GLOBAL
RESEARCH INSTITUTE OF PHARMACY

Under the Patronage of
Pt. B. D. Sharma University of Health Sciences, Rohtak

PHARMA ANVESHAN 2025

(National Pharmacy Education Day)

THEME | **Entrepreneurship & Startups in Pharma and Pharmacy Practice Encouraging Innovation, Incubation Centers and Pharmaceutical Startups**

In collaboration with

Society of Pharmaceutical Education & Research

SOUVENIR

INSTITUTION'S INNOVATION COUNCIL
(Ministry of Education Initiative)

Message of the Chairman

C.A. S.K. Jindal

It is heartening to know that Global Research Institute of Pharmacy, Radaur, Yamuna Nagar is organizing a One-Day National Conference on PHARMA ANVESHAN 2025 (National Pharmacy Education Day) on the theme **"Entrepreneurship & Startups in Pharma and Pharmacy Practice Encouraging Innovation, Incubation Centers and Pharmaceutical Startups"** under the patronage of Pt. B. D. Sharma University of Health Sciences, Rohtak and in collaboration with the Society of Pharmaceutical Education & Research (SPER).

The theme of the conference is of current interest and will serve as a dynamic dialogue between industry experts, academics, and researchers in the field of pharmacy. This conference provides a platform for exchanging ideas, sharing experiences, and exploring opportunities for collaboration and innovation. Through keynote lectures, panel discussions, and poster presentations, the conference will delve into the latest trends and advancements in pharmacy, fostering a spirit of innovation and entrepreneurship. The conference also aims to create a network of professionals and researchers who can work together to address the challenges facing the pharmaceutical industry. By bringing together the best minds in the field, the conference seeks to inspire excellence and drive progress in pharmacy.

I welcome all the participants to the conference.

C.A. S.K. Jindal
Chairman
Global Research Institute of Pharmacy,
Radaur, Yamuna Nagar, Haryana, India

From the Desk of Principal

Prof. (Dr.) Ashwani K. Dhingra

It is indeed a matter of great delight to bring out the proceeding of the One-Day National Conference on PHARMA ANVESHAN 2025 (National Pharmacy Education Day) on the theme **"Entrepreneurship & Startups in Pharma and Pharmacy Practice Encouraging Innovation, Incubation Centers and Pharmaceutical Startups"** which is being organized in our college. The theme of the conference was chosen keeping in view the present scenario of globalization and the vital role of pharmacists in these fields in the years to come. Many relevant topics about various aspects of the theme will be deliberated by eminent scientists, who very kindly accepted our request and spared time for us out of their heavy work schedule. More than 800 delegates, who attended, will be immensely benefited. I fail to find words to express my deep gratitude to these distinguished speakers. I would like to place on record my sincere gratitude to our worthy chairman and chief patron of the conference, **C.A. S.K. Jindal** for his keen interest, blessing, patronage and encouragement. I am also thankful to all members of the college and managing committee for their kind support.

Prof. (Dr.) Ashwani K. Dhingra

Principal
Global Research Institute of Pharmacy,
Radaur, Yamuna Nagar, Haryana, India

From the Desk of Co-ordinator

Dr. Neha Yadav

The Global Research Institute of Pharmacy is committed to establishing itself as a leading pharmacy institution, focusing on pharmaceutical education and research. The One-Day National Conference – PHARMA ANVESHAN 2025, will be held on National Pharmacy Education Day, March 6, 2025, to commemorate the birth anniversary of Prof. (Dr.) M.L. Shroff, widely regarded as the "Father of Pharmacy in India"

This conference is being organized under the patronage of Pt. B. D. Sharma University of Health Sciences, Rohtak, in collaboration with the Society of Pharmaceutical Education & Research (SPER). The theme of the conference is "Entrepreneurship & Startups in Pharma and Pharmacy Practice: Encouraging Innovation, Incubation Centers, and Pharmaceutical Startups."

The event aims to bring together eminent academicians, researchers, and industry experts to share their insights and experiences in pharmaceutical sciences, healthcare innovations, bioinformatics, and entrepreneurship.

I extend a warm welcome to all delegates attending the conference and express my sincere gratitude to the esteemed resource persons for dedicating their valuable time to share their expertise. Furthermore, I acknowledge and appreciate the dedicated efforts of the faculty members and the organizing team, whose hard work has played a pivotal role in making this National Conference a grand success.

Through this conference, we aim to facilitate knowledge sharing, collaboration, and innovation, ultimately contributing to the growth and development of the pharmaceutical industry.

