/traumatic brain injury,and Parkinson′s disease, share common characteristics such as oxidative stress, misfolded proteins, excitotoxicity, inflammation, and neuronal loss. As no drugs are available to prevent the progression of these neurological disorders, intervention strategies using phytochemicals have been proposed as an alternative form of treatment. Among phytochemicals, isothiocyanate sulforaphane, derived from the hydrolysis of the glucosinolate glucoraphanin mainly present in Brassica vegetables has demonstrated neuroprotective effects in several *in-vitro* and *in-vivo* studies. In particular, evidence suggests that sulforaphane beneficial effects could be mainly ascribed to its peculiar ability to activate the Nrf2/ARE pathway. Therefore, sulforaphane appears to be a promising compound with neuroprotective properties that may play an important role in preventing neurodegeneration

Keywords: sulforaphane; neuroprotective effects; Parkinson's disease; excitotoxicity.

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PHYTOPHARMACOLOGY OF ASHWAGANDHA AS AN ANTI-DIABETIC HERB

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Ashwagandha (Withania Somnifera) extracts are used in several pharmaceutical formulations containing them are nowadays often used as tonics useful for the preservation and cure of mental health problems, including sleep disturbances,depression,anxiety,insomnia,mental health and diabetes. On the 9th Ayurveda day 2024,a centre of excellence for fundamental and translational research in Ayurveda at CDRI Lucknow focused on advanced research in Ayurvedic botanicals like Ashwagandha. The possibility that W.somnifera could be used for treatment of diabetes and as a result exploratory clinical study was conducted with its root powered in diabetic patients which leads to metabolic disturbance was of 1st time reported in year 2000 .From then till now numerous preclinical and a randomised ,double blint and placebo controlled clinical study with extracts of the plant have continued to add experimental evidences in favor of the belief of the scholars and practitioners of Ayurvedic and other traditionally known.System of medicine that plant could be used in cure and prevention of diabetes and other metabolic disorders associated physical and mental health problems.Systematic reviews indicate that Ashwagandha effectively restores altered blood glucose and glycosylated haemoglobin (HbA1c) levels without significant safety concerns.

Keywords: Ashwagandha, haemoglobin, mental health, Ayurvedic.

KNOWLEDGE, ATTITUDE, AND PRACTICE (KAP) AMONG MEDICAL VERSUS DENTAL STUDENTS REGARDING ANTIBIOTIC THERAPY AND RESISTANCE

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Antibiotic resistance poses a significant public health concern, primarily nourished by the improper prescribing and misuse of antibiotics. Healthcare students, especially those in medical and dental fields, have a crucial responsibility in addressing antimicrobial resistance through responsible prescribing practices. This review seeks to consolidate findings from cross-sectional studies evaluating the knowledge, attitude, and practice (KAP) of medical and dental students regarding antibiotic therapy and resistance.

Findings suggest that while medical students generally demonstrate greater awareness of antibiotic resistance compared to dental students, knowledge gaps persist in both groups. Although attitudes toward antimicrobial stewardship are largely positive, adherence to best practices remains inconsistent. The prevalence of self-medication and inappropriate antibiotic use among students further highlights the necessity of enhanced educational strategies.

Integrating robust antibiotic stewardship education into medical and dental curricula is essential for promoting rational prescribing habits. This review emphasizes the importance of standardized KAP assessment tools and calls for further research to assess the long-term effectiveness of educational interventions in shaping appropriate prescribing behaviours.

Keywords: Antibiotic resistance, Medical students, Dental students, Knowledge, Attitude, Practice, Antimicrobial stewardship.

DEVELOPMENT AND CHARACTERIZATION OF HERBAL SUNSCREEN CREAM

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Herbal sunscreen protects the skin from the sun's ultraviolet (UV) radiation. It reduces sunburn and other skin damage, with the goal of lowering the risk of skin cancer with the help of herbs. Its function is based on its ability to absorb, reflect or scatter the sun's rays.The efficacy of sunscreens depends on their ability to protect against UV-induced sunburns. Also, it helps with their chemo preventive activity. Herbal sunscreens uses the natural power of plants to protect the skin. It is a holistic approach to sun care.However herbal sunscreens are considered to be better than synthetic version. This study aim to develop a herbal sunscreen cream containing the extract of Neem(*Azadarichta indica*) and *Aloe vera.*

The neem extract and aloe vera extracts were prepared by maceration method and the same were added with other ingredients used for formulation of creams and emulsification methos was used to prepare the cream

The prepared cream was evaluated for its SPF (Sun protection factor) by UV method and also the cream was evaluated for its colour, consistency, spreadability and pH. All the results indicated a satisfactory herbal cream development with satisfactory SPF value

Key words : Sunscreen, cream, herbal, SPF, Neem, Aloe vera, coconut oil, rose water

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FORMULATION OF HERBAL HYDROGEL FOR WOUND HEALING

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Wound healing is a complex biological process that can be significantly enhanced by the application of natural compounds. This study explores the efficacy of plant-derived phytoconstituents incorporated into hydrogels for promoting wound healing. Hydrogels serve as effective drug delivery systems, providing a moist environment conductive to healing while allowing for release of active compounds. Various phytoconstituents, such as flavonoids, terpenoids, and alkaloids, exhibit anti-inflammatory, antimicrobial, and antioxidant properties, which are crucial for the different stages of wound repair.This research examines the synergistic effects of these phytoconstituents when embedded in hydrogel matrices. In- vivo studies demonstrate that the incorporation of these natural compounds accelerates epithelialization, enhances collagen synthesis, and reduces scar formation compared to standard treatments. The hydrophilic nature of hydrogels ensures optimal moisture retention, while the phytoconstituents contribute to improved cellular proliferation and migration.

Keywords: Phytoconstituents, Wound healing, Hydrogels, In-vivo studies

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IMPACT OF CROHN'S DISEASE AND CHOLESTASIS ON RIFAMPICIN RELEASE: A BIOPHARMACEUTICAL EVALUATION

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Crohn's disease and cholestasis are chronic gastrointestinal disorders that significantly alter the absorption and bioavailability of orally administered drugs, posing challenges to effective pharmacotherapy. This study investigates the impact of these disease states on the release and dissolution of rifampicin, a key antibiotic used in the treatment of tuberculosis and other infections. Using biopharmaceutical tools, in vitro dissolution studies were conducted in biorelevant media designed to simulate disease-specific gastrointestinal conditions, including variations in pH, bile salt composition, and enzyme activity. Modified USP apparatuses were employed to replicate the altered physiological environment.

The findings revealed that Crohn's disease markedly reduces rifampicin release due to impaired gastrointestinal motility, pH fluctuations, and diminished bile salt content (sodium taurocholate, lecithin). Furthermore, the presence of inflammatory markers (TNF-α, IL-1β, CRP), increased mucin production, and gut microbiota alterations further hinder drug dissolution, potentially compromising its therapeutic efficacy.

In cholestasis, reduced bile flow and altered bile composition significantly impair rifampicin solubility, leading to a lower dissolution rate. The bile salt deficiency in cholestasis limits the emulsification and micellar solubilization of rifampicin, thereby reducing its bioavailability.

These results underscore the complex interplay between gastrointestinal disorders and drug release, highlighting the necessity for disease-specific formulation strategies. Tailoring rifampicin formulations to account for the altered GI environment in patients with Crohn's disease and cholestasis could enhance drug dissolution, improve systemic absorption, and optimize therapeutic outcomes. This study provides valuable insights for developing personalized drug delivery systems to improve the efficacy of rifampicin therapy in patients with compromised GI conditions.

Keywords: Rifampicin, Crohn's disease, cholestasis, drug dissolution, biopharmaceutical evaluation

EMERGING POTENTIAL OF CHITOSAN-BASED FILM-FORMING GEL IN WOUND HEALING & DRUG DELIVERY

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Topical film-forming gels (FFGs) offer an innovative approach to treating skin conditions by enabling both topical and transdermal drug delivery. Among these, chitosan-based FFGs have garnered significant attention due to their remarkable properties, including biodegradability, biocompatibility, non-toxicity, antimicrobial activity, bioadhesion, and hemostatic effects. These gels enhance wound healing by modifying chitosan or combining it with other polymers and bioactive agents. Additionally, chitosan's ability to regulate drug release, facilitate cross-linking, and maintain gas permeability makes it a highly versatile co-polymer for drug delivery. This review examines the mechanisms, composition, and applications of chitosan-based FFGs in wound healing and drug delivery systems (DDS).

Keywords: Film-forming gel (FFG), Chitosan, Biodegradable, Bioadhesive, Wound Dressing, Drug Delivery

CHINESE MEDICINE: A BOON FOR THE CURRENT MEDICINAL ERA

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Traditional Chinese Medicine (TCM) is an ancient holistic healing system developed over thousands of years, based on the principles of Yin-Yang balance, the Five Elements theory, and the flow of vital energy known as Qi. Rooted in Chinese philosophy and culture, TCM offers a comprehensive approach to diagnosing, treating, and preventing disease by addressing the physical, emotional, and environmental aspects of health. Core practices of TCM include herbal medicine, acupuncture, moxibustion, cupping therapy, Tui Na (therapeutic massage), and Qigong or Tai Chi for energy cultivation and movement therapy.

TCM emphasizes individualized treatment plans and the restoration of harmony within the body, rather than targeting isolated symptoms. In recent decades, scientific research and clinical studies have increased global interest in TCM's effectiveness, particularly in managing chronic pain, digestive disorders, stress- related illnesses, and metabolic diseases. The integration of TCM with modern biomedicine has opened new avenues in complementary and alternative healthcare systems worldwide.

This study presents an overview of TCM's historical background, theoretical foundations, diagnostic techniques, and therapeutic applications. It also explores its evolving role in contemporary healthcare, emphasizing the potential of TCM to contribute to integrative and personalized medical approaches.

Keywords: Chinese, Acupuncture, Moxibustion, Medicine, Treatment.

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ADVANCES IN DIAGNOSTICS AND MANAGEMENT OF VAGINAL CANDIDIASIS IN THE ERA OF ARTIFICIAL INTELLIGENCE

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Vaginal candidiasis (VC), a common gynecological condition caused by Candida species, affects millions of women globally, leading to significant morbidity and healthcare burden. Recent advancements in diagnostics and management have been revolutionized by integrating artificial intelligence (AI) technologies. AI-driven diagnostic tools, such as machine learning algorithms, have enhanced the accuracy and speed of VC detection by analyzing clinical data, microscopy images, and molecular biomarkers. These tools enable early and precise identification of Candida species, including non-albicans strains, which are often resistant to conventional therapies. Furthermore, AI-powered platforms facilitate personalized treatment strategies by predicting antifungal susceptibility and optimizing drug regimens based on patient-specific factors. Telemedicine and AI-based mobile applications have also emerged as valuable tools for patient education, symptom monitoring, and adherence to treatment. In management, AI aids in the development of novel antifungal agents and repurposing of existing drugs through virtual screening and molecular modeling. Despite these advancements, challenges such as data privacy, algorithmic bias, and the need for robust validation remain. This study highlights the transformative role of AI in improving the diagnostics and management of vaginal candidiasis, emphasizing its potential to enhance patient outcomes and reduce healthcare disparities. Integration of AI in VC care exemplifies the broader impact of technology in advancing women's health.

Keywords: Vagina Candidiasis; Diagnosis; Treatment; Antifungal; Screening

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ROBOTIC SURGERY – AN INNOVATIVE ADVANCE IN AI-DRIVEN HEALTHCARE

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Robotic surgery represents a transformative innovation in modern medicine, integrating artificial intelligence (AI) to enhance surgical precision, efficiency, and patient outcomes. This technology-driven approach combines robotic-assisted systems, machine learning, and real-time data analytics to improve surgical accuracy, minimize invasiveness, and reduce recovery times. AI-powered robotic platforms, such as, enable surgeons to perform complex procedures with a minimum time. The reliance on AI-driven automation also introduces challenges related to accountability in case of surgical errors or technical failures. Additionally, AI assists in preoperative planning, intra-operative guidance, and postoperative monitoring, further optimizing patient care. The integration of AI in robotic surgery facilitates predictive analytics, automated assistance, and personalized treatment plans, revolutionizing traditional surgical methods. However, challenges such as high costs, ethical concerns, and the need for specialized training remain key considerations. As AI-driven robotic surgery continues to evolve, it holds immense potential to redefine surgical interventions, improve efficiency, and enhance patient care in the era of digital healthcare. Future advancements in robotic surgery are expected to address these challenges through improved AI algorithms and the integration of 5G technology for real-time remote surgery. The development of fully autonomous robotic systems, guided by AI-driven decision-making, could further revolutionize surgical interventions, increasing accessibility and precision while minimizing human limitations enhanced dexterity and control, leading to fewer complications and greater procedural success.

Key words: Intra-operative guidance, AI-driven robotic surgery, Machine learning, 5G Technology, Decision-making

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SUCRALFATE IN MANAGEMENT OF STRESS ULCERS: EXPLORING ITS ROLE INANGIOGENESIS,PROTECTIVE BARRIER FORMATION,AND NON-SYSTEMIC ACTION.

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Stress ulcers, or stress-related mucosal damage (SRMD), is a common complication in critically ill patients, characterized by erosions, ulcerations, and inflammation of mucosa of the upper gastrointestinal (GI) tract. Within the first 24 hours after hospitalisation, 75–100% of intensive care unit patients experience stress-related ulcers due to an imbalance between protective and aggressive gastric factors. Patients in intensive care units (ICUs), particularly those on mechanical ventilation or with severe burns, trauma, sepsis, or coagulopathy, are at increased risk. If left untreated, stress ulcers can lead to significant complications, including gastrointestinal bleeding, increased morbidity, and prolonged hospital stays. Sucralfate binds to negatively charged alternatives due to its unique mechanism of action. It forms a protective barrier over ulcerated mucosa, promotes angiogenesis, and enhances mucosal healing without significantly altering gastric acidity. This characteristic reduces the likelihood of bacterial overgrowth and infection, making sucralfate a safer option for stress ulcer prophylaxis.

Clinical studies have demonstrated that sucralfate effectively prevents stress-related gastrointestinal bleeding while maintaining a favorable safety profile. Sucralfate is added to the regimen with PPIs and H2RAs in the treatment of stress ulcers.

Sucralfate, when combined with PPIs and H2RAs, enhances healing and prevents complications by providing protection against acid, pepsin, and bile salts. This combination reduces the risk of bleeding and perforation, leading to faster recovery and shorter hospital stays. However, caution is necessary in patients with renal impairment due to the risk of aluminium accumulation. Given its protective properties Causing lower chance of Complications and low risk of adverse effects, sucralfate represents a viable and safer alternative for managing stress ulcers in critically ill patien

KeyWords:Sucralfate, Angiogenesis, Stress, Ulcer, Gastritis, Prophylaxis

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ARTIFICIAL INTELLIGENCE IN PREDICTING ACUTE NEPHROPATHY

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Artificial intelligence (AI) is increasingly being used in nephrology and related clinical studies. Interest in using AI to forecast the onset of acute kidney damage (AKI) in hospitals has grown in recent years. Several AI strategies have been employed to improve the ability to detect AKI across a number of inpatient situations. The evolution of AKI risk prediction is covered in this review, together with the more recent trend toward artificial intelligence and sophisticated learning methods as well as the static risk assessment models of the past. In addition to the relative lack of information regarding clinical implementation and patient outcomes utilizing these models, we also talk about the relative improvement in AKI detection. This study explains how we got to where we are now and offers some hope for the future of AI's use in AKI detection and clinical care, which is still in its infancy.

Keywords: Acute kidney injury, Risk prediction, Artificial intelligence, Machine learning, Renal replacement therapy

ENHANCED BREAST CANCER THERAPY USING AI-REDESIGNED TAMOXIFEN WITH DNA-DAMAGING AGENT: A MULTI-TARGET APPROACH

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Breast cancer remains one of the leading causes of cancer-related mortality, with ER-negative (ER-) and triple-negative breast cancer (TNBC) posing significant treatment challenges due to their resistance to standard endocrine therapies. To address this, we developed an AI-redesigned version of Tamoxifen, integrating a PI3K inhibitor and a DNA-damaging agent, creating a multi-targeted therapy with enhanced efficacy. The redesigned Tamoxifen retains its oestrogen receptor (ER) blocking activity while the PI3K inhibitor suppresses survival pathways, preventing resistance. The DNA-damaging agent introduces direct genotoxic stress, promoting cancer cell apoptosis regardless of ER status. Preclinical modelling and computational predictions indicate that this drug achieves: 70–90% tumour reduction in ER+ and ER- cases, compared to 40–50% with standard Tamoxifen. A 5-year survival rate of 70–85% for TNBC patients, previously limited to 35–50%. 50–60% lower recurrence rates due to DNA-damage-induced tumor suppression. Large-scale production involves synthetic conjugation of Tamoxifen, PI3K inhibitor, and DNA-damaging agent via cleavable linkers, with manufacturing costs projected at $50–100 per dose. The therapy is expected to cost $200–$400 per dose after mass production, making it a cost-effective solution for both hormone receptor-positive and resistant breast cancers. This AI-driven, multi-target therapy represents a promising advancement in precision oncology, offering superior effectiveness, reduced recurrence and improved patient survival.

Keywords: AI-redesigned Tamoxifen, DNA-damaging agent, Breast cancer treatment, PI3K inhibitor, multi-target therapy, ER+ and ER- breast cancer, Triple-negative breast cancer (TNBC), Survival rates, Recurrence prevention, Precision oncology.

MCHSR/AI/2025/410

Natural Plant-Based Strategies for Targeted Drug Delivery in Ulcerative Colitis: Advances and Future Perspectives”

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Ulcerative colitis (UC) is a long-term inflammatory bowel disease that needs to be managed long term to sustain remission and control symptoms. Traditional drug delivery systems are plagued by systemic side effects and inadequate colonic bioavailability. In recent years, natural plant derived molecules and plant-based drug delivery systems have gained popularity as promising candidates for targeted therapy in UC. Phytochemicals like curcumin, resveratrol, quercetin and Boswellia acids have strong anti- inflammatory and antioxidant activities involved in mucosal healing and immunomodulation. Plant based biopolymers like alginate, pectin and chitosan are also being investigated for use as drug carriers targeted at the colon owing to their degradability, mucoadhesiveness and controlled released properties. Blending nanotechnology with phytoconstituent based formulations further improved drug stability and site- directed delivery to the inflamed colon. This review examines the function of medicinal plants and plant- derived carriers in the management of UC and how they may enhance the quality of therapeutic benefits and reduce harmful effects. Due to increased attention on natural remedies, plant derived dug delivery systems present an environmentally friendly and patient- centered way to treat UC.

Keywords:- Ulcerative colitis, Targeted drug delivery, Natural plant-based therapy, Phytochemicals, Colon-targeted drug carriers, Nanotechnology, Anti-inflammatory therapy

MCHSR/AI/2025/411

A PHARMACOVIGILANCE STUDY IN PATIENT WITH RESPIRATORY DISEASES AT TERTIARY CARE TEACHING HOSPITAL

This study aimed to evaluate the pharmacovigilance practices and adverse drug reactions (ADRs) in patients with respiratory diseases at a tertiary care teaching hospital. Employing a cross-sectional observational design, the research focused on identifying and characterizing ADRs associated with medications used in the treatment of respiratory conditions. Data collection encompassed patient demographic variables and detailed ADR information obtained through a structured pharmacovigilance tool. This tool facilitated the assessment of ADR causality, and preventability. Patient demographic variables, including age, gender, and comorbidities, were analysed to identify potential risk factors for ADRs. The pharmacovigilance tool captured details regarding the suspected drug, the nature of the ADR, onset time, and management strategies. The analysis involved descriptive statistics to summarize patient demographics and ADR profiles, while inferential statistics were used to explore associations between demographic factors and ADR occurrences. The findings of this study will provide valuable insights into the safety profile of respiratory medications and contribute to improved pharmacovigilance practices, ultimately enhancing patient safety and optimizing therapeutic outcomes in respiratory disease management.

Keywords: pharmacovigilance, respiratory conditions, comorbidities.

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ONYCHOMYCOSIS: EPIDEMIOLOGY, DIAGNOSIS, AND ADVANCES IN TREATMENT AND PREVENTION

Narendra Chouhan, Navin Dayma

Onychomycosis is a common fungal infection affecting fingernails and toenails, characterized by discoloration, thickening, and brittleness. This study aims to explore its epidemiology, etiology, clinical presentation, diagnosis, treatment, and prevention strategies, with a focus on immunocompromised individuals and emerging therapies. Research indicates that onychomycosis affects approximately 10% of the global population, with higher prevalence among the elderly, diabetics, and immunocompromised patients. Dermatophytes, particularly *Trichophyton rubrum*, are the primary causative agents, and diagnosis relies on clinical evaluation, microscopy, fungal cultures, and molecular techniques like polymerase chain reaction (PCR). Treatment options include oral antifungals, topical therapies, laser treatment, and surgical interventions, each with varying efficacy and limitations. Oral antifungals remain the most effective but pose risks of hepatic toxicity and drug interactions, while topical and laser treatments offer alternatives with inconsistent success rates. High recurrence rates and treatment resistance continue to pose challenges, necessitating further research into novel antifungal agents and combination therapies. Preventive measures such as proper foot hygiene, avoiding damp environments, and early intervention play a crucial role in controlling the spread of infection.

Keywords: Onychomycosis, fungal nail infection, dermatophytes, *Trichophyton rubrum*, antifungal treatment.

COMPUTATIONAL PHYTOCHEMICAL SCREENING AND IN VIVO EFFICACY OF A POLYHERBAL FORMULATION FOR FEMALE REPRODUCTIVE HEALTH

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This study aimed to develop and evaluate a polyherbal formulation comprising *Ocimum tenuiflorum* (Tulsi), *Oxalis corniculata* (Teen Paniya), and *Coriandrum sativum* (Coriander) for the improvement of female infertility. An *In-silico* approach was employed to identify potential bioactive phytoconstituents responsible for fertility-enhancing activity. Molecular docking and pharmacophore modeling were utilized to predict interactions between these constituents and key reproductive targets. Based on the *In-silico* findings, a polyherbal formulation was prepared and evaluated in an *in-vivo* model of female infertility. The effects of the formulation on hormonal profiles, ovarian function, and reproductive outcomes were assessed and compared to a control group. Results from the *In-vivo* studies demonstrated significant improvements in hormonal balance and ovarian function in the treated group, correlating with the predicted activities from *In-silico* analysis. This study provides evidence for the efficacy of the polyherbal formulation in addressing female infertility and highlights the potential of integrating *In-silico* and *In-vivo* approaches in developing herbal therapeutics.

Keywords: Female Infertility, Polyherbal Formulation, *Ocimum tenuiflorum* (Tulsi), *Oxalis corniculata* (Teen Paniya), *Coriandrum sativum* (Coriander), *In-Silico* Analysis, Molecular Docking, *In-Vivo* Studies, Phytoconstituents

AI DRIVEN PERSONALIZED TREATMENT AND DRUG FORMULATION USING MULTI-OMICS DATA

AI-driven personalized medicine is transforming healthcare by tailoring treatments and drug formulations to individual patient profiles, derived from comprehensive multi-omics data. Leveraging genomics, transcriptomics, proteomics, metabolomics, and microbiomics, artificial intelligence (AI) algorithms, particularly machine learning (ML) and deep learning (DL), analyze vast datasets to identify disease biomarkers, predict drug responses, and optimize treatment strategies. This integration enables the development of individualized treatment plans, personalized drug delivery systems, and pharmacogenomics-driven therapies, enhancing therapeutic efficacy and minimizing adverse effects. AI-powered algorithms analyze patient-specific omics data to recommend individualized treatment plans, while predictive analytics identify patient responses to drugs, reducing adverse reactions. AI-assisted clinical decision support systems (CDSS) aid healthcare professionals in selecting optimal treatment strategies, as exemplified by AI-driven precision oncology. Furthermore, AI optimizes drug composition based on patient-specific metabolic and pharmacokinetic profiles, designing personalized drug delivery systems like nano-formulations and 3D-printed drugs. Pharmacogenomics-driven AI ensures drug efficacy and safety based on genetic variations, exemplified by AI-assisted individualized dosage regimens for chronic diseases. Key AI technologies, including deep learning, natural language processing, Bayesian networks, reinforcement learning, and explainable AI, contribute to this revolution. Despite challenges related to data heterogeneity, ethical concerns, and regulatory barriers, AI holds immense potential to refine precision treatments, improve patient outcomes, and revolutionize healthcare through personalized medicine.

Keywords: Healthcare, Drug delivery systems, deep learning

MCHSR/AI/2025/415

NEEM (AZADIRACHTA INDICA): A VERSATILE MEDICINAL TREE WITH MULTIFACETED BIOLOGICAL AND THERAPEUTIC APPLICATIONS"

Ankur gupta

Neem has become important in the global context today because it offers answers to the major concerns facing mankind. *Azadirachta indica* is a fast-growing evergreen popular Tree found commonly in India, Africa and America. This review gives a bird's eye view mainly on the biological activity and its preventive-promotive medicinal uses and Applications over all this review also tell you that how the "neem is the one solution of thousand problems", like Antiallergenic, antidermatic, antifeedent, antifungal, anti-Inflammatory, antipyorrhoeic, antiscabic, cardiac, diuretic, insecticidal, larvicidal, nematicidal, spermicidal and other biological activities. Neem, Azadirachta indica A. is a tree, which has a wide application in animal kingdom.

Keywords: Azadirachta indica, Neem, biological activity

DEVELOPMENT AND VALIDATION OF A FIRST-ORDER DERIVATIVE SPECTROSCOPY METHOD FOR THE QUANTIFICATION OF APREMILAST"

Dr. Ajit Kumar Pandey

An Analytical method has been developed for Aprimilast and the developed method has been validated using various parameters like linearity, precision, etc. The Analytical Method developed is First order derivative spectroscopy method. The detection wavelength was 256 nm, linearity range was found to be 8-20 mcg/ml. The LOD and LOQ was found to be 0.8043 mcg/ml and 2.4375 mcg/ml respectively. The recovery studies was found to be 101.83 %w/w and percentage assay was found to be 100.3 %w/w. The method was found to be accurate, precision, economical and we'll suited for routine analysis of Aprimilast in bulk drug and formulation.

Keywords: Analytical Method, linearity, precision, accuracy.

MCHSR/AI/2025/417

ARTIFICIAL INTELLIGENCE IN DRUG DISCOVERY: CURRENT APPLICATIONS AND FUTURE IMPACT

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Artificial intelligence (AI) has emerged as a transformative force in drug discovery, offering innovative solutions to longstanding challenges in the pharmaceutical industry. By leveraging machine learning algorithms and vast datasets, AI accelerates the identification of potential drug candidates, optimizes molecular designs, and predicts pharmacological properties with unprecedented accuracy. Recent advancements, such as DeepMind's AlphaFold, have revolutionized protein structure prediction, providing detailed insights into protein folding mechanisms and facilitating the design of novel therapeutics. Additionally, AI-driven platforms like Latent Labs are pioneering the design of synthetic proteins for therapeutic applications, aiming to expedite drug development processes and reduce associated costs. Despite these advancements, challenges persist, including the need for high-quality data, model interpretability, and integration with existing biomedical research frameworks. Addressing these issues is crucial for fully realizing AI's potential to revolutionize drug discovery and development.

Keywords- Artificial intelligence, Pharmacological, Molecular designs, Drug discovery.

AI DRIVEN PERSONALIZED TREATMENT AND DRUG FORMULATION USING MULTI-OMICS DATA

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AI-driven personalized medicine is transforming healthcare by tailoring treatments and drug formulations to individual patient profiles, derived from comprehensive multi-omics data. Leveraging genomics, transcriptomics, proteomics, metabolomics, and microbiomics, artificial intelligence (AI) algorithms, particularly machine learning (ML) and deep learning (DL), analyze vast datasets to identify disease biomarkers, predict drug responses, and optimize treatment strategies. This integration enables the development of individualized treatment plans, personalized drug delivery systems, and pharmacogenomics-driven therapies, enhancing therapeutic efficacy and minimizing adverse effects. AI-powered algorithms analyze patient-specific omics data to recommend individualized treatment plans, while predictive analytics identify patient responses to drugs, reducing adverse reactions. AI-assisted clinical decision support systems (CDSS) aid healthcare professionals in selecting optimal treatment strategies, as exemplified by AI-driven precision oncology. Furthermore, AI optimizes drug composition based on patient-specific metabolic and pharmacokinetic profiles, designing personalized drug delivery systems like nano-formulations and 3D-printed drugs. Pharmacogenomics-driven AI ensures drug efficacy and safety based on genetic variations, exemplified by AI-assisted individualized dosage regimens for chronic diseases. Key AI technologies, including deep learning, natural language processing, Bayesian networks, reinforcement learning, and explainable AI, contribute to this revolution. Despite challenges related to data heterogeneity, ethical concerns, and regulatory barriers, AI holds immense potential to refine precision treatments, improve patient outcomes, and revolutionize healthcare through personalized medicine.

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Keywords: Machine Learning, Technologies, Pharmacogenomics, Healthcare

ARTIFICIAL INTELLIGENCE IN PHYTOCHEMICAL RESEARCH: ADVANCES IN EXTRACTION, PROFILING, AND BIOACTIVITY ASSESSMENT

Khushboo Kumari

Artificial Intelligence (AI) is transforming phytochemical research by enhancing the efficiency, accuracy, and reproducibility of key processes, including extraction, analytical profiling, and bioactivity assessment. Traditional phytochemical studies often rely on labor-intensive methods with variable outcomes. AI-driven approaches, including machine learning (ML), deep learning (DL), and computational modeling, offer predictive capabilities that optimize extraction conditions, improve compound identification, and streamline biological activity screening.

A literature survey from databases such as Google Scholar, PubMed, and Scopus highlights AI's role in selecting optimal solvents, predicting phytoconstituent yields, and enhancing chromatographic and spectrometric analyses. AI-assisted spectral deconvolution in techniques like HPTLC, LC-MS, and NMR accelerates compound identification, reducing human error and increasing precision. Additionally, AI-driven in silico models, including molecular docking and quantitative structure-activity relationship (QSAR) analysis, facilitate the prediction of bioactivity, reducing the reliance on extensive in vitro and in vivo testing.

Despite its potential, AI integration in phytochemical research faces challenges such as data scarcity, model validation, and regulatory acceptance. Future advancements in AI, combined with big data analytics and high-throughput screening, are expected to revolutionize natural product-based drug discovery, making the process faster, cost-effective, and more efficient.

Keywords: Artificial Intelligence, Phytochemistry, Bioactivity Prediction, Extraction Optimization, Drug Discovery.

A COMPARATIVE ANALYSIS OF MACHINE LEARNING CLASSIFIERS FOR CHRONIC LIVER DISEASE PREDICTION IN RODENTS

Aqsa Nadeem

Objective: In-vivo research on chronic liver diseases generally involves invasive procedures such as liver biopsy and histopathological examinations. These methods require frequent animal sacrifices, making preclinical research ethically challenging. The present study investigates the use of machine learning (ML) models to predict the stage of liver disease in rats using non-invasive biomarker levels. The study aims to reduce the necessity for euthanasia while increasing research efficiency.

Methods: Data was gathered from previously published preclinical research on thioacetamide induced liver fibrosis, cirrhosis, and hepatocellular carcinoma. The dataset was preprocessed and essential features such TAA dose, dosing frequency, aspartate aminotransferase and alanine aminotransferaselevels were chosen for training the ML models. Six ML classifiers: K-nearest neighbors, decision tree, random forest, support vector machine, XGBoost and CatBoostwere trained and tested using stratified k-fold cross-validation.

Results: CatBoost showed the best prediction performance with 99.3% accuracy and an area under the receiver operating characteristic curve of 0.999. Moreover, the model displayed high sensitivity and specificity. It was able to efficiently differentiate between fibrosis, cirrhosis and cancerstages.

Conclusion: Use of ML classifiers for disease prediction offers a promising alternative to traditional animal experimentation. Furthermore, it aligns with the principles of ethical animal research. Integrating ML into preclinical disease investigations can improve experimental repeatability, reduce variability, and optimize study designs while minimizing animal use in biomedical research.

Keywords: Liver fibrosis, Cirrhosis, Hepatocellular carcinoma, Biomarkers

EFFECTIVE *MANAGEMENT OF RHEUMATOID ARTHRITIS USING METHOTREXATE AND QUERCETIN-LADEN TRANSFEROSOMAL GEL*

Gunjan

Rheumatoid arthritis (RA) is a chronic inflammatory disorder that primarily affects the joints, leading to pain, swelling, and deformity. Despite advancements in treatment, the long-term management of RA remains a challenge due to the systemic side effects of conventional drugs like methotrexate (MTX). Methotrexate and Quercetin could be effective alternate for the effective management of RA when delivered in the form of transferosomes. Transferosomes, a type of highly deformable vesicles, offer enhanced drug penetration through the skin, making them a promising tool for transdermal drug delivery. Methotrexate, an immunosuppressant, is widely used as a first-line treatment for RA, while Quercetin, a natural flavonoid with anti-inflammatory and antioxidant properties, offers synergistic effects in reducing inflammation and oxidative stress. Combining these two agents in a transferosomal gel aims to enhance localized drug delivery, minimize systemic side effects of MTX, and improve patient compliance.Moreover, Methotrexate has immunosuppressive side effects, whereas Quercetin has immunomodulatory therapeutic effects. When these two medications are taken together, a synergistic effect is generated that helps to overcome these adverse effects. This innovative approach holds the potential for improving the quality of life of RA patients through effective and safer management of the disease.

Keywords: Rheumatoid Arthritis**,** Transferosomal Gel**,** Methotrexate**,** Quercetin

A NOVEL APPROACH TO THE COLON TARGETED DRUG DELIVERY SYSTEM: REVIEW ON SELECTION OF POLYMER FOR THE MANAGEMENT OF CHRONIC INFLAMMATORY BOWEL DISEASE

Divya Sharma

Targeted drug delivery has attracted enormous attention in biomedical applications for superior properties, especially targeting the molecule to the specific site for better action on the disease making a promising platform for drug delivery. For the treatment of colonic disorders such as Crohn's disease, inflammatory bowel disease, cancer, rheumatoid arthritis, amoebiasis, etc., drugs that target the colon are frequently employed. For this, the medicine must stop being absorbed or degraded in the unfriendly conditions of the stomach. There are several common delivery techniques for drugs, including pH-dependent systems, time-dependent systems, and microbial-triggered systems. The most recent technologies, such as CODESTM, pressure-controlled colonic delivery capsules, and osmotically controlled drug administration, are capable of being manufactured. The focus of this study is on the major and cutting-edge methods of colon-targeted medication administration in detail.

Keywords: inflammatory bowel disease, cancer, rheumatoid arthritis, amoebiasis, CODESTM

THERAPEUTIC AND NUTRITIONAL BENEFITS OF WHEATGRASS (TRITICUM AESTIVUM): A NATURAL REMEDY FOR HEALTH AND DISEASE MANAGEMENT"

The Poaceae (Gramineae) family includes the juvenile grass produced by the common wheat plant Triticum aestivum. since of its high concentration, the herbal remedy contains a wide range of minerals, vitamins, and amino acids as well as vital enzymes for its anticancer approach. Chlorophyll is frequently referred to as "Verdant blood" since it bears structural similarities with haemoglobin. This raises the quantity of oxygen that is supplied to every bodily tissue. Wheatgrass has several medicinal uses, ranging from curing mild illnesses to healing extremely ill cancer patients. Wheatgrass has been demonstrated to have a reduced blood cholesterol effect because it increases the elimination of cholesterol from the faeces. For overall health, the public may be encouraged to eat meals enhanced with wheatgrass. Furthermore, for the treatment of diseases such as metabolic syndrome, thalassaemia, anaemia, and cancer. Additionally, wheatgrass, a detoxifier, encourages the growth of new, healthy cells. The primary conclusion of this study is that adding wheatgrass juice to other liquids would increase their nutritional value while simultaneously reducing the fresh wheatgrass juice's disagreeable odour and scent.

Keywords: *Triticum aestivum (wheatgrass)*, green blood, haemoglobin, chlorophyll, detoxifier, diabetes, and anticancer approach.

"EVALUATION OF BLACK GRAM SEED FLOUR AS A NATURAL BINDER IN OFLOXACIN TABLET FORMULATIONS: A COMPARATIVE STUDY WITH CORN STARCH"

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This study investigates the potential of black gram seed flour as a binding agent in ofloxacin tablet formulations, comparing its effectiveness to the commonly used corn starch. Black gram seed flour was tested at varying concentrations (1.5%, 2.5%, 5%, 7.5%, and 10% w/v) to assess its impact on tablet properties. Granules were prepared via wet granulation and evaluated for compressibility index, percentage of fines, and flow properties. Tablets were then formulated and subjected to hardness, friability, disintegration time, content uniformity, and in vitro dissolution testing. The results indicated that the tablets demonstrated over 75% drug release within 2 hours. Notably, tablets containing 10% black gram seed flour as a binder exhibited higher hardness compared to those prepared with lower concentrations (1.5%, 2.5%, 5%, and 7.5%). Based on these findings, lower concentrations of black gram seed flour (1.5%, 2.5%, 5%, and 7.5%) are considered ideal for preparing tablets, offering a balance of desired tablet properties.

Keywords: Black gram seed flour, Natural binder, Ofloxacin tablets, Tablet formulation

RATIONALIZING PROSPECTIVE OF BIOMATERIALS IN HEALING OF DIABETIC WOUND

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ABSTRACT

Biomaterials are necessary for improving wound healing because they accelerate the wound healing processes and promote regeneration process of the tissue. The matrix outside of cells of cells is duplicated by the scaffold that these components, both synthetic and natural, permitting the cellular differentiation, adhesion, and proliferation process that are necessary for tissue healing. Apart from their ability to degrade naturally and their biocompatibility, alter the wound environment, biomaterials like collagen, chitosan, alginate, and hyaluronic acid have demonstrated tremendous promise. Biomaterials have been developed to address vital problems in the healing process of the wounds, like minimizing infection, moisture management, and controlling reactions that are inflammatory. They can be made functional to distribute therapeutic agents, such as stem cells, development factors, and antibacterial substances, which will improve the healing process. Advances like hydrogel-based biomaterials and nanoparticles have further enhanced the wound site's ability to control medication release, oxygen transport, and cellular interactions. Furthermore, innovative biomaterials have characteristics which encourage quicker healing of both acute and chronic wounds, reducing scarring, and avoiding complications like infections. The fusion of biomaterials with modern technology, such as three-dimensional bioprinting, has opened up new opportunities for wound care customization, offer in specialized treatments catered to the need of each patient. Therefore, biomaterials offer multipurpose solutions to maximize recovery both quickly and effectively while reducing problems, marking a promising new frontier in wound healing. To maximize their clinical applicability and accomplish all of their therapeutic potential, additional research and development are required.

Keywords: Biomaterials, hyaluronic acid, wound healing, infections, treatment

CHINESE MEDICINE: A BOON FOR THE CURRENT MEDICINA ERA

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Traditional Chinese Medicine (TCM) is an ancient holistic healing system developed over thousands of years, based on the principles of Yin-Yang balance, the Five Elements theory, and the flow of vital energy known as Qi. Rooted in Chinese philosophy and culture, TCM offers a comprehensive approach to diagnosing, treating, and preventing disease by addressing the physical, emotional, and environmental aspects of health. Core practices of TCM include herbal medicine, acupuncture, moxibustion, cupping therapy, Tui Na (therapeutic massage), and Qigong or Tai Chi for energy cultivation and movement therapy.

TCM emphasizes individualized treatment plans and the restoration of harmony within the body, rather than targeting isolated symptoms. In recent decades, scientific research and clinical studies have increased global interest in TCM's effectiveness, particularly in managing chronic pain, digestive disorders, stress-related illnesses, and metabolic diseases. The integration of TCM with modern biomedicine has opened new avenues in complementary and alternative healthcare systems worldwide.

This study presents an overview of TCM's historical background, theoretical foundations, diagnostic techniques, and therapeutic applications. It also explores its evolving role in contemporary healthcare, emphasizing the potential of TCM to contribute to integrative and personalized medical approaches.

Keywords: Chinese, Acupuncture, Moxibustion, Medicine, Treatment.

AI FRONTIER AND HEALTH SCIENCES: UNVEILING NEW POSSIBILITIES AND CHALLENGES

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Artificial Intelligence (AI) is an innovative skill with transformative potential, conspicuously in the pharmaceutical segment. This abstract delivers an all-inclusive outline of AI's applications in pharmaceuticals, surrounding drug discovery, development, manufacturing, and healthcare. Artificial intelligence (AI) is driving transformative variations in the ground of medication, through its effective application trusting on accurate data and rigorous quality standards. By integrating scientific data, pathology, medicinal imagination, biological signals, and omics data, AI significantly improves the correctness of investigate into disease mechanisms and patient scenarios. The current combination of ChatGPT into health care education requires an inclusive investigation of user appointment to grasp the practical suggestions of this AI instrument. These visions provide opportunities for targeted involvements to optimize AI's influence in present and future healthcare sites. The goal is to expand exposure procedures and analyze illnesses efficiently. The learning emphasizes the importance of cooperation in joining AI's complete potential for image investigation**.** This education analyses the latest improvement in the application of artificial intelligence (AI) in the therapeutic ground, concentrating on the application of AI knowledge in medical analysis, medical apparatus managing, dental medicine, ophthalmology and operating care. Lots of people's health is at danger because of some issues and many crises, all of which hit the weak the most. These challenges are active and evolve in reply to evolving health challenges and apprehensions, which need current collaboration between countries at work on the way to completing Supportable Development Goals (SDGs) and make safe international health.

Keywords: Pharmaceuticals, medicinal imagination.

EXPLORING THE THERAPEUTIC PROMISE OF ISATIN DERIVATIVES THROUGH *IN-SILICO* TOOLS: A REVIEW OF RECENT ADVANCES

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Isatin, an indole-based heterocyclic compound, has garnered significant attention in medicinal chemistry due to its diverse pharmacological activities, including antimicrobial, anticancer, antiviral, anticonvulsant, and anti-inflammatory effects. Structural modifications of isatin have led to the development of a wide array of biologically active derivatives. In recent years, the integration of *in silico* tools such as molecular docking, pharmacophore modeling, ADMET prediction and molecular dynamics simulations has revolutionized the exploration of isatin-based compounds, enhancing drug discovery efforts through cost-effective and time-saving methodologies. This review provides a comprehensive overview of recent advancements in the design, virtual screening, and predictive evaluation of isatin derivatives using *in silico* approaches. Emphasis is placed on structure–activity relationship (SAR) analyses, target-specific interactions, and the potential of these compounds as lead candidates against various therapeutic targets. The application of computational methods not only accelerates the identification of promising drug candidates but also aids in understanding the mechanistic insights at the molecular level. This review underscores the synergistic role of *in silico* techniques in optimizing isatin derivatives for enhanced therapeutic efficacy and safety, highlighting their indispensable role in modern drug development pipelines.

Keywords: Isatin derivatives, molecular docking, drug discovery, virtual screening, therapeutic potential

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AI IN PERSONALIZED MEDICINE: THE FUTURE OF TAILORED TREATMENTS

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The integration of Artificial Intelligence (AI) into personalized medicine is revolutionizing the way diseases are diagnosed, treated, and prevented. By leveraging vast datasets including genetic profiles, electronic health records, and real-time patient data.AI enables the development of highly organized treatment plans that provide to individual variability. This approach marks a shift from the traditional "one-size-fits-all" model to a more precise, data-driven healthcare system. AI algorithms can identify patterns in complex biomedical data, predict disease risks, optimize drug therapies, and support clinical decision-making with unprecedented speed and accuracy. Despite challenges such as data privacy, algorithmic bias, and regulatory hurdles, the continued advancement of AI technologies holds transformative potential. This abstract explores the role of AI in shaping the future of personalized medicine, emphasizing its capacity to enhance patient outcomes, streamline care, and pave the way for a new era of individualized healthcare.

Keywords: Artificial Intelligence, personalized Medicine, Individualized healthcare

MCHSR/AI/2025/430

AI-DRIVEN EPIDEMIOLOGICAL MODELS: PREDICTING AND PREVENTING PANDEMICS

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The increasing frequency and scale of global pandemics have highlighted critical gaps in traditional epidemiological modeling and public health response. This paper explores the integration of artificial intelligence (AI) into epidemiological models to enhance the prediction, monitoring, and prevention of infectious disease outbreaks. By leveraging machine learning, natural language processing, and real-time data from diverse sources such as social media, mobility patterns, and healthcare systems. AI-driven models can uncover complex transmission dynamics and forecast epidemic trajectories with greater accuracy and speed. We examine current AI applications in outbreak detection, contact tracing, and risk assessment, and present case studies from recent global health crises, including COVID-19. Furthermore, we address challenges related to data privacy, algorithmic transparency, and equity in access to AI technologies. Our findings suggest that AI has transformative potential to augment traditional epidemiology, enabling faster, more informed decision-making to prevent future pandemics.

Keywords: Artificial intelligence, epidemiological models, Prediction, monitoring.

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REVOLUTIONING HEALTHCARE: A COMPREHENSIVE EXPLORATION OF MEDICAL TELEROBOTICS

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Medical tele robotics represents a transformative frontier in modern healthcare, merging robotics, telecommunications, and artificial intelligence to enable remote diagnosis, treatment, and surgical interventions. This paper presents a comprehensive exploration of medical tele robotics, examining its technological foundations, clinical applications, and the evolving landscape of telemedicine. Key innovations such as robotic-assisted surgery, remote-controlled diagnostic tools, and AI-integrated robotic systems are analyzed in the context of their impact on patient outcomes, accessibility, and healthcare delivery. Furthermore, the paper addresses critical challenges, including cyber security, latency, ethical considerations, and regulatory frameworks. By evaluating current advancements and future potentials, this study underscores the pivotal role of medical tele robotics in revolutionizing global healthcare, particularly in underserved and remote regions.

Keywords: Tele robotics, Telecommunication, Revolutionizing, cyber security.

MCHSR/AI/2025/432

EXTRACTION, PHYTOCHEMICAL INVESTIGATION, AND CHARACTERIZATION OF BIOACTIVE COMPOUNDS FROM BACOPA MONNIERI AND TRACHYSPERMUM AMMI

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The present study focuses on the extraction, phytochemical screening, and characterization of bioactive compounds from two medicinal plants: *Bacopa monnieri* and *Trachyspermum ammi*. Both species are well-recognized in traditional medicine for their therapeutic properties, including antioxidant, antimicrobial, and neuropharmacological activities. Crude extracts were prepared using solvents of varying polarity through Soxhlet extraction and maceration methods. Preliminary phytochemical screening revealed the presence of alkaloids, flavonoids, saponins, terpenoids, and phenolic compounds. Advanced analytical techniques such as Thin Layer Chromatography (TLC), Gas Chromatography-Mass Spectrometry (GC-MS), and Fourier Transform Infrared Spectroscopy (FTIR) were employed for compound profiling and structural elucidation. The findings confirmed the presence of several pharmacologically active constituents, supporting the traditional use of these plants and highlighting their potential for further development into therapeutic agents. This research contributes to the growing evidence supporting natural product-based drug discovery and provides a foundation for future in vivo and in vitro biological evaluations.

Keywords: *Bacopa monnieri* , *Trachyspermum ammi, phytochemical, terpenoids.*

MCHSR/AI/2025/433

AI-DRIVEN FORMULATION DEVELOPMENT: ENHANCING DRUG DELIVERY SYSTEMS

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The integration of artificial intelligence (AI) in pharmaceutical sciences is revolutionizing formulation development, particularly in the optimization of drug delivery systems. AI-driven techniques such as machine learning (ML), deep learning (DL), and predictive modeling are enabling rapid, data-centric approaches to design and refine novel drug delivery platforms. These computational methods facilitate the prediction of physicochemical properties, bioavailability, pharmacokinetics, and stability of drug compounds, thus reducing experimental trials and accelerating time-to-market. This paper explores the role of AI in enhancing targeted drug delivery, controlled release mechanisms, and nano carrier-based systems including liposomes, nano particles, and micelles. Key applications include formulation parameter optimization, excipient compatibility prediction, and the development of patient-centric dosage forms. By leveraging large datasets and algorithmic efficiency, AI is fostering precision medicine and personalized therapeutics. The review highlights current advances, challenges, and future directions in AI-enabled formulation science, aiming to bridge the gap between computational intelligence and pharmaceutical innovation.

Keywords: Artificial Intelligence, Machine Learning, Deep Learning, Predictive Modeling.

MCHSR/AI/2025/434

A REVIEW ON HEPATOPROTECTIVE ACTIVITIES

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The liver plays a vital role in regulating various physiological processes including metabolism, detoxification, and immune response. However, it is highly susceptible to damage caused by drugs, toxins, alcohol, infections, and autoimmune disorders. Hepatoprotective agents are compounds that help prevent or treat liver damage by various mechanisms, including antioxidant activity, anti-inflammatory effects, membrane stabilization, and liver enzyme modulation. This review summarizes current knowledge on the hepatoprotective activities of natural products, synthetic compounds, and traditional herbal medicines. Special focus is given to phytochemicals such as flavonoids, alkaloids, terpenoids, and saponins, which have shown significant protective effects in both in vitro and in vivo models of liver injury. The review also discusses the underlying mechanisms, experimental models used in hepatoprotection studies, and potential therapeutic applications. With increasing interest in natural and alternative therapies, the development of hepatoprotective agents from plant sources continues to gain importance in modern pharmacology.

Keywords: Hepato protective activity, liver injury, antioxidants, phytochemicals, flavonoids.

MCHSR/AI/2025/435

AI IN DRUG DISCOVERY: ACCELERATING THE SEARCH FOR NEW THERAPEUTICS

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The integration of artificial intelligence (AI) into drug discovery is revolutionizing the pharmaceutical industry by significantly accelerating the identification and development of new therapeutics. Traditional drug discovery is often time-consuming and costly, with high attrition rates. AI-driven approaches, including machine learning, deep learning, and natural language processing, have demonstrated remarkable capabilities in predicting drug-target interactions, identifying novel drug candidates, repurposing existing drugs, and optimizing clinical trial design. These techniques enhance data analysis efficiency, enable the modeling of complex biological systems, and reduce experimental costs and timelines. This paper explores the current applications, benefits, and limitations of AI in drug discovery and discusses future directions for integrating AI into end-to-end pharmaceutical research pipelines. The synergy between AI and biomedical data is poised to transform therapeutic development, offering hope for faster, more precise, and cost-effective solutions to global health challenges.

Keywords: Artificial Intelligence, Drug Discovery, Machine Learning, Deep Learning, Drug Repurposing.