Dr. Neha Yadav

Co-Ordinator

From the Desk of Organizing Secretary

Dr. Smita Narwal

It is wonderful feeling of joy, pleasure, and privilege to be a part of the organizing committee in the One-Day National level conference held at the Global Research Institute of pharmacy, Radaur, Yamuna Nagar on 6th March 2025. The theme of this conference, **"Entrepreneurship & Startups in Pharma and Pharmacy Practice: Encouraging Innovation, Incubation Centers, and Pharmaceutical Startups,"** is a pioneering initiative in this region. It is truly inspiring to witness the keen interest of researchers, academicians, and industry professionals in nurturing innovation and entrepreneurship in the pharmaceutical sector.

I extend my sincere gratitude to the eminent speakers for sharing their expert insights on various aspects of pharmaceutical startups, incubation centers, and entrepreneurship in pharma and pharmacy practice. I would like to thank **Pt. B. D. Sharma University of Health Sciences, Rohtak,** for its patronage and the **Society of Pharmaceutical Education & Research (SPER)** for its collaboration in organizing this significant event. I am deeply indebted to our worthy **Chairman, C.A. S.K. Jindal**, for his invaluable support in making this conference a grand success. I also extend my heartfelt appreciation to the entire team at Global Research Institute of Pharmacy for their dedicated efforts in ensuring the success of Pharma Anveshan 2025.

On behalf of the **college and organizing committee,** I express my gratitude to all our contributors and well-wishers for their unwavering support

Dr. Smita narwal

Organizing Secretary

PROGRAM SCHEDULE

March 6, 2025

S. No.	Event	Time
1	Inaugural session • Introductory speech • Lightening of lamp • Welcome speech by Principal sir • Speech by Guest of honor of the day • Speech by the Chief guest of the day • Release of souvenir/book by dignitaries on the dais	 10:15 - 10:20 AM 10:20 - 10:30 AM 10:30 - 10:35 AM 10:35 - 10:45 AM 10:45 - 10:50 AM 10:50 - 11:00 AM
2	Tea Break for Guest	11:00 - 11:30 AM
3	Industry-Academia Panel Discussion	11:30 - 12:00 Noon
4	Poster/Oral Evaluation	11:30 - 1:00 PM
5	First technical session	12:00 - 12:30 PM
6	Second technical session	12:30 - 1:00 PM
7	Lunch Break	1:00 - 2:00 PM
8	Third technical session	2:00 - 2:30 PM
9	Forth technical session	2:30 - 3:00 PM
10	Valedictory session • Culture activity • Prize distribution • Conclusive conference report • Vote of thanks	 3:00 - 3:20 PM 3:20 - 3:40 PM 3:40 - 3:50 PM 3:50 - 4:00 PM

SCIENTIFIC TALKS

S-1

Research profiling: Enhancing Your Research Visibility and Impact

Dr. Monika Gulati

Dean, Lovely Professional University,

School of Pharmaceutical Sciences

Enhancing your research visibility and impact is essential for establishing your academic reputation and promoting collaboration. A well-crafted research profile, whether on platforms like Google Scholar, ResearchGate, or LinkedIn, serves as a public-facing portfolio of your work. To optimize this visibility, it is crucial to keep your profile updated with recent publications, citations, and collaborations. Engaging with relevant academic communities and attending conferences will help expand your network and increase the reach of your research. Additionally, making your work accessible through open-access platforms can significantly increase its discoverability. Citation tracking tools, like ORCID, ensure that you maintain control over your research identity. Collaborating with diverse researchers and publishing in high-impact journals further elevates the recognition of your work. Lastly, leveraging social media platforms such as Twitter and LinkedIn to share insights, articles, and findings helps bring attention to your research beyond the academic sphere.

S-2

Indian Herbal Industry: Current Status and Sustainability

Dr. Rohini Sharma

Managing Director

Rohini BioCare Research, Ponta Sahib

Recently, there has been observed a shift in the universal trend that is from 'Synthetics to Naturals' and now it is 'RETURN TO NATURE. Medicinal plants have been known for millennia and highly esteemed worldwide as a rich source of medicinal agents, and our country India is also known as the Medicinal Garden of the World. We now have an opportunity to bring the Indian system of medicine in the mainstream, and integrate the AYUSH infrastructure into the Indian healthcare system. Earlier there were issues related to the Marketing Trade in Medicinal Plants. However, new challenges in initiatives in the Medicinal Plants Sector have led to development of guidelines for Good Agricultural Practices (GAP) for cultivation of Medicinal Plants and Good Field Collection Practices (GFCP) for wild collection of medicinal plants as per WHO guidelines. For a start-up of the Herbal industry: Proper Space Allocation, Warehousing, Shipping & Receiving, Environmental factors, and Regulatory have a key role. Addressing the challenges like variability in raw materials, difficulty in standardization, contamination from pesticides and heavy metals, there is a solution like 'How Are we Sustaining'. To survive in the market with Ayurveda manufacturing, key points are: Good manufacturing practice for herbal medicines, Qualification and validation, Complaints, Product recalls, Personnel Training for personal hygiene, and good production practices as well as in quality control, which are to be included in the manufacturing process.