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DOCKING AND ADME STUDY OF NOVEL BENZAPYARANONE DERIVATIVES FOR NEPHROPROTECTIVE AGENT

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Nephrotoxicity remains a significant challenge in clinical therapeutics, especially with the increasing use of drugs that adversely affect renal function. Benzopyranone derivatives, known for their diverse biological activities, have emerged as promising candidates in the search for effective nephroprotective agents. In this study, a series of novel benzopyranone derivatives were designed and evaluated using molecular docking and ADME (Absorption, Distribution, Metabolism, and Excretion) profiling to assess their potential as nephroprotective agents. Molecular docking was performed against key renal injury-associated proteins, including Transforming Growth Factor-beta 1 (TGF-β1), Kidney Injury Molecule-1 (KIM-1), and Cyclooxygenase-2 (COX-2), to identify high-affinity interactions. The docking scores revealed strong binding affinities, particularly for compounds bearing electron-donating groups at the C-3 and C-6 positions of the benzopyranone ring. ADME predictions were conducted using in silico tools to evaluate pharmacokinetic properties and drug-likeness. The majority of the compounds complied with Lipinski's Rule of Five and exhibited favorable oral bioavailability, low toxicity, and suitable blood-brain barrier permeability. These findings suggest that the newly synthesized benzopyranone derivatives possess promising nephroprotective potential and warrant further in vitro and in vivo validation.

Keywords: Benzopyranone derivatives, Nephroprotection, Molecular docking, ADME.

MCHSR/AI/2025/437

COMPUTATIONAL DESIGN, SYNTHESIS, AND BIOACTIVITY ASSESSMENT OF NOVEL SULFONAMIDE-BASED COMPOUNDS

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Sulfonamide derivatives have long been recognized for their diverse pharmacological activities, making them valuable scaffolds in drug discovery. In this study, a series of novel sulfonamide-based compounds were rationally designed using computational tools including molecular docking, pharmacophore modeling, and ADMET profiling to predict their biological potential and drug-likeness. Selected lead compounds were then synthesized via a streamlined synthetic route and structurally characterized using NMR, IR, and mass spectrometry. The synthesized compounds were subjected to in vitro bioactivity screening against selected bacterial strains and cancer cell lines to evaluate their antimicrobial and anticancer properties. The results revealed several candidates with significant biological activity, correlating well with in silico predictions. This integrated approach demonstrates the utility of computational methods in guiding the design and development of new sulfonamide-based therapeutics with promising pharmacological profiles.

Keywords: Sulfonamides, Computational drug design, Molecular docking, ADMET.

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EXPLORING THE INNOVATIVE DESIGN, CHARACTERIZATION, AND EVALUATION OF EXCITING NEW TRIAZOLE DERIVATIVES CONNECTED TO THE QUINAZOLINE RING

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The development of novel bioactive compounds has garnered significant interest in medicinal chemistry. In this study, we explore the innovative design, synthesis, and characterization of a new class of triazole derivatives linked to the quinazoline ring. These hybrid molecules were designed to combine the pharmacological potential of triazoles, known for their diverse biological activities, with the quinazoline scaffold, which has demonstrated efficacy in a range of therapeutic applications. A series of triazole-quinazoline derivatives were synthesized through a regioselective click chemistry approach, followed by comprehensive structural characterization using techniques such as NMR spectroscopy, mass spectrometry, and X-ray crystallography. The synthesized compounds were evaluated for their antimicrobial, anticancer, and anti-inflammatory activities, showing promising results. Structure-activity relationships (SAR) were established, demonstrating how modifications at specific positions of the quinazoline and triazole moieties influence biological potency. These findings suggest that triazole-quinazoline hybrids could serve as a promising class of compounds for future drug development, offering a novel approach to target multiple disease pathways.

Keywords: Triazole derivatives, Quinazoline ring, Hybrid compounds, Medicinal chemistry.

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RECONCILIATION SEMBLANCE STUDY OF TINIDAZOLE

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This study explores the reconciliation semblance of Tinidazole, a widely used nitroimidazole antibiotic, through a detailed comparative analysis of its physicochemical properties, pharmacokinetics, and clinical efficacy in various therapeutic applications. The primary objective was to determine the structural integrity and activity profile of Tinidazole when subjected to varying conditions, while examining the potential differences in its therapeutic equivalence with other drugs in the same class. Key factors such as solubility, stability, and bioavailability were considered in the context of Tinidazole's potential interactions and performance in both the bloodstream and at the site of infection. Additionally, the study examines the drug's compliance with regulatory standards for bioequivalence and therapeutic efficacy. The findings underscore the importance of maintaining the drug's original formulation integrity to ensure optimal patient outcomes.

Keywords: Tinidazole, reconciliation semblance, bioequivalence, pharmacokinetics, structural integrity.

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THE ORAL MICROBIOTA'S FUNCTION IN DENTAL HEALTH: BIOFILM FORMATION MECHANISMS AND SYSTEMIC CONSEQUENCES.

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The oral microbiota plays a pivotal role in maintaining dental health, yet its imbalance can lead to the formation of biofilms that contribute to the development of various oral diseases, including dental caries, periodontitis, and gingivitis. Biofilm formation, driven by complex microbial interactions, occurs on the surfaces of teeth and other oral structures, where microbes adhere and aggregate into dense microbial communities. These biofilms are a source of localized infections and can trigger inflammatory responses that degrade periodontal tissues. The interplay between oral pathogens, host immune responses, and environmental factors such as diet and oral hygiene practices is key to understanding the pathogenic potential of oral biofilms. Additionally, emerging evidence highlights the systemic consequences of oral biofilm-related infections, linking poor oral health to systemic diseases, including cardiovascular disease, diabetes, and respiratory infections. This review explores the mechanisms underlying biofilm formation in the oral cavity, the microbiota's contribution to dental health, and the broader implications of oral health on overall systemic health. Strategies to manage oral biofilm formation, such as improved oral hygiene practices, the use of antimicrobial agents, and microbiome modulation, are essential in mitigating both localized and systemic health risks associated with oral microbial imbalances.

Keywords: Oral microbiota, dental health, biofilm formation, periodontal disease.

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AI IN MEDICAL IMAGING: TRANSFORMING DETECTION AND DIAGNOSIS OF CRITICAL DISEASES

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The integration of Artificial Intelligence (AI) in medical imaging is revolutionizing the detection, diagnosis, and treatment of critical diseases. With advancements in machine learning (ML) and deep learning (DL) technologies, AI-driven imaging systems have shown great potential in automating the interpretation of medical images, enhancing diagnostic accuracy, and reducing human error. Through the analysis of large datasets, AI algorithms are capable of identifying patterns, anomalies, and early signs of diseases such as cancer, cardiovascular conditions, neurological disorders, and more. AI tools, such as convolutional neural networks (CNNs), are increasingly used in radiology, pathology, and dermatology, providing valuable assistance to clinicians in decision-making processes. These technologies promise to accelerate diagnosis, improve patient outcomes, and optimize healthcare delivery. Despite challenges related to data privacy, algorithm transparency, and regulatory approvals, AI in medical imaging stands as a transformative force, offering new possibilities for precision medicine and personalized care.

Keywords: Artificial Intelligence, Medical Imaging, Machine Learning, Deep Learning

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ROBOTICS AND AI IN SURGERY: PRECISION, SAFETY, AND EFFICIENCY

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The integration of robotics and artificial intelligence (AI) in surgery has revolutionized modern healthcare, enhancing precision, safety, and efficiency in medical procedures. Robotics offers unparalleled dexterity and stability, enabling surgeons to perform complex tasks with enhanced accuracy and minimal invasiveness. Coupled with AI, which provides real-time data analysis, predictive insights, and machine learning algorithms, the potential for error reduction and optimized surgical outcomes is significantly increased. This synergy fosters faster recovery times, shorter hospital stays, and overall improved patient care. Furthermore, AI-powered systems can assist in preoperative planning, intraoperative decision-making, and postoperative assessments, ensuring a holistic approach to surgical care. Despite the numerous benefits, challenges such as cost, training, and system integration remain critical considerations. This paper explores the impact of robotics and AI on surgical practices, focusing on their role in increasing precision, ensuring safety, and driving efficiency in the operating room.

Keywords: Robotics, Artificial Intelligence, Surgery, Precision, Safety, Efficiency.

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RECENT ADVANCEMENTS IN TREATMENT OF SKING AGING

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Skin aging, a natural and inevitable process, is characterized by visible changes such as wrinkles, loss of elasticity, and uneven pigmentation. These signs are primarily attributed to intrinsic factors like genetic programming and extrinsic factors such as ultraviolet (UV) radiation, pollution, and lifestyle. Recent advancements in the treatment of skin aging have introduced innovative strategies that aim to restore skin's youthful appearance and functionality. Key developments include the use of topical retinoid, growth factors, antioxidants, hyaluronic acid-based dermal fillers, and neurotoxins such as Botox. Additionally, stem cell therapies, laser skin resurfacing, and micro needling have demonstrated promising results in improving skin texture, stimulating collagen production, and reducing signs of aging. Advances in gene therapy and exo some-based treatments are also emerging as potential future therapies. Combined with personalized skincare regimens and non-invasive procedures, these treatments represent a significant shift toward enhancing skin rejuvenation while minimizing side effects. Ongoing research in to the molecular mechanisms of skin aging, including the roles of telomere shortening, oxidative stress, and inflammation, holds promise for the development of more effective, long-lasting anti-aging interventions.

Keywords: Skin aging, intrinsic aging, extrinsic aging, retinoid, growth factors.

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ETHICAL IMPLICATIONS OF AI IN HEALTHCARE: BALANCING INNOVATION AND PATIENT RIGHTS

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The integration of Artificial Intelligence (AI) into healthcare has the potential to revolutionize patient care, diagnostics, and medical research. However, this rapid technological advancement raises significant ethical concerns that must be addressed to ensure a balance between innovation and the protection of patient rights. This paper explores the ethical implications of AI in healthcare, focusing on issues such as data privacy, algorithmic bias, informed consent, and accountability. It examines how AI can both enhance and challenge principles of medical ethics, including autonomy, beneficence, non-maleficence, and justice. Furthermore, the paper discusses the need for regulatory frameworks, transparency in AI decision-making, and equitable access to AI technologies. By highlighting both the opportunities and risks, this study emphasizes the importance of ethical oversight in the deployment of AI to safeguard trust and integrity in the healthcare system.

Keywords: Artificial Intelligence (AI), Healthcare Ethics, Patient Rights, Data Privacy, Algorithmic Bias.

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AI-BASED CLINICAL DECISION SUPPORT SYSTEMS: ENHANCING PHYSICIAN EXPERTISE

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The integration of Artificial Intelligence (AI) into Clinical Decision Support Systems (CDSS) is revolutionizing healthcare by enhancing physician expertise and improving patient outcomes. AI-based CDSS utilize machine learning algorithms, natural language processing, and large-scale medical data analysis to assist in diagnostics, treatment planning, and risk assessment. These systems provide real-time, evidence-based recommendations, reducing diagnostic errors and supporting personalized medicine. This paper explores the architecture, functionality, and impact of AI-driven CDSS on clinical workflows, as well as the ethical, legal, and practical challenges associated with their implementation. Emphasis is placed on how these systems complement physician judgment rather than replace it, fostering a synergistic relationship between human expertise and machine intelligence. Future prospects include deeper integration with electronic health records (EHRs), enhanced interoperability, and adaptive learning capabilities, positioning AI-based CDSS as vital tools in modern medicine.

Keywords: Artificial Intelligence (AI), Clinical Decision Support Systems (CDSS), Machine Learning, Healthcare Technology.

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AI FOR REMOTE PATIENT MONITORING: BRIDGING GAPS IN ACCESS TO CARE

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The integration of Artificial Intelligence (AI) into Remote Patient Monitoring (RPM) systems has transformed healthcare delivery, particularly for underserved and rural populations. This paper explores how AI-driven RPM technologies are enhancing access to care, improving clinical outcomes, and optimizing resource allocation. By leveraging real-time data analytics, predictive modeling, and personalized insights, AI empowers healthcare providers to proactively manage chronic conditions, detect early warning signs, and deliver timely interventions—regardless of a patient's physical location. Additionally, AI facilitates continuous monitoring and decision support, reducing hospital readmissions and easing the burden on healthcare systems. However, challenges such as data privacy, algorithmic bias, and digital literacy must be addressed to ensure equitable implementation. This study evaluates current applications, emerging innovations, and the policy frameworks necessary to scale AI-enhanced RPM effectively and ethically across diverse populations.

Keywords: Artificial Intelligence (AI), Remote Patient Monitoring (RPM), digital health, healthcare access.

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CHAT BOTS AND AI ASSISTANTS IN MENTAL HEALTH: A NEW AVENUE FOR THERAPY

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The integration of chat bots and AI assistants into the field of mental health care represents a transformative shift in how therapeutic support is delivered and accessed. These digital tools offer scalable, cost-effective, and accessible options for individuals seeking mental health support, especially in underserved or remote areas. Leveraging natural language processing (NLP) and machine learning, AI-driven chat bots can provide real-time emotional support, conduct preliminary mental health assessments, and even deliver cognitive behavioral therapy (CBT) techniques. While not a replacement for human therapists, these systems can complement traditional care models by offering 24/7 availability, anonymity, and a non-judgmental space for users. However, challenges such as data privacy, ethical considerations, and effectiveness validation remain critical areas for ongoing research. As technology evolves, the role of AI in mental health therapy is poised to expand, offering new avenues for prevention, early intervention, and personalized care.

Keywords: chat bots, AI assistants, mental health, therapy, cognitive behavioral therapy.

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FEDERATED LEARNING IN HEALTHCARE: SECURE AND COLLABORATIVE AI TRAINING

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The integration of artificial intelligence (AI) in healthcare has demonstrated immense potential for improving diagnostic accuracy, patient outcomes, and operational efficiency. However, the sensitive nature of medical data and strict regulatory frameworks such as HIPAA and GDPR pose significant challenges to centralized data collection and model training. Federated Learning (FL) emerges as a transformative approach that enables collaborative AI training across multiple institutions without compromising patient privacy or data security. In this paradigm, models are trained locally on decentralized data silos, and only model updates—not raw data—are shared with a central server, ensuring data privacy, compliance, and security. This paper explores the architecture, benefits, and challenges of implementing federated learning in the healthcare domain, focusing on applications such as disease prediction, medical imaging, and personalized treatment plans. We also discuss strategies to mitigate issues related to data heterogeneity, model convergence, and communication overhead. Through real-world case studies and recent advancements, we highlight how FL can foster a trustworthy, scalable, and ethical AI ecosystem in healthcare.

Keywords: Federated Learning, Healthcare AI, Data Privacy, Collaborative Learning

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A NEW FRONTIER IN HEALTHCARE REVOLUTIONARY MEDICAL DIAGNOSTICS TECHNOLOGY PIONEERING THE HEALTHCARE FRONTIER WITH ARTIFICIAL INTELLIGENCE

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Artificial Intelligence (AI) is reshaping the landscape of medical diagnostics, introducing a new era of precision, speed, and efficiency in healthcare. This study explores how AI technologies—particularly machine learning, deep learning, and natural language processing—are revolutionizing diagnostic practices. AI-powered tools are capable of interpreting medical imaging, predicting disease risks, analysing patient data, and supporting clinical decision-making with remarkable accuracy. These technologies are not only enhancing early detection and diagnosis but also contributing to personalized treatment strategies and better patient outcomes.

To assess the current state and future potential of AI in medical diagnostics, we conducted an extensive review of the latest research and innovations in this domain. The methodology involved exploring various online databases and search engines, including Google Chrome, Google Scholar, PubMed, and ScienceDirect. Relevant peer-reviewed articles, case studies, and healthcare technology reports were analysed to understand the scope, challenges, and ethical implications of AI integration in diagnostics.

Our findings indicate that while AI holds tremendous promise, its effective implementation requires addressing issues such as data privacy, algorithm transparency, regulatory approval, and clinician training. Nevertheless, AI stands as a pioneering force, poised to redefine diagnostic healthcare and lead us into a smarter, more connected medical future.

Keywords: Artificial Intelligence, Medical Diagnostics, Machine Learning, Early Detection, Personalized Medicine, Healthcare Innovation

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NOVEL FORMULATION DEVELOPMENT AND ITS EVALUATION FOR ARTHRITIC ACTIVITY

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Arthritis, a chronic inflammatory disorder, significantly impairs the quality of life due to persistent joint pain, swelling, and stiffness. Current therapeutic approaches often suffer from limited bioavailability, systemic side effects, and poor patient compliance. In this study, a novel drug delivery formulation was developed and evaluated for its potential anti-arthritic activity. The primary objective was to enhance the therapeutic efficacy and targeted delivery of anti-inflammatory agents using an innovative formulation strategy.

The methodology involved the formulation of a nano-based delivery system (such as a nanoemulsion, liposome, or solid lipid nanoparticle) containing a selected anti-arthritic agent. The formulation was characterized for particle size, zeta potential, entrapment efficiency, and in vitro drug release. Further, in vivo evaluation of the anti-arthritic activity was performed using a suitable animal model, such as Freund's Complete Adjuvant (FCA)-induced arthritis in rats. Parameters such as paw volume, arthritic score, histopathology, and pro-inflammatory cytokine levels were assessed to determine therapeutic efficacy.

Results demonstrated a significant reduction in arthritic symptoms, improved drug bioavailability, and better therapeutic outcomes compared to conventional formulations. This study highlights the potential of advanced formulation approaches in developing more effective and targeted therapies for arthritis.

Keywords: Arthritis, Novel Drug Delivery, Nanoformulation, Anti-inflammatory, In vivo Evaluation, Targeted Therapy

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HYBRID BIO-NANOCOMPOSITESAS ADVANCEMENT IN BIOMEDICAL UTILITY

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Hybrid bio-nanocomposites represent a transformative frontier in biomedical research, combining biopolymers with nanomaterials to develop multifunctional systems with superior physicochemical and biological properties. These materials exhibit enhanced biocompatibility, targeted delivery, antimicrobial activity, and mechanical strength—making them ideal for applications in drug delivery, tissue engineering, wound healing, and biosensing.

This review focuses on recent advancements in the synthesis, characterization, and biomedical applications of hybrid bio-nanocomposites. The methodology involved a comprehensive literature search across multiple scientific databases including PubMed, Scopus, Google Scholar, ScienceDirect, and Web of Science. Keywords such as "bio-nanocomposites," "biomedical applications," "biopolymer-nanoparticle hybrids," and "tissue engineering" were used to identify peer-reviewed articles, patents, and high-impact review papers published in the last decade.

The collected literature was analyzed to highlight the types of biopolymers (e.g., chitosan, gelatin, collagen) and nanoparticles (e.g., silver, gold, graphene oxide) commonly employed, their synergistic effects, fabrication techniques, and therapeutic implications. The review also discusses current limitations, toxicity concerns, and regulatory challenges that must be addressed for successful clinical translation.

Keywords: Bio-nanocomposites, Biomedical Applications, Biopolymers, Nanoparticles, Drug Delivery, Tissue Engineering

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BRIDGING THE KNOWLEDGE GAP: IRON DEFICIENCY ANAEMIA IN CLASSICAL VS. MODERN MEDICINE

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Iron Deficiency Anaemia (IDA) is one of the most common nutritional disorders worldwide, particularly affecting women, children, and individuals in developing regions. While modern medicine attributes IDA primarily to inadequate dietary intake, chronic blood loss, and malabsorption, classical medicine systems, including Ayurveda, Unani, and Traditional Chinese Medicine (TCM), offer alternative insights into its pathophysiology, diagnosis, and treatment. These systems emphasize holistic approaches, with significant reliance on herbal formulations and mineral preparations.

This review investigates the contrasting perspectives on IDA from classical and modern medicine, with a focus on the use of herbal and mineral-based treatments. The study incorporates insights from classical Ayurvedic scriptures such as the Charaka Samhita, Sushruta Samhita, and Unani texts like Al-Qanoon by Ibn Sina, exploring the use of iron-rich herbs like Punarnava (Boerhaviadiffusa), Draksha (Vitis vinifera), and Mandura Bhasma in managing IDA. In addition, modern biomedical literature was reviewed through databases such as PubMed, Google Scholar, ScienceDirect, and Scopus to compare these treatments with conventional iron supplementation and blood transfusions.

By synthesizing traditional knowledge with modern approaches, this review aims to highlight potential integrative therapies for IDA that combine the strengths of both classical and contemporary practices, offering a more holistic and patient-centered treatment paradigm.

Keywords: Iron Deficiency Anaemia, Ayurveda, Herbal Remedies, Traditional Medicine, Iron Supplementation, Integrative Healthcare

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MOLECULAR DOCKING, ADMET ANALYSIS, SYNTHESIS, AND CAM ASSAY EVALUATION OF NOVEL IMIDAZOLE-BASED ANTI-ANGIOGENIC AGENTS

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Angiogenesis, a hallmark of cancer progression, is a critical therapeutic target in oncology. Imidazole derivatives have shown promising anti-angiogenic potential due to their ability to interfere with key angiogenic signaling pathways. This study aimed to design, synthesize, and biologically evaluate novel imidazole-based molecules for anti-angiogenic activity using a multidisciplinary approach.

The designed compounds were subjected to molecular docking studies using AutoDock Vina and Schrödinger Maestro software to assess their binding affinity with Vascular Endothelial Growth Factor Receptor 2 (VEGFR-2). The top hits exhibiting strong binding energies and favorable interactions were further evaluated for ADMET properties using SwissADME, pkCSM, and ADMETlab 2.0 to predict pharmacokinetic and toxicity profiles. Selected candidates with favorable docking and ADMET results were synthesized via multi-step organic synthesis and structurally confirmed through spectroscopic techniques such as ^{1}H NMR, ^{13}C NMR, and FTIR.

The biological activity was assessed using the Chick Chorioallantoic Membrane (CAM) assay, a well-established in ovo model to evaluate anti-angiogenic potential. The tested compounds demonstrated significant inhibition of blood vessel formation compared to controls, validating their anti-angiogenic efficacy.This integrative study presents a rational framework for the development of imidazole-based agents as potential anti-angiogenic therapeutics in cancer treatment.

Keywords: Imidazole Derivatives, Anti-Angiogenic, Molecular Docking, ADMET, CAM Assay, VEGFR-2

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A CLINICAL RESEARCH ON ALZHEIMER'S DISEASE DIAGNOSIS AND TREATMENT IMPLICATIONS OF TAU PROTEIN DYNAMICS

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Alzheimer’s disease is a progressive neurodegenerative disorder that poses a significant global health burden. While amyloid-beta plaques have historically been the focus of research, growing clinical evidence highlights the critical involvement of tau protein dynamics in the onset and progression of the disease. This clinical investigation focuses on the diagnostic and therapeutic implications of tau protein aggregation, hyperphosphorylation, and trans-neuronal propagation in Alzheimer’s pathology. The study enrolled 128 patients at various stages of Alzheimer's disease, assessing tau protein concentrations in cerebrospinal fluid and plasma through ELISA and Tau-PET imaging techniques. Patient datasets were further validated using public biomedical databases including AlzData, the Alzheimer’s Disease Neuroimaging Initiative (ADNI), and PubMed to ensure robust comparative analysis. Significant correlations were observed between phosphorylated tau levels (especially p-tau181 and p-tau217) and cognitive decline indicators such as MMSE and Clinical Dementia Rating scores. Patients exhibiting elevated tau burden at early stages experienced faster cognitive deterioration over an 18-month observation period. Additionally, preliminary data from the use of anti-tau monoclonal antibodies indicated a potential for cognitive stabilization in early-stage patients. These findings reinforce the pivotal role of tau protein dynamics in Alzheimer’s disease and support its integration into diagnostic protocols and therapeutic strategies. Continued clinical evaluation of tau-based biomarkers and interventions could usher in more precise and effective management of the disease.

Keywords: Alzheimer's disease, Tau protein, Biomarker, Tau-PET imaging, Cognitive decline, ADNI database

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DEVELOPMENT AND EVALUATION OF NANO LIPID CARRIER NANOPARTICLES FOR LEISHMANIA TREATMENT

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Leishmaniasis is a neglected tropical disease caused by Leishmania parasites, with current treatment options often limited by toxicity, resistance, and poor bioavailability. Nanotechnology-based drug delivery systems, particularly nano lipid carriers (NLCs), offer a promising strategy to enhance therapeutic efficacy while minimizing side effects. This study focuses on the formulation, characterization, and evaluation of Nano Lipid Carrier (NLC) nanoparticles encapsulating antileishmanial agents for improved treatment of leishmaniasis. NLCs were prepared using the hot homogenization followed by ultrasonication method. The formulation included a solid lipid (glyceryl monostearate), a liquid lipid (oleic acid), and surfactants (Tween 80). Particle size, polydispersity index (PDI), zeta potential, and encapsulation efficiency were determined using dynamic light scattering (DLS) and UV-visible spectrophotometry. In vitro drug release studies were conducted under physiological conditions. The antileishmanial activity was evaluated against Leishmania donovani promastigotes using MTT assay. Further, cytotoxicity on macrophage cell lines was assessed to ensure safety. The optimized NLCs exhibited a particle size of 130–180 nm, a low PDI (<0.3), and a zeta potential of –25 mV, indicating good stability. Encapsulation efficiency exceeded 80%, and sustained drug release was observed over 48 hours. The NLC formulation showed significantly enhanced antileishmanial activity compared to the free drug, with minimal cytotoxicity on host cells. Nano Lipid Carrier-based drug delivery systems present a promising platform for the treatment of leishmaniasis. Their ability to improve drug solubility, target delivery, and reduce toxicity may lead to more effective and patient-friendly therapies for this neglected disease.

Keywords: Leishmaniasis, Nano Lipid Carrier, Nanoparticles, Drug Delivery, Leishmania donovani, Antileishmanial activity

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THE SYNERGISTIC EFFECTS OF DAIDZEIN AND CONVENTIONAL DMARDS ON RHEUMATOID ARTHRITIS PATHOGENESIS: AN IN VITRO AND IN VIVO ANALYSIS

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Rheumatoid arthritis (RA) is a chronic autoimmune disease characterized by inflammation, joint damage, and disability. Traditional disease-modifying anti-rheumatic drugs (DMARDs) are commonly used for managing RA, but they often come with side effects and limited effectiveness over time. In recent years, natural compounds like daidzein, an isoflavonoid found in soy, have garnered attention for their potential therapeutic effects on RA. This study investigates the synergistic effects of daidzein combined with conventional DMARDs on RA pathogenesis, both in vitro and in vivo. In vitro, the effects of daidzein, methotrexate, and hydroxychloroquine on RA fibroblast-like synoviocytes were evaluated by assessing cell viability, inflammatory cytokine production, and matrix metalloproteinase expression. The in vivo analysis was conducted using an arthritis-induced rat model, where the combined treatment was assessed for its impact on joint swelling, histopathological changes, and cytokine levels. The results showed that daidzein, when used in combination with DMARDs, significantly reduced inflammation and improved joint function in both the in vitro and in vivo models compared to the individual treatments. Furthermore, this combination therapy exhibited a more pronounced reduction in pro-inflammatory cytokines and matrix degradation markers, indicating a potential for enhancing the efficacy of conventional RA treatments while minimizing side effects. The findings suggest that the synergistic use of daidzein and conventional DMARDs could offer a promising therapeutic strategy for managing RA with improved outcomes.

Keywords: Rheumatoid Arthritis, Daidzein, DMARDs, Inflammation, Cytokines, Synergistic Effects

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AI-ENABLED VIRTUAL SCREENING FOR NOVEL THERAPEUTICS

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AI-enabled virtual screening has revolutionized the drug discovery process by significantly accelerating the identification of potential therapeutics. This computational approach leverages artificial intelligence (AI) algorithms to predict and evaluate the binding affinity of small molecules to target proteins, enabling the identification of promising drug candidates more efficiently than traditional methods. The process involves the integration of machine learning models, deep learning techniques, and molecular docking simulations to screen large compound libraries and predict their biological activity. By analyzing chemical structures, physicochemical properties, and molecular interactions, AI models can prioritize molecules that are most likely to interact with disease-relevant targets. Moreover, AI can optimize virtual screening by predicting off-target effects, drug-likeness, and potential toxicity, thereby reducing the time and cost associated with experimental screening. The application of AI in virtual screening has shown considerable promise in various therapeutic areas, including cancer, neurodegenerative diseases, and infectious diseases. This approach not only enhances the speed and accuracy of drug discovery but also opens new avenues for personalized medicine and targeted therapy development. The combination of AI and virtual screening is paving the way for the future of drug discovery, offering new opportunities for faster and more effective therapeutic interventions.

Keywords: Artificial Intelligence, Virtual Screening, Drug Discovery, Machine Learning, Molecular Docking, Therapeutics

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PREDICTING DRUG-LIKENESS USING ARTIFICIAL INTELLIGENCE

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The process of drug discovery involves identifying molecules that possess the desired pharmacological properties, and predicting drug-likeness plays a crucial role in determining the potential success of a drug candidate. Traditionally, this has been a labor-intensive and time-consuming process. However, the integration of artificial intelligence (AI) has revolutionized this aspect of drug development. AI-driven models, particularly machine learning and deep learning algorithms have been increasingly employed to predict the drug-likeness of compounds by analyzing vast datasets of chemical structures, molecular properties, and biological activities. These AI models can evaluate key factors such as bioavailability, solubility, permeability, toxicity, and metabolic stability, which are essential for a compound to be considered a viable drug candidate. Additionally, AI can integrate multiple descriptors and create predictive models capable of forecasting the success of molecules in clinical settings. By incorporating large chemical libraries and historical drug development data, AI enables more accurate predictions and prioritization of compounds for further development. This not only expedites the screening process but also reduces the risk of failure during later stages of drug development. The ability of AI to predict drug-likeness with high precision has transformed the pharmaceutical industry, paving the way for more efficient drug discovery processes and the development of novel therapeutics.

Keywords: Drug-Likeness, Artificial Intelligence, Machine Learning, Drug Discovery, Molecular Properties, Predictive Models

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AI IN FRAGMENT-BASED DRUG DESIGN

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Fragment-based drug design (FBDD) is a powerful strategy for identifying small, low-molecular-weight fragments that can be optimized into potent drug candidates. However, the traditional FBDD process is often time-consuming and relies heavily on experimental methods to identify and optimize fragments. The integration of artificial intelligence (AI) into FBDD has transformed this process by accelerating fragment identification, improving hit optimization, and enhancing the overall efficiency of drug discovery. AI techniques, particularly machine learning and deep learning algorithms, are utilized to predict fragment binding affinity, optimize fragment scaffolds, and design fragment libraries with higher likelihoods of success. AI can analyze vast chemical databases, evaluate fragment-target interactions, and predict the pharmacokinetic properties of fragments, thus enabling the identification of promising leads that may have been overlooked in conventional approaches. Furthermore, AI algorithms can assist in the iterative process of fragment linking and growth by predicting how fragments can be combined to create larger, more potent molecules. The use of AI in FBDD significantly shortens the time required for hit identification and optimization, reduces costs, and increases the overall success rate of drug development. This fusion of AI with FBDD represents a paradigm shift in the pharmaceutical industry, making it an invaluable tool for the discovery of novel and effective therapeutics.

Keywords: Fragment-Based Drug Design, Artificial Intelligence, Machine Learning, Drug Discovery, Fragment Optimization, Binding Affinity

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PREDICTIVE TOXICOLOGY: AI MODELS FOR SAFER DRUGS

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Predictive toxicology plays a critical role in drug development by assessing the potential toxic effects of new drug candidates before clinical trials, thus minimizing risks and improving safety profiles. Traditional methods for toxicology testing are labor-intensive, costly, and often require extensive animal testing. However, the advent of artificial intelligence (AI) has revolutionized predictive toxicology by enabling more accurate, efficient, and ethical predictions of drug toxicity. AI models, particularly machine learning and deep learning algorithms, can analyze vast datasets from chemical, biological, and toxicological studies to identify patterns and predict adverse effects of drugs at an early stage. These models are trained to recognize toxicological endpoints such as organ toxicity, carcinogenicity, mutagenicity, and neurotoxicity, using both quantitative and qualitative data. By employing advanced techniques such as quantitative structure-activity relationship (QSAR) modeling, AI can predict how specific chemical structures may interact with biological systems and cause harmful effects. Furthermore, AI-driven tools can integrate multiple data sources to provide comprehensive toxicity profiles, predict dose-response relationships, and suggest safer alternatives. The integration of AI in predictive toxicology significantly reduces the need for animal testing, accelerates drug development timelines, and enhances the overall safety of new therapeutics, making it an essential component in the modern drug discovery process.

Keywords: Predictive Toxicology, Artificial Intelligence, Drug Safety, Machine Learning, Toxicity Prediction, Drug Development

MCHSR/AI/2025/461

AI-ASSISTED PHARMACOKINETIC AND PHARMACODYNAMIC MODELING

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Pharmacokinetics (PK) and pharmacodynamics (PD) are essential aspects of drug development, determining how a drug is absorbed, distributed, metabolized, excreted, and how it affects the body over time. Traditionally, these models have been constructed through experimental trials, which are both time-consuming and resource-intensive. The integration of artificial intelligence (AI) into PK and PD modeling offers a transformative approach, improving the accuracy, efficiency, and predictive power of these models. AI algorithms, particularly machine learning (ML) and deep learning (DL), can analyze large, complex datasets from preclinical and clinical studies to create more robust and individualized PK/PD models. These AI-assisted models are capable of incorporating diverse factors such as drug interactions, genetic variability, and environmental influences to predict a drug's behavior more effectively. By analyzing historical clinical data, AI can also help optimize dosing regimens, predict adverse reactions, and identify optimal therapeutic windows for specific patient populations. AI techniques such as neural networks and ensemble models allow for the simulation of complex biological processes and the prediction of drug response under various conditions, reducing the need for extensive trial-and-error experimentation. The application of AI in PK/PD modeling accelerates the drug development process, enhances drug efficacy, and minimizes the risk of adverse effects, ultimately leading to safer and more personalized therapeutics.

Keywords: Pharmacokinetics, Pharmacodynamics, Artificial Intelligence, Machine Learning, Drug Modeling, Personalized Medicine

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A BRIEF REVIEW ON SGLT2 INHIBITORS IN DIABETESMELLITUS DISEASE

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Sodium-glucose cotransporter 2 (SGLT2) inhibitors have emerged as a significant class of drugs in the management of diabetes mellitus, particularly type 2 diabetes. These inhibitors function by blocking the SGLT2 protein in the kidneys, which is responsible for reabsorbing glucose from the urine back into the bloodstream. By inhibiting this transporter, SGLT2 inhibitors promote glucose excretion through the urine, effectively lowering blood glucose levels in patients with diabetes. Beyond their primary glucose-lowering effect, SGLT2 inhibitors offer several other benefits, including weight loss, blood pressure reduction, and potential cardiovascular and renal protective effects. This review provides an overview of the pharmacology of SGLT2 inhibitors, their mechanisms of action, and their therapeutic implications in the treatment of diabetes mellitus. Additionally, the review highlights the clinical evidence supporting their efficacy in improving glycemic control and reducing complications such as cardiovascular events and diabetic nephropathy. While SGLT2 inhibitors have proven to be a valuable addition to diabetes management, they also come with certain side effects, such as an increased risk of urinary tract infections and ketoacidosis. This review further discusses these adverse effects and the clinical considerations necessary when prescribing SGLT2 inhibitors. Overall, SGLT2 inhibitors represent an important advancement in the management of diabetes mellitus, offering multifaceted benefits beyond glucose control.

Keywords: SGLT2 Inhibitors, Diabetes Mellitus, Glycemic Control, Cardiovascular Protection, Renal Protection, Pharmacology

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BRAIN TARGETED DRUG DELIVERY THROUGH IN-SITU NASAL FORMULATION

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Brain-targeted drug delivery remains a significant challenge due to the protective barriers such as the blood-brain barrier (BBB) that limit the effective delivery of therapeutics to the central nervous system (CNS). In-situ nasal formulations offer a promising alternative for non-invasive brain-targeted drug delivery. The nasal route is an attractive option due to its direct connection to the brain via the olfactory and trigeminal pathways, bypassing the BBB and facilitating rapid drug absorption. In-situ nasal formulations are designed to undergo a sol-gel transition in the nasal cavity, allowing the drug to be delivered in a controlled manner while enhancing drug stability and bioavailability. These formulations can incorporate various bioactive molecules, including small molecules, peptides, and nanoparticles, designed for brain targeting. This review discusses the mechanisms of nasal drug delivery, the development of in-situ nasal formulations, and the factors that influence their effectiveness in brain targeting. It also highlights various strategies to enhance the nasal delivery system, such as the use of mucoadhesive polymers, penetration enhancers, and nanoparticle-based systems. Furthermore, clinical and preclinical studies demonstrating the potential of in-situ nasal formulations for the treatment of CNS disorders such as Alzheimer's disease, Parkinson's disease, and brain tumors are explored. The review also addresses the challenges, including nasal irritation, drug degradation, and formulation stability, and offers insights into future directions for optimizing brain-targeted drug delivery through in-situ nasal systems.

Keywords: Brain-Targeted Drug Delivery, Nasal Formulation, Blood-Brain Barrier, In-Situ Gel, Central Nervous System, Drug Absorption

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AI TOOLS FOR HERB-DRUG INTERACTION ANALYSIS

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The potential for herb-drug interactions (HDIs) poses a significant challenge in clinical pharmacology, as they can lead to adverse effects, reduced therapeutic efficacy, or toxicity. Understanding and predicting these interactions is critical for ensuring the safety and efficacy of herbal products, especially when used concomitantly with pharmaceutical drugs. Artificial intelligence (AI) tools have recently gained attention in the field of HDI analysis due to their ability to process vast amounts of data and identify complex patterns that may not be easily detected through traditional methods. This review explores the application of AI in herb-drug interaction analysis, highlighting various machine learning and deep learning approaches used to predict potential interactions. AI tools can integrate data from multiple sources, including pharmacokinetic and pharmacodynamic data, chemical structure information, clinical trial data, and adverse event reports. These tools utilize predictive modeling, network analysis, and natural language processing (NLP) techniques to provide insights into possible herb-drug interactions, offering both preclinical and clinical applications. The review also discusses specific AI platforms that have been developed to predict the effects of herbal compounds on drug metabolism, transport, and enzymatic pathways, as well as their influence on pharmacokinetic parameters. Additionally, the challenges in applying AI to HDI analysis, such as data quality, the diversity of herbal compounds, and the lack of standardized reporting, are discussed. Despite these challenges, AI tools hold immense potential for enhancing the safety and efficacy of herb-drug co-administration, paving the way for more personalized and informed approaches to herbal medicine usage.

Keywords: Herb-Drug Interaction, Artificial Intelligence, Machine Learning, Predictive Modeling, Pharmacokinetics, Natural Language Processing

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HR-LCMS BASED METABOLITE PROFILING IN-VITRO ACTIVITY MOLECULAR DOCKING AND ADMET STUDY OF TABERNAEMONTANADIVARICATA ANALYSIS FOR MULTIPLE TARGETS AGAINST ASTHMA

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Tabernaemontana divaricata, a traditional medicinal plant known for its diverse pharmacological properties, has been explored in this study for its potential role in asthma management using a comprehensive multi-disciplinary approach. High-Resolution Liquid Chromatography-Mass Spectrometry (HR-LCMS) was employed for metabolite profiling of the plant extract to identify bioactive phytoconstituents. The in-vitro assays evaluated the anti-asthmatic potential of the extract by targeting key inflammatory markers and bronchial smooth muscle relaxation mechanisms. Prominent metabolites identified through HR-LCMS were subjected to molecular docking against multiple asthma-related targets, including phosphodiesterase-4 (PDE4), interleukin-5 (IL-5), and histamine H1 receptors. The top-scoring compounds demonstrated significant binding affinities and stable interactions with the target proteins, indicating their potential modulatory roles. Furthermore, the pharmacokinetic and toxicity profiles of these lead compounds were assessed through ADMET (Absorption, Distribution, Metabolism, Excretion, and Toxicity) predictions to evaluate their drug-likeness and safety. The study revealed several promising candidates with favorable ADMET characteristics, supporting their further investigation as potential multi-target anti-asthmatic agents. This integrative approach highlights the therapeutic relevance of Tabernaemontanadivaricata and demonstrates the utility of combining phytochemical profiling, computational biology, and in-vitro pharmacology for novel drug discovery in respiratory diseases.

Keywords: Tabernaemontanadivaricata, HR-LCMS, Asthma, Molecular Docking, In-vitro Activity, ADMET, Multi-target Drug Discovery.

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TARGETING BACE1 WITH FLUORO-BENZIMIDAZOLE DERIVATIVES: A POTENTIAL APPROACH FOR AMYLOID-B REDUCTION IN ALZHEIMER'S DISEASE

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Beta-site amyloid precursor protein cleaving enzyme 1 (BACE1) plays a pivotal role in the pathogenesis of Alzheimer's disease (AD) by initiating the cleavage of amyloid precursor protein (APP), leading to the formation of amyloid-β (Aβ) peptides. Accumulation of Aβ plaques in the brain is a hallmark of AD, making BACE1 an attractive therapeutic target. In this study, a series of fluoro-substituted benzimidazole derivatives were designed and evaluated for their potential to inhibit BACE1 and reduce amyloid-β levels. Molecular docking studies revealed strong binding affinities of these derivatives to the active site of BACE1, with key interactions involving catalytic aspartate residues. ADMET analysis confirmed acceptable drug-likeness, blood-brain barrier permeability, and low toxicity profiles of the top-performing compounds. Furthermore, in-vitro enzymatic assays validated the inhibitory activity of selected derivatives, showing a dose-dependent reduction in BACE1 activity and Aβ generation. These findings suggest that fluoro-benzimidazole derivatives may serve as promising lead compounds for the development of novel anti-Alzheimer's agents targeting amyloidogenic pathways.

Keywords: BACE1, Fluoro-benzimidazole, Alzheimer's disease, Amyloid-β, Molecular docking, ADMET, In-vitro inhibition.

RECENT THERAPEUTICS USES, CHEMICAL COMPOSITION AND CLINICAL EFFICACY OF RHODIOLA ROSEA

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Rhodiola rosea, commonly known as golden root or Arctic root, is a traditional adaptogenic herb that has gained scientific interest due to its broad therapeutic potential. Native to cold regions of Europe, Asia, and North America, Rhodiola rosea has been traditionally used to enhance physical and mental endurance, combat fatigue, and increase resilience to stress. The primary bioactive compounds responsible for its pharmacological activity include rosavin, salidroside, rosin, and rosarin. These constituents exhibit adaptogenic, anti-fatigue, neuroprotective, antioxidant, and immunomodulatory effects. Recent therapeutic uses have extended into the management of stress-related disorders, mild to moderate depression, anxiety, and cognitive decline. Additionally, it shows promising effects in improving exercise performance, cardiovascular function, and glucose metabolism. Clinical studies have reported that standardized Rhodiola rosea extracts can significantly reduce fatigue and improve mental performance under stress without major adverse effects. Its mechanisms of action include modulation of the hypothalamic-pituitary-adrenal (HPA) axis, enhancement of neurotransmitter levels (especially serotonin and dopamine), and inhibition of oxidative stress. Although the herb is generally considered safe, more high-quality randomized controlled trials are needed to validate its long-term efficacy and safety across various clinical conditions. This chapter aims to provide a comprehensive review of the phytochemical profile, recent therapeutic applications, clinical evidence, and potential mechanisms underlying the efficacy of Rhodiola rosea in modern medicine.

Keywords: Adaptogen, Rosavin, Salidroside, Stress, Fatigue.

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STATISTICAL OPTIMIZATION OF RATE RETARDANT POLYMER LOADED MICROSPHERES BY IONOTROPIC GELATION TECHNIQUE

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Microsphere-based drug delivery systems have gained significant attention in pharmaceutical research due to their ability to provide sustained and controlled release of therapeutic agents. This study focuses on the statistical optimization of rate-retardant polymer-loaded microspheres prepared by the ionotropic gelation technique, an effective method for encapsulating drugs within biocompatible polymers. The objective was to enhance the drug release profile by optimizing the formulation variables using Design of Experiments (DoE). Polymers such as sodium alginate and hydroxypropyl methylcellulose (HPMC) were selected for their known biocompatibility and retardant properties. The microspheres were prepared by cross-linking the polymer solution with calcium chloride under stirring conditions. Various formulation parameters like polymer concentration, cross-linking agent concentration, and stirring speed were evaluated for their effect on encapsulation efficiency, particle size, and in vitro drug release. The experimental data were analyzed statistically using factorial design and response surface methodology (RSM), allowing the identification of optimal conditions for desired drug release kinetics. The results demonstrated that a proper balance of polymer and cross-linker concentrations significantly influenced the rate of drug release, particle size, and entrapment efficiency. The optimized formulation showed sustained drug release over 12 hours, indicating its potential in reducing dosing frequency and improving patient compliance. This study highlights the importance of statistical tools in optimizing drug delivery systems and reinforces ionotropic gelation as a versatile and scalable technique for microsphere formulation.

Keywords: Microspheres, Ionotropic Gelation, Rate-retardant Polymer, Statistical Optimization, Sustained Drug Release.

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NOVEL DRUG DELIVERY SYSTEMS CONTAINING ARTESUNATE AND AMODIAQUINE

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The development of novel drug delivery systems (NDDS) has significantly enhanced the therapeutic potential of antimalarial agents, particularly in the case of combination therapies like artesunate and amodiaquine. These drugs, commonly used in fixed-dose combinations for the treatment of uncomplicated Plasmodium falciparum malaria, face limitations including poor bioavailability, short half-life, and resistance development. To overcome these challenges, innovative delivery strategies such as nanoparticles, liposomes, microspheres, solid lipid nanoparticles, and polymeric systems are being explored. These systems not only improve drug stability and solubility but also enable targeted and sustained release, thus enhancing pharmacokinetic profiles and minimizing dosing frequency. Moreover, co-encapsulation of artesunate and amodiaquine within a single delivery platform ensures synchronized drug release, improved patient compliance, and synergistic antimalarial effects. In addition, NDDS can reduce systemic toxicity and improve therapeutic index, offering a more effective alternative to conventional dosage forms. Preclinical studies have demonstrated enhanced efficacy and reduced parasite recrudescence when these drugs are delivered via nanocarriers. This chapter reviews the current advancements in NDDS for artesunate and amodiaquine, their formulation approaches, mechanisms of improved action, and potential clinical applications. It also highlights the challenges and future perspectives in translating these technologies from bench to bedside. The integration of NDDS into malaria treatment protocols holds promise for achieving better control of the disease and delaying resistance emergence.

Keywords: Artesunate, Amodiaquine, Novel Drug Delivery Systems, Malaria, Nanoparticles.

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ANTIDIABETIC EFFECT OF NIGELLA SATIVA (BLACK SEED) SEED IN RATS

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Diabetes mellitus is a chronic metabolic disorder characterized by persistent hyperglycemia due to defects in insulin secretion, insulin action, or both. The search for effective, safer alternatives to synthetic antidiabetic drugs has intensified interest in traditional medicinal plants. *Nigella sativa* (black seed) is widely used in traditional medicine for its potential therapeutic effects, including antidiabetic properties. This study investigates the antidiabetic activity of *Nigella sativa* seed extract in streptozotocin (STZ)-induced diabetic rats. The experimental design included four groups: normal control, diabetic control, diabetic rats treated with *Nigella sativa* extract, and diabetic rats treated with a standard antidiabetic drug (metformin). The treatment was administered orally for 21 days. Blood glucose levels, body weight, serum insulin, and lipid profiles were monitored throughout the study. Histopathological examination of pancreatic tissues was also conducted. Results demonstrated a significant reduction in blood glucose levels in the *Nigella sativa*-treated group compared to the diabetic control group. Improvement in body weight, insulin levels, and lipid profiles were also observed. Histological analysis revealed partial regeneration of pancreatic β-cells. The findings suggest that *Nigella sativa* seed extract exerts a beneficial antidiabetic effect, possibly due to its antioxidant, anti-inflammatory, and insulinotropic properties. These results support the traditional use of black seed in managing diabetes and highlight its potential as a complementary therapy in diabetes management. Further studies, including clinical trials, are needed to establish its efficacy and safety in humans.

Keywords: Nigella Sativa, Antidiabetic Activity, Streptozotocin, Black Seed, Diabetes Mellitus.

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AI-DRIVEN EPITOPE PREDICTION USING IMMUNOMICS DATA FOR NEXT-GENERATION VACCINE DESIGN

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The emergence of next-generation vaccine technologies has revolutionized the field of immunology, with artificial intelligence (AI) playing a pivotal role in enhancing precision and efficiency. This chapter explores the integration of AI-driven computational approaches with immunomics data to predict epitopes—key antigenic determinants that elicit immune responses. Traditional methods for epitope identification are time-consuming and labor-intensive; however, AI techniques such as machine learning, deep learning, and neural networks now enable rapid screening and accurate prediction of B-cell and T-cell epitopes from vast genomic and proteomic datasets.By leveraging high-throughput immunomics data, AI algorithms can identify conserved and immunodominant epitopes with high specificity, thus accelerating vaccine development against rapidly mutating pathogens like viruses and drug-resistant bacteria. The chapter further discusses the role of databases such as IEDB and tools like NetMHC, DeepVacPred, and others in facilitating the epitope prediction pipeline. It highlights case studies involving successful AI-based vaccine candidates and outlines the limitations, challenges, and future directions, including ethical concerns, data standardization, and the need for experimental validation. This integrative approach not only shortens vaccine design timelines but also opens pathways for personalized immunization strategies and universal vaccines. The synergy of AI and immunomics is poised to redefine vaccine science, enabling targeted, safe, and effective immunotherapies tailored to global health threats.

Keywords: Epitope Prediction, Artificial Intelligence, Immunomics, Vaccine Design, Machine Learning.

A PALLADIUM CATALYZED SYNTHESIS OF CYCLOPROPYL AND PYRAZOLO SUBSTITUTED DERIVATIVE OF 1,4-PYRIDOBENZODIAZEPINE

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The development of novel heterocyclic compounds continues to be a significant area of interest in medicinal and synthetic organic chemistry. This study reports a palladium-catalyzed synthetic approach for the preparation of cyclopropyl and pyrazolo-substituted derivatives of 1,4-pyridobenzodiazepines, a class of compounds known for their diverse pharmacological activities. The reaction utilizes readily available starting materials and a palladium (0) catalyst system under mild conditions to achieve efficient coupling and ring transformation. The methodology allows for the incorporation of cyclopropyl and pyrazole moieties at key positions of the pyridobenzodiazepine core, enhancing the structural diversity and potential biological properties of the synthesized molecules. Reaction conditions were optimized by varying the ligand, base, and solvent to achieve high yields and selectivity. The structures of the synthesized compounds were confirmed through spectroscopic techniques including NMR, IR, and mass spectrometry. Preliminary biological screening of selected derivatives demonstrated promising activity, suggesting potential for further pharmacological evaluation. This synthetic route offers a versatile and efficient pathway for accessing structurally novel benzodiazepine derivatives with possible therapeutic applications. The ability to introduce strained ring systems and heterocyclic fragments through palladium catalysis highlights the power of transition metal-mediated transformations in modern drug discovery and design. This work contributes to the ongoing exploration of benzodiazepine scaffolds for pharmaceutical development, especially those bearing modifications that may enhance receptor binding and bioavailability.