S-3

Emerging Opportunities for Young Pharmacy Entrepreneurs

Dr. Sameer Sapra

Managing Directo,

Physic Herbals, Baddi

India’s pharmaceutical sector is heavily regulated, has high setup costs, and faces tough competition from well-established companies. These factors make it hard for new B.Pharm graduates to start a full drug manufacturing business right after college. However, this does not mean there are no opportunities for young pharmacy entrepreneurs. By using their knowledge of drug formulas and patient care, B.Pharm graduates can explore paths that avoid the large expenses and strict requirements tied to traditional manufacturing.

One practical route is third-party manufacturing or private labeling, where pharmacists can develop and sell their own lines of products—such as herbal supplements or over-the-counter medicines—by partnering with existing factories. This method lowers regulatory barriers while still allowing them to build a brand. Digital solutions also offer big possibilities: telepharmacy services, apps that remind patients to take their medicine, or software that helps pharmacists run their stores. These options need less money to begin with and are easier to scale, especially in a country where internet use is growing fast.

Moreover, creative forms of pharmacy retail, such as small community clinics that offer one-on-one patient counseling or online services that combine telemedicine, can help pharmacists stand out. Providing consulting services in areas like regulatory compliance or drug safety can also be profitable, as many smaller pharma companies need expert guidance but cannot afford big in-house teams.

S-4

Entrepreneurship & Startups in Pharma and Pharmacy Practice Encouraging Innovation, Incubation Centers and Pharmaceutical Startups

Mr. Subhash Baidya

Vice President Operation

Mankind Pharma Ltd., Paonta Sahib

Entrepreneurship in the pharmaceutical sector is evolving, offering diverse opportunities beyond traditional drug manufacturing. Pharmacists can establish themselves as entrepreneurs in areas such as community pharmacy ownership, health and wellness product development, pharmaceutical consulting, marketing, and digital health solutions. The rising demand for personalized healthcare, wellness products, and innovative pharmacy services creates new business avenues. Key entrepreneurial opportunities include developing dietary supplements, herbal medicines, and medical devices, leveraging expertise in regulatory affairs, clinical trials, and medication therapy management, and engaging in pharmaceutical marketing, sales, and franchising. The integration of telepharmacy, mobile pharmacy services, and online platforms is further transforming patient care and expanding market reach. Understanding business planning, securing financing, navigating regulatory compliance, and adopting digital health technologies is crucial for success in this competitive industry.

S-5

Recent Advances in Quality Control of Herbal Drugs

Dr. Rajesh Kumar

Sr. Principal Scientist,

Dabur Research & Development Centre, Ghaziabad

The quality control of herbal drugs has significantly advanced in recent years, driven by the need for standardization, safety, efficacy, and regulatory compliance. Modern analytical techniques, such as high-performance liquid chromatography (HPLC), gas chromatography-mass spectrometry (GC-MS), nuclear magnetic resonance (NMR), and liquid chromatography-mass spectrometry (LC-MS), have enhanced the identification and quantification of bioactive compounds in herbal formulations.

Additionally, advancements in DNA barcoding and chemometric analysis have improved the authentication of medicinal plants, reduced the risk of adulteration and ensuring consistency in herbal preparations. Emerging technologies, such as Fourier-transform infrared spectroscopy (FTIR) and near-infrared spectroscopy (NIRS), offer rapid and non-destructive analysis for quality assessment. Regulatory frameworks worldwide are also evolving to establish good manufacturing practices (GMP), pharmacopeial standards, and stability testing protocols for herbal drugs.

This review highlights recent innovations in analytical techniques, regulatory guidelines, and quality assurance strategies that contribute to the global acceptance and scientific validation of herbal medicines.

Chief Guest

Prof. (Dr.) Deependra Singh
Honorable Chairman
ERC- Pharmacy Council of India
New Delhi

Guest of Honors

Dr. Narender Kumar
SDM, Radaur
Yamuna Nagar, Haryana,

Prof. (Dr.) Rohit Dutt
Principal,
GMN College Ambala Cantt.