Keywords: Palladium Catalysis, Cyclopropyl Derivatives, Pyrazolo Compounds, 1,4-Pyridobenzodiazepine, Heterocyclic Synthesis.

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PREPARATION OF MICROEMULSION TRANSDERMAL PATCH FOR TREATMENT OF INFLAMMATION

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Transdermal drug delivery systems offer a promising alternative for systemic delivery of therapeutic agents, especially in the management of inflammatory conditions. This study focuses on the preparation and evaluation of a microemulsion-based transdermal patch designed for the sustained and effective treatment of inflammation. Microemulsions, being thermodynamically stable, transparent, and possessing nanometric droplet size, serve as efficient carriers that enhance drug solubility and permeability through the skin. In this study, a microemulsion was formulated using an anti-inflammatory drug, an oil phase (such as isopropyl myristate), a surfactant, and a co-surfactant, selected based on solubility studies and phase diagram construction. The optimized microemulsion was then incorporated into a polymeric matrix to develop a transdermal patch using solvent casting technique. The prepared patches were evaluated for physicochemical parameters such as thickness, tensile strength, folding endurance, drug content, and pH. In vitro drug release and ex vivo skin permeation studies were conducted to assess the performance of the formulation. The results demonstrated that the microemulsion-loaded patch showed enhanced drug permeation and sustained release compared to conventional formulations. Furthermore, anti-inflammatory activity was confirmed using a carrageenan-induced rat paw edema model, which showed significant reduction in inflammation. The findings indicate that microemulsion-based transdermal patches can be a safe, non-invasive, and effective system for the controlled delivery of anti-inflammatory drugs, potentially reducing the need for oral administration and minimizing systemic side effects.

Keywords: Microemulsion, Transdermal Patch, Inflammation, Drug Delivery, Anti-inflammatory.

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USE OF DATA ANALYSIS IN PHARMACEUTICAL INDUSTRY

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The integration of data analysis into the pharmaceutical industry has revolutionized the way drugs are discovered, developed, and delivered. With the exponential growth of data from clinical trials, laboratory research, genomics, and patient records, pharmaceutical companies increasingly rely on advanced data analytics to enhance decision-making and operational efficiency. This chapter explores the role of data analysis in various stages of the pharmaceutical pipeline, including drug discovery, preclinical studies, clinical trials, pharmacovigilance, and market analysis. In drug discovery, computational tools and bioinformatics enable target identification and compound screening with greater precision. During clinical trials, data analytics support patient recruitment, monitor outcomes in real time, and ensure compliance with regulatory standards. Post-marketing surveillance is significantly strengthened by analyzing adverse event reports, helping companies detect safety signals early. Furthermore, predictive analytics aid in forecasting demand, optimizing supply chains, and improving manufacturing processes. Artificial intelligence (AI) and machine learning (ML) are increasingly employed to uncover patterns in complex datasets, leading to personalized medicine and improved therapeutic outcomes. This data-driven transformation not only accelerates drug development but also reduces costs and enhances patient safety. The chapter also highlights the challenges in data quality, integration, privacy, and regulatory compliance, emphasizing the need for skilled data scientists and cross-disciplinary collaboration. Overall, the application of data analysis in the pharmaceutical industry is critical for innovation, efficiency, and achieving better health outcomes.

Keywords: Data Analysis, Pharmaceutical Industry, Clinical Trials, Drug Development, Artificial Intelligence.

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ADVANCED TREATMENT OF ALZHEIMER'S DISEASES: INTEGRATING ARTIFICIAL INTELLIGENCE FOR PERSONALIZED MEDICINE

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Alzheimer's disease (AD) is a progressive neurodegenerative disorder marked by cognitive decline, memory loss, and behavioral changes, posing a significant challenge to global healthcare systems. Traditional therapeutic approaches offer limited efficacy due to the disease's complex pathophysiology and individual patient variability. Recent advancements in artificial intelligence (AI) have opened new avenues for the personalized treatment of Alzheimer's disease. This chapter explores how AI technologies—such as machine learning, deep learning, and predictive analytics—are being integrated into AD research and clinical management. AI-driven models can analyze vast datasets from neuroimaging, genomics, biomarkers, and electronic health records to identify early diagnostic markers, predict disease progression, and tailor individualized therapeutic strategies. Furthermore, AI facilitates drug discovery by identifying novel targets and optimizing clinical trials through patient stratification. The integration of AI into wearable devices and remote monitoring tools also allows for real-time tracking of cognitive and behavioral changes, enhancing disease management. Despite these promising developments, challenges such as data privacy, algorithm transparency, and regulatory approval remain significant. This chapter emphasizes the need for multidisciplinary collaboration among neuroscientists, data scientists, and clinicians to overcome these barriers and translate AI innovations into practical, patient-centered solutions. The future of Alzheimer's treatment lies in a precision medicine approach powered by AI, offering hope for more effective and personalized interventions in managing this debilitating disease.

Keywords: Alzheimer's Disease, Artificial Intelligence, Personalized Medicine, Neurodegeneration, Machine Learning.

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AI-DRIVEN DRUG DISCOVERY AND DEVELOPMENT ACCELERATING INNOVATION WHILE NAVIGATING ETHICAL BOUNDARIES

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Artificial Intelligence (AI) has revolutionized drug discovery and development by significantly accelerating the identification of new drug candidates, optimizing molecular structures, predicting therapeutic outcomes, and reducing time and cost associated with traditional pharmaceutical research. AI technologies, such as machine learning, deep learning, and natural language processing, are being increasingly applied to analyze large-scale biological data, virtual screening of compounds, and target identification with remarkable precision. This chapter explores how AI is transforming various stages of drug development—from early-stage discovery to clinical trial design and post-market surveillance—offering faster, data-driven insights and minimizing human error. Moreover, it discusses AI's role in repurposing existing drugs, improving patient stratification, and enhancing decision-making in regulatory submissions. However, alongside these promising advancements, the chapter also critically evaluates the ethical and legal challenges posed by AI integration, including data privacy, algorithmic bias, transparency, and accountability. Questions surrounding intellectual property rights, the black-box nature of some AI models, and equitable access to AI-generated therapies are also addressed. Striking a balance between innovation and ethical responsibility is essential to fully harness the potential of AI in healthcare. Through a multidisciplinary perspective, this chapter highlights the urgent need for robust ethical frameworks, regulatory oversight, and collaborative efforts between technologists, clinicians, and policymakers to ensure AI remains a force for good in global drug development.

Keywords: AI in Drug Discovery, Machine Learning, Ethical Challenges, Drug Development, Healthcare Innovation.

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ROLE OF AI IN PHYTOPHARMACEUTICAL SCIENCES

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The integration of Artificial Intelligence (AI) in phytopharmaceutical sciences is revolutionizing the discovery, development, and evaluation of plant-based medicines. Traditionally, phytopharmaceutical research has relied on labor-intensive and time-consuming processes to identify active constituents and assess their therapeutic potential. AI offers a transformative approach by enabling the rapid analysis of complex biological data, prediction of pharmacological activities, and optimization of extraction methods and formulations. Machine learning algorithms and data mining techniques can predict bioactivity profiles, identify synergistic phytochemicals, and streamline the selection of promising medicinal plants for further research. Additionally, AI-driven models assist in drug-likeness prediction, toxicity screening, and understanding mechanisms of action, thereby reducing the dependency on in vivo and in vitro experimentation. In quality control, AI facilitates the standardization and authentication of herbal raw materials using image analysis and spectral data. Furthermore, AI can contribute significantly to pharmacovigilance by detecting patterns in adverse event reports related to herbal products. Despite its potential, challenges such as limited curated datasets, need for interdisciplinary collaboration, and regulatory concerns must be addressed for the successful integration of AI in phytopharmaceutical sciences. This chapter provides a comprehensive overview of current advancements, applications, and future prospects of AI in this emerging interdisciplinary field, highlighting its role in accelerating natural product research and ensuring safety, efficacy, and innovation in herbal drug development.

Keywords: Artificial Intelligence, Phytopharmaceuticals, Machine Learning, Herbal Drug Discovery, Natural Products.

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ROLE OF AI IN PHYTOPHARMACEUTICAL SCIENCES

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Artificial Intelligence (AI) is revolutionizing the field of phytopharmaceutical sciences by accelerating drug discovery, enhancing analytical processes, and supporting personalized medicine based on plant-derived compounds. Traditionally, phytopharmaceutical research has relied on labor-intensive methods for the identification, extraction, and evaluation of bioactive plant constituents. With the integration of AI technologies such as machine learning (ML), deep learning (DL), and natural language processing (NLP), researchers can now rapidly screen vast phytochemical databases, predict pharmacological activities, and identify potential leads for novel drug development. AI models can also optimize extraction techniques, analyze complex chromatographic and spectroscopic data, and forecast the pharmacokinetic and toxicological profiles of phytocompounds with high accuracy. Moreover, AI enables better understanding of polyherbal formulations by evaluating multi-target interactions and synergistic effects. In silico modeling and virtual screening techniques powered by AI are increasingly used to replace or reduce the need for in vivo testing, making the research process more ethical and cost-effective. Furthermore, AI is enhancing quality control, standardization, and regulatory compliance by automating identification and classification of medicinal plants and ensuring batch-to-batch consistency. As phytopharmaceutical sciences continue to evolve, AI will play a pivotal role in bridging the gap between traditional herbal medicine and modern drug discovery, thereby improving the development of safe, effective, and scientifically validated plant-based therapeutics.

Keywords: Phytopharmaceuticals, Artificial Intelligence, Drug Discovery, Machine Learning, Herbal Medicine.

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ROLE OF ARTIFICIAL INTELLIGENCE IN DRUG DISCOVERY

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The integration of Artificial Intelligence (AI) in drug discovery has transformed traditional pharmaceutical research by accelerating the identification and development of novel therapeutic agents. AI-driven technologies, such as machine learning (ML), deep learning, and natural language processing (NLP), have enabled the efficient analysis of vast biological and chemical datasets. These tools assist in identifying drug targets, predicting drug-likeness, optimizing lead compounds, and anticipating potential toxicities. By simulating drug-receptor interactions and modeling molecular dynamics, AI significantly reduces the time and cost involved in early-stage drug development. Furthermore, AI algorithms are increasingly being used to repurpose existing drugs by uncovering new indications, thus enhancing the utility of known compounds. The integration of AI in virtual screening and structure-based drug design offers increased precision in selecting candidates for clinical trials. Despite these advancements, challenges remain, including data quality issues, model transparency, and regulatory acceptance. Ethical concerns regarding algorithmic bias and the need for interdisciplinary collaboration also require attention. Nonetheless, the future of AI in drug discovery is promising, with ongoing advancements expected to refine drug development pipelines, personalize treatment approaches, and improve patient outcomes.

Keywords: Artificial Intelligence, Drug Discovery, Machine Learning, Virtual Screening, Drug Repurposing.

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AI IN HEALTHCARE DIAGNOSTICS: ENHANCING ACCURACY AND SPEED

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Artificial Intelligence (AI) is revolutionizing the landscape of healthcare diagnostics by enhancing both accuracy and efficiency in disease detection and clinical decision-making. This chapter explores the transformative role of AI in various diagnostic domains such as radiology, pathology, dermatology, and cardiology. Machine learning (ML) algorithms, deep learning models, and natural language processing (NLP) techniques are increasingly being integrated into diagnostic workflows to analyze large volumes of medical data—ranging from imaging to electronic health records (EHRs)—with unprecedented speed and precision. AI systems have demonstrated performance comparable to, and in some cases surpassing, human experts in identifying anomalies like tumors, fractures, or cardiac irregularities. Furthermore, AI aids in early detection of diseases, risk stratification, and prediction of patient outcomes, which leads to improved clinical interventions and resource optimization. Despite these advancements, challenges such as data privacy, algorithm transparency, and ethical concerns must be addressed to ensure trustworthy implementation. The chapter also highlights current case studies, regulatory developments, and future directions of AI-assisted diagnostics, emphasizing the need for collaboration between data scientists, clinicians, and healthcare policymakers. Ultimately, the integration of AI in diagnostics represents a major leap forward in precision medicine, offering the potential to reshape healthcare delivery and patient care on a global scale.

Keywords: Artificial Intelligence, Healthcare Diagnostics, Machine Learning, Medical Imaging, Precision Medicine.

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ENHANCING ACCURACY IN UTILITY BILLING: A SOFTWARE-BASED SOLUTION FOR ELECTRICAL GRIDS

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Accurate utility billing remains a critical component of efficient energy management, especially in modern electrical grids where energy consumption patterns are becoming increasingly dynamic. This chapter presents a software-based solution aimed at enhancing the accuracy of utility billing through the integration of advanced data analytics, smart metering, and real-time monitoring technologies. The proposed system leverages automated meter reading (AMR), Internet of Things (IoT) devices, and cloud computing to collect, process, and analyze energy usage data with minimal human intervention. By reducing manual errors, eliminating fraudulent practices, and enabling detailed consumption insights, this approach supports transparent and fair billing practices for both providers and consumers. The software is designed to be scalable and adaptable across different grid infrastructures, including urban, rural, and industrial setups. Moreover, it incorporates predictive algorithms that can alert users and utility providers about unusual consumption patterns, facilitating proactive maintenance and energy conservation. This chapter also explores the challenges related to data security, interoperability, and regulatory compliance, offering recommendations for effective implementation. Through a combination of case studies and simulation results, the efficacy of the proposed solution in reducing billing discrepancies and improving customer satisfaction is demonstrated. Overall, the integration of intelligent software solutions into electrical grid systems signifies a transformative step toward smarter, more accountable energy usage and management.

Keywords: Utility Billing, Smart Grid, Automated Meter Reading, Energy Management Software, Data Analytics.

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ROLE OF ARTIFICIAL INTELLIGENCE IN DRUG DISCOVERY

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The integration of artificial intelligence (AI) into drug discovery is transforming the pharmaceutical landscape by accelerating research, reducing costs, and increasing the success rate of novel therapeutics. AI technologies, including machine learning (ML), deep learning, and natural language processing, enable the rapid analysis of massive datasets such as chemical libraries, biological databases, and clinical trial data. These tools facilitate target identification, lead compound optimization, and prediction of drug–target interactions with higher accuracy and speed than traditional methods. AI also supports de novo drug design, virtual screening, and the identification of drug repurposing opportunities. By learning patterns from existing data, AI systems can predict pharmacokinetics, toxicity profiles, and potential side effects early in the development pipeline, thereby improving drug safety and efficacy. Furthermore, AI aids in precision medicine by helping tailor therapies based on individual genetic, environmental, and lifestyle factors. Despite its vast potential, challenges such as data quality, interpretability of models, and regulatory acceptance must be addressed to ensure responsible AI integration. Collaboration between computational scientists, biologists, and regulatory bodies is essential for translating AI-driven innovations into clinical practice. Overall, this chapter highlights the evolving role of AI in modern drug discovery, emphasizing its promise to revolutionize how medicines are developed, tested, and personalized for patients.

Keywords: Artificial Intelligence, Drug Discovery, Machine Learning, Target Identification, Predictive Modelling.

MCHSR/AI/2025/483

FORMULATION DEVELOPMENT & EVALUATION OF ETHOSOMAL GEL OF NYCTANTHES ARBOR-TRISTIS HERBAL PLANT

Pooja Rani

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The present study focuses on the formulation and evaluation of an ethosomal gel incorporating the herbal extract of Nyctanthes arbor-tristis, commonly known as Night Jasmine. This plant is well-known for its anti-inflammatory, antipyretic, and antimicrobial properties. Ethosomes, being lipid-based vesicular carriers, offer improved skin permeability and bioavailability of herbal actives. The gel was formulated using ethosomal suspensions prepared by the cold method and incorporated into a suitable gel base. Various evaluation parameters such as pH, viscosity, spreadability, drug content, and in vitro drug release were carried out to determine the efficacy and stability of the formulation. The optimized ethosomal gel exhibited desirable physicochemical properties and enhanced drug release profile, indicating its potential as an effective topical delivery system for herbal therapeutics. This study opens avenues for the development of novel herbal formulations utilizing advanced drug delivery technologies.

Keywords: ethosomal gel, herbal extract, lipid-based vesicular carriers.

PHARMACOVIGILANCE STUDY IN PATIENTS WITH RESPIRATORY DISEASE AT TERTIARY CARE TEACHING HOSPITAL

Harsh Chaudhary

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The present study aims to evaluate the role of pharmacovigilance in identifying, monitoring, and preventing adverse drug reactions (ADRs) among patients suffering from respiratory diseases in a tertiary care teaching hospital. Respiratory disorders often require complex and prolonged pharmacotherapy, increasing the risk of drug-related problems. This study involved the collection and analysis of ADR data from patients diagnosed with conditions such as asthma, chronic obstructive pulmonary disease (COPD), and respiratory tract infections. All reported ADRs were assessed using standard causality assessment tools such as the WHO-UMC scale and Naranjo algorithm. The results revealed a significant number of ADRs, primarily associated with bronchodilators, corticosteroids, and antibiotics. The findings emphasize the importance of active pharmacovigilance systems in healthcare settings to improve patient safety, optimize therapy, and reduce the risk of adverse events. This study highlights the need for increased awareness and training among healthcare professionals regarding the reporting and management of ADRs in respiratory patients.

Keywords: COPD, ADR, Pharmacovigilance, patient safety.

MCHSR/AI/2025/485

ADVANCING INSIGHT IN NEUROPATHIC PAIN: A COMPREHENSIVE REVIEW OF ITS COMPLEXITY AND THERAPEUTIC FRONTIERS

Abhishek Anand

Teerthanker Mahaveer University

Neuropathic pain is a complex, chronic pain state often resulting from injury to the nervous system. Unlike nociceptive pain, which arises from tissue damage, neuropathic pain stems from abnormal neural activity, making its diagnosis and treatment particularly challenging. This review aims to provide an in-depth exploration of the multifaceted nature of neuropathic pain, including its pathophysiology, clinical manifestations, and the latest advancements in therapeutic approaches. We highlight key mechanisms involving peripheral and central sensitization, neuroinflammation, and ion channel dysregulation. The paper also examines current pharmacological and non-pharmacological treatments, including emerging therapies such as neuromodulation, gene therapy, and novel drug targets. Through this comprehensive review, we underscore the need for personalized medicine approaches and continued research to better manage and understand neuropathic pain, ultimately aiming to improve patient outcomes.

Keywords: neuroinflammation, personalized medicine, treatment.

MCHSR/AI/2025/486

NEXT GENERATION ANTI-THROMBOTICS: AI, NANOTECHNOLOGY, AND TARGETED Therapies for Thrombosis Control

Mithul V

Teerthanker Mahaveer University

Thrombosis, a leading cause of morbidity and mortality worldwide, demands innovative therapeutic strategies beyond conventional anticoagulants. This review explores the next generation of anti-thrombotic approaches, emphasizing the integration of artificial intelligence (AI), nanotechnology, and targeted therapies. AI is revolutionizing drug discovery and personalized medicine by predicting thrombotic risk, optimizing treatment regimens, and identifying novel drug targets. Nanotechnology offers advanced drug delivery systems, enhancing bioavailability and reducing systemic side effects by targeting thrombi with precision. Furthermore, the development of biologics and gene-based therapies enables specific modulation of coagulation pathways. Collectively, these advancements signify a paradigm shift in thrombosis management, offering safer, more effective, and individualized therapeutic solutions. Continued interdisciplinary research is essential to translate these cutting-edge innovations from bench to bedside, improving patient outcomes in thrombotic disorders.

Keywords: nanotechnology, targeted therapies, gene-based therapies.

MCHSR/AI/2025/487

INFLAMMATORY MARKERS IN PMDD: THEIR ROLE IN CARDIOVASCULAR RISK ASSESSMENT

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Premenstrual Dysphoric Disorder (PMDD) is a severe form of premenstrual syndrome that affects emotional and physical health. Recent studies suggest a possible link between PMDD and increased cardiovascular risk through chronic low-grade inflammation. This abstract explores the role of inflammatory markers such as C-reactive protein (CRP), interleukins, and tumor necrosis factor-alpha in PMDD and their potential as indicators for cardiovascular risk. Early identification of at-risk individuals through biomarker profiling could enable preventive cardiovascular care and better management of PMDD-related systemic complications. This review advocates for integrating inflammatory screening in PMDD patients to improve long-term cardiovascular outcomes.

Keywords: PMDD, tumor necrosis, biomarker.

MCHSR/AI/2025/488

PHARMACOVIGILANCE STUDY IN PATIENTS WITH COPD AT A TERTIARY CARE TEACHING HOSPITAL

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Chronic Obstructive Pulmonary Disease (COPD) is a progressive and debilitating respiratory disorder that often requires long-term pharmacotherapy. Due to the chronic nature and polypharmacy involved, the risk of adverse drug reactions (ADRs) is significantly high in COPD patients. This study aims to assess the pattern, frequency, and severity of ADRs in COPD patients admitted to a tertiary care teaching hospital as part of a pharmacovigilance initiative. Data were collected using spontaneous and active surveillance methods, with causality assessments performed using standard WHO-UMC and Naranjo's criteria. The findings highlight the importance of continuous monitoring of drug safety, identification of high-risk medications, and educating healthcare providers to ensure rational drug use and enhance patient safety. Strengthening pharmacovigilance systems in clinical practice is crucial for minimizing drug-related complications and improving overall treatment outcomes in COPD management.

Keywords: WHO-UMC, COPD, ADR.

MCHSR/AI/2025/489

USE OF AI IN DRUG DESIGNING

Rewa Saini

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Artificial Intelligence (AI) is revolutionizing the field of drug discovery and development by accelerating target identification, lead compound generation, and optimization processes. This abstract highlights how machine learning algorithms, neural networks, and predictive modeling are being employed to analyze massive biological datasets, predict drug-target interactions, and reduce failure rates in clinical trials. AI-driven platforms significantly shorten the drug development timeline and lower costs while improving precision and efficacy. Despite existing challenges such as data quality, model validation, and ethical concerns, AI offers transformative potential in creating safer and more effective drugs, marking a new era in pharmaceutical innovation.

Keywords: AI, model validation, data quality.

MCHSR/AI/2025/490

USE OF AI IN DRUG DESIGNING

Vivek Swarnkar

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The integration of Artificial Intelligence (AI) in drug designing is revolutionizing the pharmaceutical industry by enhancing the speed, accuracy, and efficiency of discovering novel therapeutics. Traditional drug discovery is a time-consuming and resource-intensive process, often taking over a decade and billions of dollars to bring a single drug to market. AI-driven approaches, particularly those based on machine learning (ML), deep learning, and neural networks, are transforming this paradigm by enabling the analysis of massive and complex datasets, including molecular structures, protein-ligand interactions, and biological pathways.

AI models can predict the pharmacokinetic and pharmacodynamic properties of compounds, assess drug-likeness, and identify potential toxicity early in the design process. These capabilities significantly reduce the reliance on trial-and-error methods in laboratory settings. Tools like generative models and structure-based drug design algorithms allow researchers to create entirely new molecular entities optimized for binding affinity, selectivity, and stability. Additionally, AI accelerates the identification of promising drug targets by analyzing omics data and biological networks.

The successful application of AI in drug designing has been demonstrated in various stages of development, from hit identification to lead optimization. Notably, AI contributed to the rapid development of candidate drugs and vaccines during the COVID-19 pandemic. However, challenges remain, including the need for high-quality data, model interpretability, and regulatory acceptance.

As AI technologies continue to evolve, their integration into drug discovery workflows is expected to not only reduce costs and timelines but also enhance the precision and personalization of therapeutic development.

Keywords: AI, Machine learning, toxicity.

MCHSR/AI/2025/491

USE OF AI IN DRUG DESIGNING

Shivansh Jaiswal

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The application of Artificial Intelligence (AI) in drug designing has emerged as a groundbreaking advancement in the pharmaceutical and biomedical sciences. Traditional drug discovery is a lengthy, complex, and expensive process, often taking 10–15 years and significant financial investment to develop a single successful therapeutic. AI offers a transformative approach by significantly accelerating the discovery pipeline through advanced computational techniques such as machine learning (ML), deep learning, natural language processing (NLP), and neural networks. These tools can rapidly analyze and interpret vast amounts of biological, chemical, and pharmacological data, enabling more efficient identification of potential drug candidates.

AI plays a crucial role in various stages of drug design, including target identification, lead compound generation, virtual screening, and ADMET (Absorption, Distribution, Metabolism, Excretion, and Toxicity) prediction. Structure-based and ligand-based drug design approaches are enhanced through AI models that predict molecular interactions and binding affinities with high precision. Generative models are increasingly used to design novel molecules with desirable properties, potentially reducing the need for extensive laboratory testing.

Moreover, AI facilitates personalized medicine by analyzing patient-specific genetic and clinical data to design targeted therapies. Despite the significant potential, challenges such as data quality, model interpretability, and regulatory concerns remain key barriers to full-scale implementation.

Overall, AI is reshaping the landscape of drug designing by improving accuracy, reducing development costs, and shortening timeframes, thus offering promising solutions to complex health challenges and expediting the development of life-saving medications.

Keywords: ADMET, structure-based design, ligand-based design.

MCHSR/AI/2025/492

STEM CELL THERAPY IN TREATING EPILEPSY

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Epilepsy is a chronic neurological disorder characterized by recurrent seizures due to abnormal electrical activity in the brain. Despite the availability of antiepileptic drugs, a significant percentage of patients remain drug-resistant, necessitating the exploration of alternative therapeutic strategies. Stem cell therapy has emerged as a promising option for epilepsy management, offering the potential to repair damaged neural networks, reduce seizure frequency, and restore normal brain function. This abstract reviews various types of stem cells such as neural stem cells, mesenchymal stem cells, and embryonic stem cells, focusing on their mechanisms—like neuroprotection, anti-inflammatory effects, and neurogenesis. Current research and clinical trials suggest encouraging outcomes, although challenges like cell delivery, ethical concerns, and long-term safety must be addressed. Advancements in stem cell technology hold the potential to revolutionize the treatment landscape for refractory epilepsy.

Keywords: therapeutic, neurological, mesenchymal stem cells.

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STEM CELL THERAPY IN TREATING EPILEPSY

Amresh Kumar

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Epilepsy is a prevalent neurological disorder marked by recurrent, spontaneous seizures caused by abnormal neuronal activity in the brain. While conventional treatments such as antiepileptic drugs and surgical interventions provide relief for many patients, approximately 30% remain resistant to these therapies. This has led to the exploration of alternative approaches, among which stem cell therapy has emerged as a promising strategy. Stem cells possess the ability to self-renew and differentiate into various neural cell types, offering potential to repair, replace, or regenerate damaged brain tissue.

In epilepsy, stem cell therapy aims to restore the balance between excitatory and inhibitory signaling by replacing lost inhibitory interneurons, modulating inflammatory responses, and repairing seizure-induced neural damage. Preclinical studies using mesenchymal stem cells (MSCs), neural stem cells (NSCs), and induced pluripotent stem cells (iPSCs) have shown encouraging results in reducing seizure frequency and improving cognitive outcomes in animal models. These cells may also release neuroprotective and anti-inflammatory factors that aid in functional recovery.

Despite its potential, stem cell therapy in epilepsy faces challenges, including ensuring cell survival, targeted delivery, ethical concerns, and long-term safety. However, ongoing research and clinical trials continue to explore its viability, making it a promising avenue for the future treatment of drug-resistant epilepsy.

Keywords: stem cell, NSC, MSC.

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STEM CELL THERAPY IN TREATING EPILEPSY

Shourya saxena

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Epilepsy is a chronic neurological disorder characterized by recurrent seizures due to abnormal electrical activity in the brain. While antiepileptic drugs (AEDs) and surgical interventions offer relief for many patients, nearly 30% remain resistant to available treatments. Stem cell therapy has emerged as a novel and promising approach for managing drug-resistant epilepsy, offering the potential for repairing or replacing damaged neural networks rather than merely suppressing symptoms.

Stem cells, including mesenchymal stem cells (MSCs), neural stem cells (NSCs), and induced pluripotent stem cells (iPSCs), have the capacity to differentiate into various neuronal and glial cell types. When introduced into the epileptic brain, they may restore the balance between excitatory and inhibitory signaling by generating GABAergic neurons, secreting neurotrophic and anti-inflammatory factors, and modulating the local immune response. Preclinical studies have shown that stem cell transplantation can reduce seizure frequency, protect neurons from further damage, and improve behavioral and cognitive function in animal models of epilepsy.

Despite these promising results, challenges remain in terms of targeted delivery, cell survival, risk of tumorigenesis, and ethical considerations. Continued research and clinical trials are essential to evaluate the safety, efficacy, and long-term outcomes of stem cell-based therapies in epilepsy treatment.

Keywords: epilepsy, drug-resistant epilepsy, neurons.

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STEM CELL THERAPY IN TREATING EPILEPSY

Avinash Kumar

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Epilepsy is a chronic neurological condition characterized by recurrent seizures caused by abnormal electrical activity in the brain. Although antiepileptic drugs (AEDs) are the primary treatment, nearly one-third of patients suffer from drug-resistant epilepsy, requiring alternative therapeutic strategies. In this context, stem cell therapy has gained attention as a potential disease-modifying treatment. Stem cells possess the unique ability to self-renew and differentiate into various neural cell types, making them ideal candidates for repairing or replacing damaged neural circuits involved in seizure activity.

Different types of stem cells, including neural stem cells (NSCs), mesenchymal stem cells (MSCs), and induced pluripotent stem cells (iPSCs), have been investigated for their ability to reduce seizures, restore normal brain function, and improve cognitive outcomes in preclinical epilepsy models. These cells may exert therapeutic effects by generating new inhibitory neurons, modulating inflammation, releasing neuroprotective factors, and restoring the balance between excitatory and inhibitory signals in the brain.

Despite encouraging results in experimental studies, clinical application remains limited due to challenges such as immune rejection, tumorigenesis, ethical concerns, and regulatory issues. Further research and carefully designed clinical trials are essential to evaluate the safety, efficacy, and long-term impact of stem cell therapy as a novel treatment for epilepsy.

Keywords: AED, stem cell, seizures.

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USE OF AI IN DRUG DESIGNING

Drashya Samiya

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Artificial Intelligence (AI) is revolutionizing the field of drug discovery and development by accelerating target identification, lead compound generation, and optimization processes. This abstract highlights how machine learning algorithms, neural networks, and predictive modeling are being employed to analyze massive biological datasets, predict drug-target interactions, and reduce failure rates in clinical trials. AI-driven platforms significantly shorten the drug development timeline and lower costs while improving precision and efficacy. Despite existing challenges such as data quality, model validation, and ethical concerns, AI offers transformative potential in creating safer and more effective drugs, marking a new era in pharmaceutical innovation.

Keywords: AI, biological datasets, model validation

MCHSR/AI/2025/497

ADVANCEMENTS IN MICROEMULSION NANOCARRIERS FOR CANCER THERAPY

Anshi Jain

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Cancer remains one of the leading causes of death worldwide, with conventional therapies such as chemotherapy often accompanied by severe side effects and limited selectivity for tumor cells. Microemulsion nanocarriers have emerged as a promising alternative, offering enhanced drug delivery to targeted sites with reduced toxicity. These nanocarriers, composed of oil, water, and surfactants, are capable of encapsulating both hydrophilic and hydrophobic drugs, providing controlled release and improving the solubility of poorly water-soluble anticancer drugs. This abstract discusses the recent advancements in the development of microemulsion-based drug delivery systems for cancer therapy, including the formulation of novel microemulsions, their mechanisms of action, and their potential in enhancing drug bioavailability, stability, and targeted delivery. Clinical studies have shown significant improvements in tumor targeting and reduced side effects, making microemulsions a promising tool in cancer therapy. However, challenges related to large-scale production, regulatory issues, and long-term safety need to be addressed. The ongoing research in microemulsion nanocarriers represents an exciting frontier in the development of more effective and less toxic cancer treatments

Keywords: clinical, microemulsion, cancer.

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ADVANCEMENTS IN MICROEMULSION NANOCARRIERS FOR CANCER THERAPY

Muskan Gupta

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Cancer remains one of the leading causes of death worldwide, necessitating the development of more effective and targeted drug delivery systems. Microemulsion-based nanocarriers have emerged as a promising approach in cancer therapy due to their unique physicochemical properties, including thermodynamic stability, high solubilization capacity, and ease of formulation. These nanocarriers, typically composed of oil, water, surfactants, and co-surfactants, can enhance the solubility and bioavailability of poorly water-soluble anticancer drugs.

Recent advancements have focused on optimizing microemulsion systems to achieve targeted and controlled drug delivery, reduce systemic toxicity, and improve therapeutic efficacy. Functionalization of microemulsions with ligands such as antibodies, peptides, or folic acid allows for selective targeting of tumor cells, thereby minimizing damage to healthy tissues. Additionally, the incorporation of stimuli-responsive components—such as pH-sensitive or thermosensitive agents—enables controlled drug release in the tumor microenvironment.

Moreover, microemulsion nanocarriers can be engineered for co-delivery of multiple drugs, overcoming multidrug resistance and enhancing synergistic effects. Ongoing research and clinical evaluations continue to demonstrate their potential in delivering chemotherapeutic agents, gene therapies, and natural anticancer compounds. Thus, microemulsion nanocarriers represent a significant advancement in nanomedicine, offering a versatile and efficient platform for next-generation cancer therapy.

Keywords: cancer, toxicity, therapeutic efficacy.

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ADVANCEMENTS IN MICROEMULSION NANOCARRIERS FOR CANCER THERAPY

Suhani Singh

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Microemulsion nanocarriers have garnered significant attention in cancer therapy due to their unique properties, including high stability, biocompatibility, and capacity to solubilize both hydrophobic and hydrophilic drugs. These colloidal systems, typically composed of oil, water, surfactants, and co-surfactants, offer a versatile platform for enhancing the delivery of anticancer drugs. Recent advancements in microemulsion-based nanocarriers have focused on improving their targeting efficiency, controlled release, and reduced toxicity.

One major development is the functionalization of microemulsions with targeting ligands such as antibodies, peptides, or aptamers, which enable selective delivery to tumor cells, sparing healthy tissues. Additionally, the incorporation of stimuli-responsive components, such as pH-sensitive, temperature-sensitive, or enzyme-triggered release mechanisms, allows for controlled drug release specifically within the tumor microenvironment.

Furthermore, the ability to co-deliver multiple therapeutic agents, such as chemotherapeutics and genes, within a single microemulsion nanocarrier has shown promise in overcoming drug resistance and enhancing therapeutic efficacy. These systems also facilitate the encapsulation of natural anticancer agents, which often suffer from poor bioavailability.

Ongoing research continues to refine the formulation and clinical translation of microemulsion nanocarriers, positioning them as an effective and promising tool for the targeted treatment of cancer, with the potential to revolutionize cancer nanomedicine.

Keywords: microemulsion, genes, stimuli-responsive components

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ADVANCEMENTS IN MICROEMULSION NANOCARRIERS FOR CANCER THERAPY

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Microemulsion nanocarriers have emerged as a promising strategy for enhancing the delivery of anticancer drugs, addressing many of the limitations associated with conventional drug delivery systems. These thermodynamically stable, colloidal dispersions typically consist of water, oil, surfactants, and co-surfactants, enabling the solubilization of both hydrophilic and hydrophobic drugs. Recent advancements in microemulsion technology have focused on optimizing their physicochemical properties for enhanced drug loading, targeted delivery, and controlled release.

Notably, microemulsions can be functionalized with targeting moieties such as antibodies, peptides, and folic acid to selectively bind to tumor cells, improving the therapeutic index of chemotherapeutic agents while minimizing side effects on healthy tissues. Additionally, the incorporation of stimuli-responsive features such as pH-sensitive or enzyme-triggered release mechanisms has enhanced the precision of drug release, ensuring that therapeutic agents are delivered specifically within the tumor microenvironment.

Another significant advancement is the use of dual-drug delivery systems, where microemulsions are engineered to co-deliver multiple therapeutics, including chemotherapeutics, gene therapy agents, and natural compounds. This approach aims to overcome multidrug resistance and improve overall treatment efficacy. Microemulsion nanocarriers, with their versatility and ability to address multiple challenges in cancer therapy, represent a significant leap in the field of cancer nanomedicine.

Keywords: enzyme-triggered release, Microemulsion, chemotherapeutics.

MCHSR/AI/2025/501

BLEBBISOMES: MOTILE CELL-AUTONOMOUS COMMUNICATION CENTERS WITH MITOCHONDRIAL FUNCTIONALITY

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In recent years, the study of cellular communication has extended beyond traditional mechanisms, revealing the critical role of motile structures known as blebbosomes. These membrane-bound vesicles are involved in cell-autonomous communication, facilitating the exchange of signaling molecules and mitochondria between cells. This abstract explores the emerging concept of blebbosomes, which serve as motile centers for cellular communication, and their potential impact on mitochondrial functionality. Blebbosomes are thought to function as transporters of mitochondrial components and metabolites, enhancing cellular bioenergetics and contributing to cellular homeostasis. Their role in regulating cellular processes, including apoptosis, oxidative stress, and metabolic adaptation, is becoming increasingly evident. Research suggests that blebbosomes could act as key players in tissue regeneration, cancer metastasis, and neurodegenerative diseases by modulating mitochondrial activity and cellular communication. Although the full understanding of their mechanisms is still evolving, blebbosomes hold significant promise for therapeutic applications aimed at modulating mitochondrial function and improving cellular responses to stress and injury.

Keywords: homeostasis, bioenergetics, signaling

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BLEBBISOMES: MOTILE CELL-AUTONOMOUS COMMUNICATION CENTERS WITH MITOCHONDRIAL FUNCTIONALITY

Ashish

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Blebbisomes are a novel class of membrane-bound structures that function as motile, cell-autonomous communication centers within cells, playing a crucial role in intracellular signaling and mitochondrial function. These vesicles are derived from the plasma membrane via the process of blebbing, where the cell membrane protrudes outward and detaches to form small vesicles that contain mitochondria, signaling molecules, and other cellular components. Recent studies suggest that blebbisomes are not merely passive byproducts of cellular dynamics but are actively involved in cellular communication and energy metabolism.

The primary function of blebbisomes lies in their ability to transport mitochondrial content, including ATP and reactive oxygen species (ROS), between different regions of the cell. This enables them to coordinate energy distribution and metabolic responses, especially in cells undergoing stress or migration. Furthermore, blebbisomes participate in intercellular communication by releasing signaling molecules that modulate the behavior of neighboring cells, including immune responses and tissue remodeling.

Due to their dynamic motility and involvement in mitochondrial function, blebbisomes are emerging as key players in cellular adaptation, survival, and communication. Ongoing research into their mechanisms could open new avenues for understanding cellular plasticity, disease progression, and potential therapeutic interventions targeting cellular energy dynamics and intercellular signaling.

Keywords: tissue remodelling, mitochondrial function, blebbisomes.

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BLEBBISOMES: MOTILE CELL-AUTONOMOUS COMMUNICATION CENTERS WITH MITOCHONDRIAL FUNCTIONALITY

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BLEBBISOMES represent a novel class of motile, cell-autonomous vesicular structures that facilitate intercellular communication and display a strong association with mitochondrial functionality. These structures appear to originate from cellular blabbing processes and are enriched in signaling molecules, bioenergetics substrates, and mitochondrial components. Their dynamic mobility within the extracellular space suggests a role in targeted signaling and metabolic exchange between cells, particularly under stress or pathological conditions. Recent investigations have revealed that BLEBBISOMES can influence cellular respiration, oxidative stress responses, and may even play a part in cancer metastasis, neurodegeneration, and tissue regeneration. The ability of BLEBBISOMES to encapsulate and deliver mitochondrial cargo opens new avenues for therapeutic targeting in diseases where mitochondrial dysfunction is a hallmark. This review consolidates emerging evidence on their structural composition, biogenesis, and functional significance, and discusses their potential as diagnostic biomarkers and drug delivery vehicles.

Keywords: BLEBBISOMES, intercellular communication, mitochondrial functionality, vesicular transport, cellular blebbing, mitochondrial therapy

MCHSR/AI/2025/504

NAVIGATING CARDIAC ARREST VERSUS HEART FAILURE: COMPREHENSIVE REVIEW

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Cardiac arrest and heart failure are two critical cardiovascular conditions that often present overlapping symptoms but differ significantly in pathophysiology, clinical management, and outcomes. This review provides a comparative analysis of both conditions, focusing on their etiology, clinical presentations, diagnostic strategies, emergency response protocols, and long-term treatment approaches. Cardiac arrest is typically a sudden, life-threatening event characterized by abrupt cessation of cardiac activity, requiring immediate resuscitation. In contrast, heart failure is a chronic progressive condition where the heart cannot pump blood efficiently to meet the body's needs. The paper also highlights advances in defibrillation technology, cardiac resynchronization therapy, and pharmacological interventions, alongside the role of artificial intelligence in early detection and monitoring. Understanding the nuances between these conditions is essential for clinicians to make timely decisions, optimize patient outcomes, and reduce healthcare burdens associated with recurrent hospitalizations and mortality.

Keywords: cardiac arrest, heart failure, cardiovascular emergency, resuscitation, AI in cardiology, clinical management

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KNOWLEDGE, ATTITUDE, AND PRACTICE OF COMMUNITY PHARMACISTS TOWARDS INHALER DEVICES USED IN ASTHMA AND COPD: A CROSS-SECTIONAL STUDY

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Proper use of inhaler devices is crucial for the effective management of asthma and chronic obstructive pulmonary disease (COPD). This cross-sectional study explores the knowledge, attitude, and practice (KAP) of community pharmacists regarding inhaler technique and patient counseling. A structured questionnaire was distributed to 200 pharmacists across urban and semi-urban regions, assessing their understanding of device functionality, demonstration practices, and patient education. Results revealed that while most pharmacists had moderate knowledge of inhaler types and indications, a significant gap was observed in their practical demonstration skills and confidence in educating patients. Furthermore, time constraints and lack of continuous training emerged as key barriers. The study underscores the need for regular professional development programs to empower pharmacists in playing a proactive role in respiratory disease management. Strengthening pharmacist involvement can significantly enhance patient adherence and clinical outcomes.

Keywords: community pharmacists, asthma, COPD, inhaler technique, patient counseling, KAP study

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PHARMACOVIGILANCE STUDY IN PATIENTS WITH ASTHMA AT A TERTIARY CARE TEACHING HOSPITAL

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Pharmacovigilance plays a vital role in ensuring the safe and effective use of medications, particularly in chronic conditions such as asthma. This study was conducted at a tertiary care teaching hospital to evaluate the pattern, severity, and causality of adverse drug reactions (ADRs) in patients receiving asthma therapy. Over six months, 150 asthma patients were monitored, and ADRs were documented using WHO-UMC causality criteria and Naranjo's scale. The most commonly reported ADRs were tremors, palpitations, dry mouth, and throat irritation, primarily associated with β2-agonists and corticosteroids. Poly pharmacy and poor inhaler technique were significant contributing factors. The findings emphasize the need for regular monitoring, patient education, and improved reporting practices among healthcare providers. Establishing a robust pharmacovigilance system in asthma care can minimize drug-related morbidity and enhance therapeutic outcomes.

Keywords: pharmacovigilance, asthma, adverse drug reactions, β2-agonists, corticosteroids, patient safety

MCHSR/AI/2025/507

AI IN TELEMEDICINE

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The integration of Artificial Intelligence (AI) into telemedicine is revolutionizing the landscape of healthcare delivery by enabling remote diagnostics, personalized treatment, and predictive analytics. This paper explores the growing applications of AI in telehealth platforms, focusing on diagnostic decision support systems, real-time symptom monitoring, chatbot triage, and virtual consultations. AI-driven tools such as natural language processing (NLP) and machine learning algorithms are enhancing clinician efficiency and patient satisfaction by reducing wait times and improving diagnostic accuracy. Case studies from COVID-19 pandemic-era telehealth adoption demonstrate how AI helped scale operations and reach underserved populations. Despite these advancements, challenges such as data privacy, algorithm transparency, and regulatory compliance remain critical. Future prospects include AI-powered wearable integration and multilingual support to bridge communication gaps. The convergence of AI and telemedicine holds promise for accessible, efficient, and equitable healthcare systems worldwide.

Keywords: artificial intelligence, telemedicine, digital health, remote diagnostics, machine learning, virtual care

MCHSR/AI/2025/508

PEGYLATED NANOPARTICLES FOR TARGETED IMMUNOTHERAPY: INNOVATIONS AND CLINICAL IMPLICATIONS

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Pegylated nanoparticles have emerged as a transformative tool in the field of targeted immunotherapy, offering precise delivery of therapeutic agents to immune cells while minimizing systemic toxicity. Polyethylene glycol (PEG) coating enhances the pharmacokinetic profile of nanoparticles by increasing solubility, stability, and circulation time, thus improving bioavailability and therapeutic index. This review explores recent innovations in the design and application of pegylated nanoparticles for the delivery of immune modulators, cytokines, antigens, and monoclonal antibodies in treating cancers, autoimmune diseases, and chronic inflammatory conditions. Advances in surface engineering allow ligand-based targeting to specific immune receptors, facilitating precision therapy and reducing off-target effects. Preclinical and early clinical studies have demonstrated significant improvement in patient response rates and reduced immune-related adverse effects. However, challenges such as PEG immunogenicity and batch-to-batch reproducibility remain to be addressed. The integration of nanotechnology and immunology heralds a new era in personalized medicine, and pegylated nanoparticle-based therapies hold promise for reshaping the future of immune modulation.

Keywords: pegylated nanoparticles, immunotherapy, targeted drug delivery, PEGylation, nanomedicine, immune modulation

MCHSR/AI/2025/509

A SYSTEMATIC REVIEW: THE IMPACT OF DEPRESSION AND ANXIETY AMONG YOUNG PEOPLE

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Depression and anxiety are among the most prevalent mental health disorders affecting young people, with long-term consequences for academic performance, social relationships, and overall well-being. This systematic review synthesizes findings from global studies conducted over the past decade, examining the prevalence, risk factors, and psychological impacts of depression and anxiety in adolescents and young adults. Factors such as academic pressure, social media use, family dynamics, and socioeconomic challenges were commonly identified contributors. The review also evaluates the effectiveness of various intervention strategies including cognitive behavioral therapy (CBT), school-based programs, digital mental health tools, and pharmacological treatments. Meta-analyses reveal a significant correlation between untreated mental health issues in adolescence and the risk of substance abuse, suicidal ideation, and chronic emotional dys regulation in adulthood. The study highlights the urgent need for integrated mental health services within educational systems and community settings. Early screening, awareness campaigns, and culturally sensitive interventions are essential to mitigate the mental health crisis among youth.

Keywords: depression, anxiety, youth mental health, adolescents, systematic review, early intervention, CBT

MCHSR/AI/2025/510

ARTIFICIAL INTELLIGENCE IN HEALTHCARE: NAVIGATING NEW FRONTIERS AND EMERGING CHALLENGES

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Artificial Intelligence (AI) is revolutionizing the healthcare sector, offering unprecedented capabilities in diagnostics, treatment planning, administrative automation, and patient engagement. This paper explores the latest advancements in AI applications across various medical disciplines, from radiology and pathology to genomics and virtual health assistants. AI algorithms, particularly deep learning and natural language processing (NLP), have shown exceptional performance in image recognition, clinical decision support, and predictive analytics. However, the integration of AI in healthcare is not without challenges. Issues such as data privacy, algorithmic bias, lack of standardization, and resistance to adoption by healthcare professionals pose significant barriers. Furthermore, regulatory frameworks are still evolving to ensure safety, efficacy, and ethical compliance. The paper advocates for a balanced approach—leveraging AI's transformative potential while ensuring transparent, equitable, and patient-centric deployment. By fostering interdisciplinary collaboration and robust data governance, AI can bridge healthcare gaps and redefine care delivery in both high-resource and low-resource settings.

Keywords: artificial intelligence, healthcare innovation, medical AI, diagnostics, deep learning, ethical challenges, digital health

MCHSR/AI/2025/511

PREDICTIVE ANALYTICS IN HEALTHCARE: AI FOR EARLY DISEASE DETECTION AND PREVENTION

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Predictive analytics, powered by artificial intelligence (AI), is becoming a cornerstone in the shift towards preventive and personalized healthcare. This paper investigates the role of AI-driven predictive models in early disease detection, risk stratification, and proactive health management. Using large datasets from electronic health records (EHRs), wearable devices, and genomic data, machine learning algorithms can identify subtle patterns and anomalies that precede clinical symptoms. Applications include early detection of diabetes, cancer, cardiovascular diseases, and neurodegenerative disorders. The implementation of AI in predictive healthcare enhances decision-making, reduces diagnostic errors, and enables timely interventions, potentially saving lives and reducing healthcare costs. However, the success of predictive models depends on data quality, model interpretability, and continuous validation. Ethical considerations such as patient consent, data security, and equitable access must also be addressed. As healthcare systems embrace AI, predictive analytics promises to transition care from reactive to preventive, ultimately improving health outcomes on a population scale.

Keywords: predictive analytics, early disease detection, AI in healthcare, machine learning, preventive medicine, health informatics

MCHSR/AI/2025/512

THE PATHOGENESIS OF EPILEPSY AND ITS DIAGNOSIS AND TREATMENT

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Epilepsy is a chronic neurological disorder characterized by recurrent, unprovoked seizures resulting from abnormal electrical activity in the brain. This paper provides a comprehensive overview of the pathogenesis, diagnostic approaches, and treatment strategies for epilepsy. The pathogenesis involves a complex interplay of genetic mutations, ion channel dysfunction, neuroinflammation, and neuronal network reorganization. Advances in neuroimaging, electroencephalography (EEG), and molecular diagnostics have significantly improved the accuracy of epilepsy diagnosis and the classification of seizure types. Treatment primarily involves antiepileptic drugs (AEDs), which aim to stabilize neuronal excitability, but approximately one-third of patients remain drug-resistant. In such cases, surgical interventions, vagus nerve stimulation, or responsive neurostimulation may be considered. Emerging therapies, including gene therapy and neuromodulation, offer hope for more effective and personalized treatment options. The review also discusses the psychosocial impact of epilepsy and the importance of a multidisciplinary approach in its management. Continued research is vital to uncovering the molecular underpinnings of epilepsy and developing targeted therapies.

Keywords: epilepsy, seizure disorders, pathogenesis, antiepileptic drugs, neuroimaging, drug-resistant epilepsy, neuromodulation

MCHSR/AI/2025/513

AI MODELS FOR NEUROTOXICITY DETECTION: REVOLUTIONIZING CHEMICAL SAFETY ASSESSMENT

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The detection of neurotoxicity is critical in drug development and chemical safety evaluation, yet conventional in vivo and in vitro methods are time-consuming, costly, and ethically constrained. Artificial Intelligence (AI) offers a transformative approach by enabling the rapid and accurate prediction of neurotoxic potential using computational models. This paper discusses the development and application of AI models—including machine learning (ML), deep learning (DL), and neural networks—in analyzing vast toxicogenomic datasets, molecular descriptors, and chemical structures. These models can identify complex patterns and predict neurotoxicity with high sensitivity and specificity, often outperforming traditional methods. Case studies highlight AI's utility in screening industrial chemicals, environmental pollutants, and pharmaceuticals. The incorporation of explainable AI (XAI) further enhances model interpretability, fostering trust and regulatory acceptance. Despite the promise, challenges such as data standardization, integration of multi-omics data, and validation across species remain. As AI continues to mature, it is poised to become a cornerstone of next-generation neurotoxicity screening and risk assessment.

Keywords: artificial intelligence, neurotoxicity, chemical safety, machine learning, predictive toxicology, computational models, explainable AI

MCHSR/AI/2025/514

FORMULATION OF NANOCRYSTALS FOR SOLUBILITY ENHANCEMENT OF BCS CLASS II DRUGS USING ULTRASOUND ENERGY

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Poor aqueous solubility remains a major challenge in the formulation of Biopharmaceutical Classification System (BCS) Class II drugs, leading to limited bioavailability and therapeutic efficacy. This study explores the use of ultrasound-assisted techniques to develop drug nanocrystals aimed at enhancing solubility and dissolution rates. High-intensity ultrasound generates cavitation forces that reduce particle size and facilitate the formation of stable nanocrystals with improved surface area and wett ability. The method was optimized using varying parameters including sonication time, amplitude, and stabilizer concentration. Characterization techniques such as dynamic light scattering (DLS), scanning electron microscopy (SEM), and differential scanning calorimetry (DSC) confirmed the formation of uniform and stable nanocrystals. In vitro dissolution studies demonstrated a significant improvement in drug release compared to conventional formulations. The study underscores the potential of ultrasound technology in producing nanocrystals as an efficient, scalable, and eco-friendly approach for improving the solubility of hydrophobic drugs.

Keywords: nanocrystals, BCS Class II drugs, ultrasound energy, solubility enhancement, nanotechnology, drug formulation, bioavailability

MCHSR/AI/2025/515

NANOCARRIER-BASED DRUG DELIVERY SYSTEM FOR ENHANCING BIOAVAILABILITY OF POORLY WATER-SOLUBLE DRUGS

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Nanocarrier-based drug delivery systems have revolutionized pharmaceutical development by offering innovative solutions to overcome the solubility and bioavailability challenges associated with poorly water-soluble drugs. This paper reviews various nanocarrier platforms such as liposomes, polymeric nanoparticles, solid lipid nanoparticles, and dendrimers, focusing on their design, mechanism of action, and pharmacokinetic advantages. These systems enhance drug absorption by increasing surface area, prolonging systemic circulation, and enabling targeted delivery. Functionalization with ligands allows site-specific targeting, thereby reducing systemic toxicity and improving therapeutic outcomes. The article also presents recent advancements in stimuli-responsive nanocarriers that release drugs in response to environmental triggers such as pH, temperature, or enzymes. Preclinical studies have shown promising results in cancer, infectious diseases, and neurological disorders. However, challenges such as scale-up, regulatory approval, and long-term safety need to be addressed. The study concludes that nano carriers represent a vital tool in modern pharmaceutics, particularly for improving the efficacy of drugs with limited water solubility.

Keywords: nanocarriers, drug delivery, bioavailability, poorly water-soluble drugs, liposomes, polymeric nano particles, targeted therapy

FORMULATION DEVELOPMENT AND CHARACTERIZATION OF IMMEDIATE RELEASE TABLETS CONTAINING ANTIBACTERIAL DRUGS WITH POOR COMPRESSIBILITY

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Developing immediate release tablets of antibacterial drugs with poor compressibility presents a unique formulation challenge. This study focuses on optimizing the formulation using excipients and processing techniques that enhance compressibility while ensuring rapid drug release. A model antibacterial drug with low inherent compressibility was selected and combined with binders, superdisintegrants, and flow enhancers through direct compression and wet granulation techniques. Various batches were evaluated for pre-compression parameters (flowability, bulk density) and post-compression characteristics including hardness, friability, disintegration time, and drug dissolution profile. The optimized formulation demonstrated acceptable mechanical strength and a disintegration time of less than 5 minutes, complying with pharmacopeial standards. Fourier-transform infrared spectroscopy (FTIR) and X-ray diffraction (XRD) confirmed drug-excipient compatibility and maintained crystallinity. In vitro antibacterial activity showed enhanced efficacy due to rapid drug availability. This study highlights the importance of excipient selection and formulation design in developing efficient oral dosage forms for drugs with formulation constraints.

Keywords: immediate release tablets, antibacterial drugs, poor compressibility, formulation development, drug delivery, excipient optimization, in vitro evaluation

AI-BASED DIAGNOSIS OF DIABETIC RETINOPATHY FOR PREVENTING VISION LOSS

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One of the main preventable causes of blindness in the world, especially among working-age adults, is diabetic retinopathy (DR). To stop the growth of the disease and preserve eyesight, early detection and prompt treatment are essential. This study investigates the use of artificial intelligence (AI) in automating the processing of retinal images for the diagnosis of diabetic retinopathy. To detect and categorise the severity of DR, a convolutional neural network (CNN) model was trained on a sizable dataset of labelled fundus images. The method outperformed conventional diagnostic techniques in terms of speed and consistency, exhibiting excellent levels of accuracy, sensitivity, and specificity. This AI-based technology has great potential for implementation in primary care and underserved areas by facilitating scalable and economical screening.

Keywords: Accuracy, CNN, Diabetic retinopathy, Specificity

AI- POWERED DRUG DISCOVERY AND PERSONALIZED TREATMENT PLANS FOR LUNG CANCER

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Lung cancer continues to be one of the deadliest types of cancer in the world, with high death rates brought on by delayed diagnosis and ineffective treatment. Recent developments in artificial intelligence (AI) hold revolutionary promise for speeding up medication discovery and facilitating individualised treatment plans. In order to find new therapeutic compounds and improve customised treatment regimens, this study investigates an AI-driven architecture that combines genomic data, patient medical records, and medication response databases. The method indicated promising candidates for additional clinical research and showed increased accuracy in forecasting successful medication combinations. By utilising AI, this work advances the field of precision oncology, improving treatment results and providing promise for more efficient and individualised lung cancer therapy.

Keywords: Artificial intelligence, genomic data, lung cancer, treatment.

A REVIEW ON FORMULATION AND EVALUATION OF SUSTAINED RELEASE MICROSPHERE OF CATIONIC

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The advancement of sustained release drug delivery systems has attracted considerable interest in recent years because of their ability to enhance therapeutic effectiveness, reduce side effects, and improve patient adherence. Microspheres, especially those designed with cationic drugs, present a viable method for controlled drug administration. Cationic drugs, known for their positive charge, demonstrate robust interactions with negatively charged polymers and mucosal surfaces, which can be leveraged to extend residence time and modulate drug release patterns. This review concentrates on the formulation approaches and assessment methods for sustained release microspheres that contain cationic drugs. Various polymers such as chitosan, Eudragit RS/RL, and sodium alginate have been thoroughly investigated for their capacity to encapsulate and manage the release of cationic substances. Methods including solvent evaporation, ionotropic gelation, and spray drying are frequently utilized for the preparation of microspheres. Essential factors like particle size, entrapment efficiency, surface morphology, and in vitro drug release are examined comprehensively to emphasize the significant elements affecting performance. Moreover, the review stresses the difficulties related to the formulation of cationic microspheres, such as drug-polymer compatibility and stability challenges. Recent developments in polymer chemistry and microsphere design are also highlighted, focusing on their contribution to addressing formulation obstacles. In summary, sustained release microspheres provide a flexible platform for improving the pharmacokinetic characteristics of cationic drugs, leading to more efficient and patient-centered therapeutic solutions.

Keywords: design, eudragit, ionotropic, spray.

THE RISE OF AI IN PHARMACY: OPPORTUNITY AND CHALLENGE

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Artificial Intelligence (AI) is swiftly changing the pharmacy landscape, providing groundbreaking solutions in drug discovery, development, dispensing, and patient care. By utilizing machine learning, natural language processing, and data analytics, AI facilitates the examination of extensive datasets to uncover new drug targets, enhance formulations, forecast pharmacokinetic properties, and tailor treatment strategies. These advancements greatly decrease the time and expenses involved in pharmaceutical research and enhance decision-making in both clinical and retail pharmacy environments. Nevertheless, the incorporation of AI into pharmacy comes with various challenges. Concerns regarding data privacy, algorithm transparency, regulatory adherence, and the requirement for interdisciplinary collaboration need to be tackled to guarantee safe and ethical implementation. Furthermore, the insufficient digital infrastructure in certain areas and the absence of technical proficiency among pharmacy practitioners present further obstacles to broad acceptance. This review examines the dual function of AI as an enabler of innovation and a source of intricate challenges in the pharmaceutical sector. It offers a detailed overview of current AI uses in pharmacy, underscores emerging trends, and deliberates on the ethical, legal, and practical issues that must be addressed. As AI continues to progress, its careful integration into pharmacy practice promises to transform healthcare delivery and enhance patient outcomes.

Keywords: artificial intelligence, data analytics, transparency.

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RECONCILIATION SEMBLANCE STUDY OF TINIDAZOLE

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Tinidazole, a synthetic nitroimidazole derivative, is widely employed as an antiprotozoal and antibacterial agent. The reconciliation semblance study of Tinidazole aims to assess the consistency and comparability of various analytical methods, formulations, or batches concerning quality, efficacy, and pharmacokinetic properties. This study includes a critical evaluation of physicochemical parameters, assay results, dissolution profiles, and compatibility with excipients among different Tinidazole products. Advanced analytical techniques such as UV-spectrophotometry, HPLC, and FTIR spectroscopy are employed to determine the semblance or differences among samples. The results contribute to ensuring the therapeutic equivalence and regulatory compliance of Tinidazole formulations, particularly regarding generic drug development and quality assurance. The study emphasizes the significance of robust reconciliation methodologies in pharmaceutical analysis to uphold drug safety, efficacy, and patient trust.

Keywords: Tinidazole, Reconciliation, Semblance, Analytical Evaluation, Drug Consistency, Quality Control, Therapeutic Equivalence, HPLC, UV-Spectrophotometry

FORMULATION, DEVELOPMENT & OPTIMIZATION OF FLOATING DRUG DELIVEY SYSTEM FOR CARDIO VASCULAR DRUG

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Floating Drug Delivery Systems (FDDS) have emerged as a promising approach to enhance the gastric retention time and bioavailability of drugs with narrow absorption windows, especially for cardiovascular agents. This study focuses on the formulation, development, and optimization of a gastroretentive floating drug delivery system for a selected cardiovascular drug. The system is designed to remain buoyant in the gastric fluid, allowing for prolonged drug release and improved therapeutic efficacy. Various polymers such as hydroxypropyl methylcellulose (HPMC), sodium alginate, and carbopol were evaluated for their impact on drug release kinetics, floating behavior, and tablet integrity.Preformulation studies were conducted to assess drug-polymer compatibility, followed by formulation using direct compression or wet granulation techniques. Optimization was carried out using a statistical design of experiments (DoE) approach to determine the ideal combination of excipients. The formulations were evaluated for physicochemical properties, floating lag time, total floating duration, swelling index, and in vitro drug release profiles. The optimized formulation demonstrated sustained drug release over 12 hours with desirable floating characteristics and acceptable physicochemical stability.This study concludes that FDDS can be a viable strategy for the effective and sustained delivery of cardiovascular drugs, enhancing patient compliance and therapeutic outcomes.

Keywords: Floating Drug Delivery System, Cardiovascular Drug, Gastroretentive System, Sustained Release, HPMC, Optimization, Design of Experiments (DoE), Bioavailability, Floating Tablets

MICROWAVE ASSISTED SYNTHESIS AND ANTI-INFLAMMATORY EVALUATION OF CHALCONE DERIVATIVES

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Chalcones, a category of α,β-unsaturated ketones, are acknowledged for their varied pharmacological properties, particularly their significant anti-inflammatory capabilities. This research investigates the microwave-assisted creation of multiple chalcone derivatives as a quick, efficient, and eco-friendly technique in contrast to traditional synthesis methods. Microwave irradiation considerably shortens reaction time and enhances yield, providing a green chemistry option for the synthesis of heterocyclic compounds. The generated chalcone derivatives were analyzed using spectroscopic methods such as IR, NMR, and mass spectrometry. Their anti-inflammatory efficacy was assessed with in vitro models like protein denaturation inhibition and in vivo models involving carrageenan-induced paw edema in rats. Numerous derivatives demonstrated encouraging anti-inflammatory properties, similar to standard medications, suggesting their promise as lead candidates for subsequent drug development. This research illustrates that microwave-assisted synthesis is a productive approach for generating biologically active chalcone derivatives and endorses their ongoing investigation as anti-inflammatory compounds.

Keywords: Chalcone Derivatives, Microwave-Assisted Synthesis, Anti-Inflammatory Activity, Green Chemistry, Protein Denaturation Assay, Carrageenan-Induced Edema, Heterocyclic Compounds, Drug Development

DESIGN SYNTHESIS AND EVALUATION OF PYRAZOLE DERIVATIVES USED IN THE TREATMENT OF REHUMATOID ARTHRITIS

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Pyrazole derivatives have attracted considerable interest in medicinal chemistry because of their wide range of biological activities, which encompass strong anti-inflammatory and analgesic properties. This research is centered on the strategic design, synthesis, and pharmacological assessment of innovative pyrazole derivatives targeted at addressing rheumatoid arthritis (RA). By applying structure-activity relationship (SAR) knowledge, a series of substituted pyrazole compounds were created using both traditional and microwave-assisted techniques to enhance efficiency and yield. The produced compounds were structurally validated through IR, NMR, and mass spectrometry analyses. Their anti-arthritic and anti-inflammatory effects were evaluated via both in vitro tests, such as protein denaturation inhibition, and in vivo experiments, including Freund's Complete Adjuvant (FCA)-induced arthritis in rats. Multiple derivatives showed a significant decrease in inflammation and joint swelling, exhibiting efficacy similar to that of standard medications like diclofenac, suggesting strong potential as therapeutic agents for RA. The research concludes that these new pyrazole derivatives are promising candidates for the development of effective therapies for rheumatoid arthritis, with additional studies necessary for clinical application.

Keywords: Pyrazole Derivatives, Rheumatoid Arthritis, Anti-inflammatory, Drug Design, Synthesis, SAR, Protein Denaturation Assay, FCA Model, Microwave-Assisted Synthesis

FORMULATION AND EVALUATION OF ACECLOFENAC SUSTAINED-RELEASE TABLET

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Aceclofenac, a non-steroidal anti-inflammatory drug (NSAID), is extensively utilized for alleviating pain and inflammation related to rheumatoid arthritis, osteoarthritis, and ankylosing spondylitis. Given its short biological half-life and the need for frequent dosing, creating a sustained-release (SR) formulation is advantageous to improve patient adherence and sustain stable therapeutic levels. This research centers on the formulation and assessment of Aceclofenac sustained-release tablets incorporating a range of hydrophilic and hydrophobic polymers such as Hydroxypropyl Methylcellulose (HPMC), Carbopol, and Ethyl cellulose.

The tablets were manufactured utilizing the direct compression technique and examined for both pre-compression and post-compression characteristics including hardness, friability, weight variation, drug content, and in vitro drug release. In vitro dissolution tests were conducted in phosphate buffer (pH 7. 4) to replicate intestinal conditions, and the drug release kinetics were scrutinized through mathematical models to ascertain the release mechanism. The optimized formulation demonstrated extended drug release over a duration of 12–24 hours with favorable physicochemical characteristics.

The findings indicate that sustained-release tablets of Aceclofenac have the potential to significantly enhance therapeutic efficacy and diminish dosing frequency, thereby presenting a promising avenue for the long-term treatment of inflammatory disorders.

Keywords: Aceclofenac, Sustained-Release, NSAID, HPMC, Tablet Formulation, Drug Release, In Vitro Evaluation, Controlled Release, Direct Compression

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THE SILENT STRUGGLE: EXPLORING NEURODEGENERATIVE DISEASE AND THEIR IMPACT

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Neurodegenerative diseases represent a group of chronic, progressive disorders characterized by the gradual loss of structure and function of neurons. Conditions such as Alzheimer's disease, Parkinson's disease, Huntington's disease, and Amyotrophic Lateral Sclerosis (ALS) not only compromise cognitive and motor functions but also exert a profound emotional and socioeconomic toll on patients, caregivers, and healthcare systems. Despite decades of research, the exact etiologies of many neurodegenerative diseases remain elusive, involving complex interactions between genetic, environmental, and molecular factors.This review explores the underlying mechanisms of neurodegeneration, including protein misfolding, oxidative stress, mitochondrial dysfunction, and neuroinflammation. It also examines the current landscape of diagnostic tools and treatment options, which largely focus on symptom management rather than disease modificationBy highlighting the biological basis, clinical manifestations, and societal impact of neurodegenerative diseases, this study underscores the urgent need for innovative research, early diagnostic strategies, and holistic care models to address the growing global burden of these often-overlooked conditions.

Keywords: Neurodegenerative Diseases, Alzheimer's, Parkinson's, ALS, Neuronal Degeneration, Protein Misfolding, Oxidative Stress, Gene Therapy, Brain Disorders, Neuroinflammation

INTEGRATION OF ARTIFICIAL INTELLIGENCE IN SINGLE -CELL RNA- BASED STUDIES OF OCULAR SURFACE INNATE IMMUNITY

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The ocular surface represents a dynamic interface between the external environment and the immune system, where innate immunity plays a critical role in maintaining homeostasis and defending against pathogens. Recent advances in single-cell RNA sequencing (scRNA-seq) have revolutionized our understanding of cellular heterogeneity and gene expression patterns at the ocular surface. However, the complexity and volume of scRNA-seq data necessitate robust computational tools for accurate interpretation. The integration of artificial intelligence (AI), particularly machine learning and deep learning techniques, has emerged as a powerful approach to decode these high-dimensional datasets.This study explores the role of AI in enhancing scRNA-based investigations of ocular surface innate immunity. AI-driven algorithms facilitate automated cell-type identification, gene regulatory network reconstruction, and biomarker discovery with improved speed and precision. Moreover, AI enables predictive modeling of immune responses and disease progression, offering new insights into conditions such as dry eye disease, conjunctivitis, and ocular allergies.The fusion of AI and single-cell transcriptomics marks a transformative step in ocular immunology research, paving the way for precision diagnostics and personalized therapeutic strategies targeting innate immune dysregulation at the ocular surface.

Keywords: Artificial Intelligence, Single-Cell RNA Sequencing, Ocular Surface, Innate Immunity, Machine Learning, Immunogenomics, Transcriptomics, Dry Eye Disease, Cell-Type Identification, Precision Medicine

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AI IN BIOAVAILABILITY AND BIOEQUIVALENCE STUDIES

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Artificial Intelligence (AI) is transforming the field of pharmaceutical research and development, especially in the areas of bioavailability (BA) and bioequivalence (BE) studies. These studies are crucial for assessing the rate and extent of drug absorption, ensuring therapeutic equivalence between generic and brand-name products. The incorporation of AI technologies—such as machine learning, deep learning, and predictive modeling—provides innovative solutions for optimizing study design, analyzing complex pharmacokinetic (PK) data, and forecasting in vivo drug performance based on in vitro parameters. AI improves the accuracy of BA/BE evaluations by facilitating population-based modeling, real-time data analysis, and the detection of interindividual variability. It additionally aids in the creation of in silico tools like physiologically based pharmacokinetic (PBPK) models, which may lessen the dependence on extensive in vivo trials. Moreover, AI supports regulatory decision-making by delivering strong, data-driven evidence of drug similarity and enhancing the reproducibility of outcomes. This review emphasizes the transformative power of AI in improving the efficiency, accuracy, and regulatory compliance of bioavailability and bioequivalence studies, ultimately leading to quicker and more economical drug development.

Keywords: Artificial Intelligence, Bioavailability, Bioequivalence, Pharmacokinetics, Machine Learning, PBPK Modeling, In Silico Prediction, Drug Absorption, Generic Drugs, Regulatory Science

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IN SILICO DRUG DISCOVERY: THE ROLE OF AI

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In silico drug discovery has emerged as a fundamental element of contemporary pharmaceutical research, providing quicker, cost-efficient, and remarkably effective alternatives to conventional drug development approaches. Central to this shift is Artificial Intelligence (AI), which has notably improved the capability to forecast, devise, and refine drug candidates through sophisticated computational methodologies. AI-driven models, such as machine learning (ML) and deep learning (DL), possess the ability to scrutinize extensive chemical and biological datasets to uncover potential drug targets, anticipate molecular interactions, evaluate drug-likeness, and enhance lead compounds. This review examines the essential function of AI in critical domains of in silico drug discovery including virtual screening, de novo drug design, molecular docking, ADMET prediction, and biomarker identification. AI not only hastens the initial phases of drug development but also enhances precision in forecasting pharmacokinetic and pharmacodynamic attributes, thereby decreasing the probability of late-stage failure. As the collaboration between AI and computational biology continues to progress, it holds the potential for transforming the future of precision medicine and targeted therapy development.

Keywords: Artificial Intelligence, In Silico Drug Discovery, Machine Learning, Deep Learning, Virtual Screening, Molecular Docking, ADMET Prediction, Drug Design, Computational Pharmacology, Precision Medicine

AI-ENABLED VIRTUAL SCREENING FOR NOVEL THERAPEUTICS

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Artificial Intelligence (AI) is revolutionizing the method of virtual screening in drug discovery by facilitating rapid, precise, and large-scale forecasting of biologically active compounds. Conventional virtual screening techniques, while effective, frequently encounter challenges pertaining to computational expense, prediction precision, and restricted scope. The incorporation of AI—especially machine learning (ML) and deep learning (DL) methodologies—has greatly improved the effectiveness and accuracy of pinpointing novel therapeutics from extensive chemical libraries. This review emphasizes the utilization of AI-enabled virtual screening instruments in the initial phases of drug development. These instruments aid in ligand-based and structure-based screening, activity forecasting, hit-to-lead refinement, and target recognition. AI algorithms are educated on pre-existing biological and chemical datasets to grasp complex patterns, enabling the estimation of binding affinities, toxicity profiles, and pharmacokinetic characteristics. Furthermore, AI models perpetually advance through feedback loops, making them increasingly dependable and adaptable. The incorporation of AI into virtual screening not only speeds up drug discovery timelines but also lowers expenses and heightens the chances of discovering effective therapeutic candidates. This paradigm shift presents significant potential in meeting unaddressed medical needs through quicker and more focused drug development.

Keywords: Artificial Intelligence, Virtual Screening, Drug Discovery, Machine Learning, Deep Learning, Binding Affinity Prediction, Hit Identification, Drug Design, Target Identification, Computational Chemistry

CHALLENGES IN DATA QUALITY AND INTEGRATION FOR AI IN HEALTH SCIENCES

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Artificial Intelligence (AI) holds immense potential to revolutionize health sciences by enhancing diagnostics, treatment planning, drug discovery, and personalized medicine. However, the effectiveness of AI applications is fundamentally dependent on the quality, consistency, and integration of the underlying data. Health data—ranging from electronic health records (EHRs) and clinical trial results to genomic sequences and imaging—are often heterogeneous, incomplete, and siloed across various platforms. These challenges in data quality and integration pose significant barriers to the successful deployment of AI in clinical and research settings.This review critically examines the key issues related to data quality, including missing values, inconsistent formats, noise, and biases that can skew AI model outcomes. It also explores integration challenges such as interoperability among healthcare systems, standardization of data formats, and ethical concerns surrounding data privacy and security. Addressing these challenges requires collaborative efforts between data scientists, healthcare professionals, and policymakers, as well as the adoption of standardized frameworks and robust data governance models.Improving data quality and integration is essential for building trustworthy, generalizable, and clinically useful AI tools that can truly benefit the health sciences and patient care.

Keywords: Artificial Intelligence, Health Data, Data Quality, Data Integration, Interoperability, EHR, Bias in AI, Data Governance, Healthcare Informatics, Clinical AI

AI IN DRUG DISCOVERY AND DEVELOPMENT

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Artificial Intelligence (AI) is revolutionizing the field of drug discovery and development by accelerating the identification, optimization, and validation of new therapeutic candidates. Traditional drug development is time-consuming, resource-intensive, and marked by a high rate of failure. AI-driven technologies—such as machine learning (ML), deep learning (DL), and natural language processing (NLP)—offer powerful tools to analyze vast and complex datasets, uncover novel drug targets, predict molecular interactions, optimize lead compounds, and streamline clinical trial design.This review explores the diverse applications of AI across all stages of drug development, including target identification, virtual screening, structure-based drug design, ADMET prediction, and biomarker discovery. AI also plays a critical role in repurposing existing drugs and personalizing treatment strategies based on patient-specific data. Despite its transformative potential, the integration of AI in pharmaceutical R&D faces challenges related to data quality, model transparency, regulatory acceptance, and the need for interdisciplinary collaboration.By addressing these challenges and leveraging AI's capabilities, the pharmaceutical industry can significantly enhance the efficiency, cost-effectiveness, and success rate of drug development pipelines.

Keywords: Artificial Intelligence, Drug Discovery, Drug Development, Machine Learning, Deep Learning, Virtual Screening, Target Identification, ADMET Prediction, Precision Medicine, Pharmaceutical R&D

AI TOOLS FOR HERB- DRUG INTERACTION ANALYSIS

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Complementary and alternative medicine are commonly used alongside conventional medications which can result in adverse drug reactions and even fatality in some cases. Moreover, the extensive range of potential herb-drug interactions makes it challenging for healthcare professionals to remembering or manually searching in databases. Decision support systems offer essential assistance to healthcare providers in navigating diagnostic and therapeutic choices in patient care. Therefore, an original and hybrid decision support system was designed to identify herb-drug interactions, applying artificial intelligence techniques to identify new possible interactions. Different machine learning models will be used to strengthen the typical rules engine used in these cases. Thus, using the proposed system, the pharmacy community, people's first line of contact within the Healthcare System, will be able to make better and more accurate therapeutic decisions and mitigate possible adverse events.

Keywords: Database, healthcare, machine learning.

AI IN MONITORING DRUG EFFICACY IN REAL TIME

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The integration of artificial intelligence (AI) into healthcare has catalyzed significant advancements in drug development and patient care, revolutionizing traditional methodologies. This review explores the multifaceted impact of AI on critical areas, highlighting its transformative potential and addressing associated challenges. In drug development, AI facilitates accelerated discovery processes, enhances precision in predicting drug efficacy and safety, and optimizes clinical trial designs. AI-driven technologies such as machine learning (ML) algorithms and deep learning models enable the analysis of vast datasets, leading to the identification of novel therapeutic targets and personalized treatment strategies. In patient care, AI enhances diagnostic accuracy, enables predictive analytics for disease management, and supports telemedicine as well as remote monitoring, thereby improving patient outcomes and accessibility to healthcare services. Despite the promising advancements, the review critically examines the ethical, regulatory, and implementation challenges that accompany AI integration in healthcare. By providing a comprehensive overview of AI's current and potential contributions, this paper aims to provide an elaborative guide that future research and policymaking in smart healthcare.

Keywords: AI, Machine learning, algorithm.

AI IN CANCER PHARMACOTHERAPY PERSONALIZATION

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The integration of artificial intelligence (AI) in the realm of personalized medicine represents a transformative advancement in cancer treatment, offering unprecedented opportunities for precision and efficacy in therapeutic strategies. This study delves into the confluence of AI-driven methodologies and cloud-based data integration, elucidating their synergistic roles in advancing cancer care. Personalized medicine, a paradigm shift from traditional one-size-fits-all approaches, necessitates a deep understanding of individual patient profiles, including genetic, molecular, and phenotypic information. AI-driven techniques, such as machine learning and deep learning, are instrumental in deciphering the intricacies of cancer genomics and identifying biomarkers that are crucial for personalized therapy. By leveraging large-scale genomic data and electronic health records, AI algorithms can uncover patterns and predict patient responses to various treatments, leading to more informed decision-making and optimized therapeutic outcomes. Despite the significant advancements, several challenges remain in the implementation of AI-driven personalized medicine. Issues related to data privacy, algorithmic transparency, and the need for interdisciplinary collaboration are critical areas that require ongoing attention.

Keywords: data privacy, AI, personalized medicine.

AI- SUPPORTED CLINICAL DECISION SYSTEMS PHARMACY PRACTICE

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In pharmacy practice, AI has the potential to significantly improve medication management and patient care. This review explores various AI applications in the field of pharmacy practice.The incorporation of AI technologies provides pharmacists with tools and systems that help them make accurate and evidence-based clinical decisions. By using AI algorithms and Machine Learning, pharmacists can analyze a large volume of patient data, including medical records, laboratory results, and medication profiles, aiding them in identifying potential drug-drug interactions, assessing the safety and efficacy of medicines, and making informed recommendations tailored to individual patient requirements. Various AI models have been developed to predict and detect adverse drug events, assist clinical decision support systems with medication-related decisions, automate dispensing processes in community pharmacies, optimize medication dosages, detect drug-drug interactions, improve adherence through smart technologies, detect and prevent medication errors, provide medication therapy management services, and support telemedicine initiatives.

Keywords: AI, medical records, patient.

EMERGENCE OF ARTIFICIAL INTELLIGENCE IN HEALTHCARE: A PROMISING FUTURE WITH CHALLENGES

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Artificial Intelligence (AI) has emerged as a transformative force in healthcare, offering a plethora of applications that promise to revolutionize the industry. This paper explores the diverse range of AI applications in healthcare, including diagnostic assistance, predictive analytics, personalized treatment, and administrative streamlining. However, alongside its immense potential, AI in healthcare faces significant challenges related to data privacy, ethics, regulatory hurdles, and the need for seamless integration into existing healthcare systems. Despite these challenges, the future prospects for AI in healthcare are promising, with the potential to enhance patient outcomes, reduce costs, and ultimately, improve the quality of care delivered.

Keywords: AI, healthcare, diagnostic assistance.

AI IN REDUCING MEDICATION ERRORS AND IMPROVING SAFETY

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Medical errors pose a significant threat to patient safety and healthcare quality, leading to adverse events, increased costs, and extended hospital stays. With the growing complexity of healthcare delivery, addressing these errors has become a critical focus. Artificial Intelligence (AI) has emerged as a powerful tool in this endeavor, offering innovative solutions to reduce medical errors and enhance patient safety across various healthcare disciplines. AI's impact on diagnostic accuracy is profound, with algorithms capable of analyzing complex medical images and patient data to support precise diagnoses. For instance, AI-driven imaging tools have demonstrated high accuracy in detecting abnormalities such as tumors, potentially reducing misdiagnoses and enabling earlier interventions. In the realm of medication safety, AI has proven effective in minimizing errors through systems that review patient histories, identify potential drug interactions, and ensure appropriate dosing. By integrating AI with electronic health records (EHRs) and barcode scanning systems, healthcare providers can reduce the risk of medication errors, leading to safer patient care.

Keywords: electronic health records, AI, patient.

AI IN CONTINUOUS MANUFACTURING OF PHARMACEUTICALS

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The emergence of artificial intelligence (AI) has driven remarkable changes in the pharmaceutical industry, presenting transformative opportunities in the continuous manufacturing of pharmaceutical dosage forms. This enables a more efficient and targeted approach to drug discovery, thereby increasing the likelihood of successful drug approvals. Furthermore, AI can contribute to reducing development costs by optimizing research and development processes. It discusses the use of machine learning algorithms to support experimental design and can predict the pharmacokinetics and toxicity of drug. This study provides an overview of various AI-based approaches utilized in pharmaceutical technology like formulation development, process optimization, testing, and pharmacokinetics/pharmacodynamics (PK/PD) studies. Nevertheless, the continued exploration of AI in the pharmaceutical industry offers exciting prospects for enhancing drug development processes and patient care.

Keywords: AI, pharmacokinetic, toxicity.

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FATTY ACIDS AS ANTIDIABETIC AGENTS

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Type 2 diabetes is an inflammatory, non-infectious disease characterized by dysfunctional pancreatic β-cells and insulin resistance. Although lifestyle, genetic, and environmental factors are associated with a high risk of type 2 diabetes, nutrition remains one of the most significant factors. Specific types and increased amounts of dietary fatty acids are associated with type 2 diabetes and its complications. Dietary recommendations for the prevention of type 2 diabetes advocate for a diet that is characterized by reduced saturated fatty acids and trans fatty acids alongside an increased consumption of monounsaturated fatty acids, polyunsaturated fatty acids, and omega-3 fatty acids. Although following the recommendations for dietary fatty acid intake is important for reducing type 2 diabetes and its related complications, the underlying mechanisms remain unclear. This review will provide an update on the mechanisms of action of fatty acids on glucose metabolism and type 2 diabetes, as well as dietary recommendations for the prevention of type 2 diabetes.

Keywords: omega-3, fatty acid, Type 2 diabetes

IN- SILICO STUDIES OF QUINOLINE-BENZIMIDAZOLE HYBRIDS AS A POTENT ANTI- EPILEPTIC AGENT

Sonakshi Tyagi

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Aim/Background: Novel quinoline compounds containing benzimidazole have been synthesized in a number of different ways and screened for anti-epileptic potential through in vivo and in silico studies.

Materials and Methods: The novel quinoline-benzimidazole hybrids were synthesized by using substituted carbaldehyde (1,2) and substituted benzimidazole (derived from amino acids) (3a-f). The synthesized derivatives were characterized by IR, 13C-NMR, 1H-NMR, and Mass spectroscopy and anti-convulsant activity was analyzed by in silico studies on the swiss albino mice using the ScPTZ model.

Conclusion and Results: Compounds (1H-Benzoimidazol-2-yl)substituted-(2-p-tolyloxy-quinolin-3-ylmethylene)-amine (4a-f) and (Benzoimidazol-2-yl)substituted-(2-ethoxy-quinolin-3-ylmethylene)-amine (5a-f) were synthesized. The synthesized derivatives were characterized (IR, 13C-NMR, 1H-NMR, and mass spectrometry) and screened for their anticonvulsant potentiality by subcutaneous pentylenetetrazol method using carbamazepine. Additionally, the anti-epileptic potential of the produced compounds is confirmed by in silico study results that were obtained. The study also proved that the synthesized derivatives used aminobutyric acid (GABA) receptors. At a dose level of 30 mg/kg body weight, 4a, 4b, and 4d were found to be more effective than the other synthesized derivatives.

Keywords: GABA, quinoline, epilepsy.

ROLE OF ARTIFICIAL INTELLIGENCE IN DRUG DISCOVERY

Hafsa khan

SRMS

The emergence of artificial intelligence (AI) has driven remarkable changes in the pharmaceutical industry, presenting transformative opportunities in the drug discovery, formulation development, and testing of pharmaceutical dosage forms. This enables a more efficient and targeted approach to drug discovery, thereby increasing the likelihood of successful drug approvals. Furthermore, AI can contribute to reducing development costs by optimizing research and development processes. It discusses the use of machine learning algorithms to support experimental design and can predict the pharmacokinetics and toxicity of drug. This study provides an overview of various AI-based approaches utilized in pharmaceutical technology like formulation development, process optimization, testing, and pharmacokinetics/pharmacodynamics (PK/PD) studies. Nevertheless, the continued exploration of AI in the pharmaceutical industry offers exciting prospects for enhancing drug development processes and patient care.

Keywords: pharmacokinetics, pharmacodynamics, AI.

A REVIEW ON WHEATGRASS FOR THE MANAGEMENT OF SKIN CANCER

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Plants have been utilized by humans throughout history for a variety of purposes, including sustenance and medicinal intentions. Since ancient times, wheatgrass has been utilized as a type of microgreen for therapeutic purposes. Phenolic flavonoids, vitamins, minerals, proteins and enzymes are all abundant in wheatgrass. These nutrients and bioactive substances enhanced wheatgrass's therapeutic efficacy and made it a powerful antioxidant agent for the treatment of a range of diseases. It has been shown to have a wide variety of pharmacological potentials, including an antioxidative potential that helps to neutralize free radicals, anti-cancer, anti-ulcer, anti-diabetic, anti-arthritic, anti-microbial action, and many more. However, there is a dearth of scientific evidence to back up wheatgrass's possible pharmacological effects and clinical value. To investigate its clinical utility for human welfare, in-depth research studies are needed. Through this analysis of the review literature, an attempt has been made to explain wheatgrass and its therapeutic potentials.

Keywords: Plants, flavonoids, antioxidant.

ROLE OF ARTIFICIAL INTELLIGENCE IN DRUG DISCOVERY

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Artificial Intelligence (AI) is revolutionizing the landscape of drug discovery by enhancing the efficiency, accuracy, and speed of identifying new therapeutic candidates. Traditional drug development is a time-consuming and costly process, often taking over a decade and billions of dollars to bring a single drug to market. AI technologies, particularly machine learning (ML) and deep learning, have the capability to analyze vast datasets, predict drug-target interactions, and identify promising molecular structures much faster than conventional methods.

AI plays a significant role in several stages of the drug discovery pipeline, including target identification, virtual screening, lead optimization, and predictive modeling of drug efficacy and toxicity. By leveraging genomic, proteomic, and chemical data, AI algorithms can uncover hidden patterns that facilitate the development of personalized and precision medicines. Additionally, AI accelerates the repurposing of existing drugs for new therapeutic indications, significantly reducing development time.

Despite its potential, challenges such as data quality, model interpretability, and regulatory acceptance remain. However, continuous advancements in computational power and algorithm design are rapidly addressing these limitations. Overall, AI is paving the way for a more efficient, cost-effective, and targeted approach to modern drug discovery.

Keywords: Artificial Intelligence, Drug Discovery, Machine Learning, Target Identification

DEVELOPMENT AND CHARACTERIZATION OF PIPERINE LOADED NANO CARRIER TO IMPROVE ITS THERAPEUTIC POTENTIAL

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About 42 % of drugs with market acceptance and 92 % of drugs in the discovery pipeline are imperfectly aqueous soluble with insufficient intestinal absorption and will suffer from low oral bioavailability. Alkaloids are a group of phytonutrients that has been examined broadly due to their various health-related benefits. However, most of the alkaloids are considered as compounds with less aqueous solubility which limits their human usefulness. Piperine (PIP) is a family of nitrogenous aggregates that are extracted from the black pepper (Piper nigrum). It holds various therapeutic effects such as antioxidant, anti-inflammatory, neuroprotective, anti-cancer, anti-microbial, hepatoprotective, anti-depressant, anti-obesity, cardioprotective, P-gp inhibitor, anti-aging, and permeation enhancer. Although both the preclinical and clinical studies confirmed the advantages of PIP, its clinical usefulness is restricted due to its low water solubility and poor bioabsorption. To overcome these limitations nanoformulation is a widely employed approach. Multiple reviews have confirmed PIP health-related benefits, still, there is a lack of comprehensive review focused on its chemistry, pharmacological effects, nanoformulation, toxicity, advantages and challenges of PIP nanosystem, and marketed herbal formulations. However, this study aims to deliver a review of several nanoformulation development and nano-technology-based approaches employed to upregulate the solubility, bioabsorption, and therapeutic efficiency of PIP. We have also reviewed information related to the toxicity of PIP and its formulations.

Keywords: nanoformulation, alkaloids, hepatoprotective.

EFFICACY OF NANO FORMULATION IN BIOFILM INFECTIONS

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Biofilm represents one of the crucial factors for the emergence of multi-drug resistance bacterial infections. The high mortality, morbidity and medical device-related infections are associated with biofilm formation, which requires primarily seek alternative treatment strategies. Recently, nanotechnology has emerged as a promising method for eradicating bacterial biofilm-related infection. The efficacy of nanoparticles (NPs) against bacterial infections interest great attention, and the researches on the subject are rapidly increasing. However, the majority of studies continue to focus on the antimicrobial effects of NPs in vitro, while only a few achieved in vivo and very few registered as clinical trials. The present review aimed to organize the scattered available information regarding NPs approach to eradicate bacterial biofilm-related infections. The current review highlighted the advantages and disadvantages associated with this approach, in addition to the challenges that prevent reaching the clinical applications. It was appeared that the production of NPs either as antimicrobials or as drug carriers requires further investigations to overcome the obstacles associated with their kinetic and biocompatibility.

Keywords: biofilm, bacterial infection, nanoparticle

AI IN CLINICAL TRIAL: ENHANCING EFFICIENCY AND REDUCING COSTS

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Artificial Intelligence (AI) is rapidly transforming the landscape of clinical trials, offering innovative solutions to longstanding challenges in drug development and research. By leveraging machine learning algorithms, natural language processing, and predictive analytics, AI streamlines various stages of the clinical trial process—from patient recruitment and trial design to data monitoring and outcome analysis. These technologies enhance trial efficiency by enabling faster patient identification, improving protocol adherence, and optimizing site selection. Furthermore, AI-driven automation reduces manual errors and administrative burdens, leading to significant cost savings. Real-time data analysis also supports adaptive trial designs, accelerating decision-making and increasing the likelihood of trial success. As AI continues to evolve, its integration into clinical trials promises not only to reduce time and financial investments but also to improve the overall quality and accessibility of clinical research.

Keywords: AI, patient, clinical research.

AI IN HEALTHCARE DIAGNOSTICS: ENHANCING ACCURACY AND SPEED

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One of the most potential uses of artificial intelligence (AI), which has changed a number of industries, is in healthcare. The application of AI in healthcare is discussed in general in this study, with an emphasis on diagnosis, treatment, and prediction. In the area of diagnostics, AI has proven to be remarkably adept at deciphering X-rays, CT scans, and MRI pictures to spot illnesses and anomalies. A branch of AI known as deep learning algorithms has shown to be particularly good at accurately identifying and categorizing medical disorders. Large volumes of imaging data may be swiftly analyzed by AI systems, enabling medical personnel to diagnose patients more accurately and with fewer mistakes. Additionally, AI may combine patient information, genetic data, and other pertinent data to produce tailored diagnostic suggestions. Consequently, AI has become a game-changing force in healthcare, especially in the disciplines of diagnosis, treatment, and prediction. AI systems can help medical personnel make more precise diagnoses, create individualized treatment plans, and forecast patient outcomes by utilizing machine learning algorithms and advanced data analytics. While there are still difficulties, there are enormous potential advantages for AI in healthcare, and coordinated efforts are required to realize these advantages and assure its ethical and fair incorporation into healthcare systems.

Keywords: AI, algorithm, diagnosis.

AI-POWERED PRECISION ONCOLOGY: REVOLUTIONIZING PERSONALIZED CANCER therapy

Poonam

CSIR-CDRI

With the evolution of Artificial Intelligence (AI), even cancer care approaches are evolving as it is providing innovative solutions to some of the most complex challenges in oncology. This article delves into how AI is making a profound impact across the cancer care spectrum worldwide, from early detection and precise diagnosis to the personalization of treatment and improved patient management. By harnessing AI's ability to analyze massive datasets and identify patterns beyond human perception, healthcare professionals can offer more accurate diagnoses and more effective treatments tailored to individual patient needs. This review also highlights the most recent advancements in AI-driven technologies in oncology and looks toward the future, where AI's role is expected to expand further. By discussing the potential and challenges of AI in cancer care, this article offers insights into how it is reshaping oncology practice, with the ultimate goal of enhancing patient outcomes and revolutionizing cancer treatment.

Keywords: AI, patient management, early detection.

STATISTICAL OPTIMIZATION OF RATE RETARDANT POLYMER LOADED MICROSPHERES BY IONOTROPIC GELATION TECHNIQUE

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Microsphere-based drug delivery systems have gained significant attention in pharmaceutical research due to their ability to provide sustained and controlled release of therapeutic agents. This study focuses on the statistical optimization of rate-retardant polymer-loaded microspheres prepared by the ionotropic gelation technique, an effective method for encapsulating drugs within biocompatible polymers. The objective was to enhance the drug release profile by optimizing the formulation variables using Design of Experiments (DoE). Polymers such as sodium alginate and hydroxypropyl methylcellulose (HPMC) were selected for their known biocompatibility and retardant properties. The microspheres were prepared by cross-linking the polymer solution with calcium chloride under stirring conditions. Various formulation parameters like polymer concentration, cross-linking agent concentration, and stirring speed were evaluated for their effect on encapsulation efficiency, particle size, and in vitro drug release. The experimental data were analyzed statistically using factorial design and response surface methodology (RSM), allowing the identification of optimal conditions for desired drug release kinetics. The results demonstrated that a proper balance of polymer and cross-linker concentrations significantly influenced the rate of drug release, particle size, and entrapment efficiency. The optimized formulation showed sustained drug release over 12 hours, indicating its potential in reducing dosing frequency and improving patient compliance. This study highlights the importance of statistical tools in optimizing drug delivery systems and reinforces ionotropic gelation as a versatile and scalable technique for microsphere formulation.

Keywords: Microspheres, Ionotropic Gelation, Rate-retardant Polymer, Statistical Optimization, Sustained Drug Release.

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NOVEL DRUG DELIVERY SYSTEMS CONTAINING ARTESUNATE AND AMODIAQUINE

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The development of novel drug delivery systems (NDDS) has significantly enhanced the therapeutic potential of antimalarial agents, particularly in the case of combination therapies like artesunate and amodiaquine. These drugs, commonly used in fixed-dose combinations for the treatment of uncomplicated Plasmodium falciparum malaria, face limitations including poor bioavailability, short half-life, and resistance development. To overcome these challenges, innovative delivery strategies such as nanoparticles, liposomes, microspheres, solid lipid nanoparticles, and polymeric systems are being explored. These systems not only improve drug stability and solubility but also enable targeted and sustained release, thus enhancing pharmacokinetic profiles and minimizing dosing frequency. Moreover, co-encapsulation of artesunate and amodiaquine within a single delivery platform ensures synchronized drug release, improved patient compliance, and synergistic antimalarial effects. In addition, NDDS can reduce systemic toxicity and improve therapeutic index, offering a more effective alternative to conventional dosage forms. Preclinical studies have demonstrated enhanced efficacy and reduced parasite recrudescence when these drugs are delivered via nanocarriers. This chapter reviews the current advancements in NDDS for artesunate and amodiaquine, their formulation approaches, mechanisms of improved action, and potential clinical applications. It also highlights the challenges and future perspectives in translating these technologies from bench to bedside. The integration of NDDS into malaria treatment protocols holds promise for achieving better control of the disease and delaying resistance emergence.

Keywords: Artesunate, Amodiaquine, Novel Drug Delivery Systems, Malaria, Nanoparticles.

HARNESSING AI IN PERSONALIZED MEDICINE: EMERGING TRENDS AND APPLICATIONS

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The integration of Artificial Intelligence (AI) into personalized medicine is revolutionizing healthcare by enabling more precise, predictive, and individualized treatment strategies. It explores the emerging trends, applications and future directions of AI in the realm of personalized medicine. AI technologies such as machine learning, deep learning and natural language processing are increasingly leveraged to analyze complex biomedical data, including genomics, proteomics, electronic health records and real-time patient monitoring systems. These tools facilitate early disease prediction, optimized drug selection and customized therapeutic approaches, enhancing clinical decision-making and patient outcomes. Key advancements discussed include AI-driven biomarker discovery, adaptive clinical trials, and the integration of multi-omics data for a holistic understanding of patient profiles. It also addresses the challenges and ethical considerations surrounding data privacy, algorithmic bias, and regulatory compliance. By highlighting current innovations and addressing existing barriers, it underscores the transformative potential of AI in achieving truly personalized healthcare. The convergence of AI with precision medicine not only enhances diagnostic and therapeutic accuracy but also paves the way for a future where treatment is tailored to the unique biological and lifestyle characteristics of each individual.

Keywords: Artificial Intelligence, Personalized Medicine, Machine Learning, Precision Healthcare, Biomarker Discovery, Multi-Omics, Clinical Decision Support, Predictive Analytics.

SMART POLYMERS AND NANOTECHNOLOGY IN THE DESIGN OF ADVANCED DRUG DELIVERY SYSTEMS

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The integration of smart polymers and nanotechnology has revolutionized the landscape of advanced drug delivery systems, offering unprecedented precision, efficiency, and control over therapeutic interventions. Smart polymers, also known as stimuli-responsive polymers, have the unique ability to undergo physical or chemical changes in response to external stimuli such as pH, temperature, light, enzymes, or redox conditions. This adaptive behavior makes them ideal candidates for site-specific and controlled drug release. Meanwhile, nanotechnology provides versatile platforms such as nanoparticles, liposomes, dendrimers, and micelles for encapsulating therapeutic agents, enhancing their bioavailability, and protecting them from premature degradation.

By combining these two advanced materials, drug delivery systems can be engineered to respond intelligently to the pathological environment, ensuring that drugs are released precisely where and when they are needed. For example, pH-sensitive polymers can exploit the acidic microenvironment of tumors to trigger localized drug release, while temperature-responsive polymers can enable targeted therapy at inflamed or diseased tissues. Furthermore, the nano-scale size of these carriers facilitates their penetration through biological barriers and enables accumulation in specific tissues via passive or active targeting mechanisms.

This synergistic approach holds significant promise for improving therapeutic outcomes in cancer, infections, autoimmune diseases, and neurological disorders. Additionally, smart polymer-nanoparticle hybrids can be designed for sustained, pulsatile, or on-demand release, offering customizable therapeutic profiles. Despite the challenges related to scalability, biocompatibility, and regulatory approval, ongoing research continues to refine these systems for clinical applications.

Keywords: Smart polymers, Nanotechnology, Drug delivery systems, Stimuli-responsive polymers, Controlled release, Nanoparticles, Targeted therapy

PHARMACOECONOMIC EVALUATION IN GENERALIZED ANXIETY DISORDER

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Introduction: Rising health expenditures have led to the necessity to find the optimal therapy at the lowest price. Pharmacoeconomics is an innovative method that aims to decrease health expenditures, whilst optimizing healthcare results. The most efficient, safe and commonly recommended medications for the quick alleviation of acute anxiety symptoms are benzodiazepines. Antidepressants have become the first line therapy in the treatment of chronic anxiety.

Objective: The evaluation of the pharmacoeconomics in generalized anxiety disorder (GAD) patients is the objective of the review study.

Materials and Methods: Different aspects of pharmacoeconomic evaluation like cost effect ratio, incremental cost effective ratio, cost of illness, direct cost, and indirect cost are measured.

Results: The review highlights pharmacoeconomics of antianxiety therapy in GAD patients based on a number of pharmacoeconomic studies carried out in different countries. Venlafaxine showed lower cost-effect ratio compared to citalopram for GAD. Total costs for escitalopram was lesser compared to paroxetine, and cost of absenteeism was the largest proportion in cost of illness for GAD.

Conclusion: Costs associated with GAD affect the economics of the patients. Financial burden increases with severity of GAD.

Keywords: Pharmacoeconomics, pharmacoeconomic evaluation, generalized anxiety disorder, anxiety disorder

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