Prof. (Dr.) Kumar Guarve
Principal
Guru Gobind Singh College of Pharmacy
Yamuna Nagar, Haryana,

Dr. Upendra Nagaich
Founder & Director,
SPER Market Research Pvt. Ltd.,
Noida, U.P

Dr Rahul Taneja
Scientist, Patent Information
CentreDepartment of
Science & Technology

Ms. Bindu Dhiman
Drug Control Officer,
Yamunanagar-II

Ms. Ritu Mehla
Drug Control Officer,
Yamunanagar-I

Mr. Chetan Verma
Drug Control Officer,
Kaithal-I

Mr. Gulshan Kumar
Drug Control Officer,
Kurukshetra-I

Speakers

Dr. Monika Gulati
Dean,
Lovely Professional University,
Jalandhar

Dr. Sameer Sapra
Managing Director,
Physic Herbals
Baddi

Dr Rohini Sharma
Managing Director
Rohini Biocare Research
Paonta Sahib

Dr. Rajesh Kumar
Sr. Principal Scientist,
Dabur R&D Centre,
Ghaziabad

Mr. Subhash Baidya
VP - Operations
Mankind Pharma Ltd.,
Paonta Sahib

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14	Sonia*, Seema pegowal	Global Research Institute of Pharmacy, Radaur, Yamuna Nagar, 135133, Haryana, India	Pharmacotherapy in Chronic Disease Management: A Holistic Approach
15	Abhishek Malik*, Harsh Rathee, Radha Rani	Puran Murti College of Pharmacy, Kami Sonipat, 131001	Micro to Macro: The Role of Nanotechnology in Transdermal Systems
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3	Vishal Chanalia*, Rounak, Pratibha, Bhavishya, Shivam	Global Research Institute of Pharmacy, Radaur, Yamuna Nagar, 135133, Haryana, India	The Integration of AI in Advancing Pharmaceutical Research and Development
4	Tarun kumar[1]*, Komal Ahuja[1], Kanwal Garg[2]	Global Research Institute of Management & Technology, Radaur, Yamuna Nagar, 135133, Haryana, India	Homomorphic Encryption for Secure Machine Learning in Pharmaceutical Research
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		2. Department of pharmaceutical sciences, Baba Mastnath University,Asthal Bohar, Rohtak	
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ORAL
PRESENTATION
ABSTRACTS

PHARMA RESEARCH BULLETIN
Open Access Journal (ISSN: 2582-676X)

Conference Proceedings

O-1

Pollution's Influence on Eczema: Unveiling Environmental Triggers

Vidhi Sharma*

Institute of Pharmaceutical Science, Kurukshetra University, Kurukshetra

Abstract: Eczema (atopic dermatitis) is a chronic inflammatory skin condition characterized by red, itchy, and inflamed skin. The cause of eczema is believed to be a combination of Genetic and majorly environmental factors. Environmental pollution can indeed play a role in triggering or exacerbating eczema symptoms through several mechanisms like Pollutants in the air, such as particulate matter (PM), nitrogen dioxide (NO2), sulphur dioxide (SO2), ozone (O3), and volatile organic compounds (VOCs), can irritate the skin and exacerbate eczema symptoms. Pollutants can act as allergens, triggering allergic reactions in susceptible individuals. Climate change can impact eczema by altering environmental conditions such as temperature, humidity, and UV radiation levels: Pollutants in the environment, such as industrial chemicals, cleaning agents, pesticides, and heavy metals, can act as irritants to the skin, Reducing exposure to environmental pollutants through measures such as air purification, avoiding allergens, using non-toxic household products, and practicing stress management techniques can help mitigate the impact of pollution on eczema symptoms.

Keywords: *Pollution, Eczema, Climate change, VOCs*

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O-2

Evolution in Treatment of Hodgkin Lymphoma: Current and future approaches

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Abstract: Hodgkin Lymphoma (HL) is one of the most dispersed cancers that occurred in adolescents and young adults. Around 20% of patients suffered progression or relapse after standard treatment of chemotherapy regimens. The availability of Hodgkin Reed Sternberg (HRS) cells is a significant feature of this tumour. Numerous cell and cell mediated interactions and a profusion of cytokines in the tumour microenvironment inclusively tasks to promote HRS cell growth and survival. Deviating and integral activation of signal transduction pathways core are an assay mark characteristic of HL. Genetic lesions put up these dysfunctioning pathways and evasion of the immune system through a diversification mechanism is alternative significant of HL. While considerable elucidation of the HL biology has entitled advancement in their therapies. Multiple modifications of treatment approaches, with methodical therapies at their core, have made Hodgkin Lymphoma a highly curable cancer and improving outcomes in the relapsed or refractory adjustment. Patients feedback have improved recent with the advancement of novel therapies and are vindicate of a greater understanding of the HL biology and translational medicines. Antibody based therapies, more collectively immunotherapies, are leading the change in the way we treat this disease. This review looks at the tumour antigen-directed immunotherapies, and immune blockade inhibitors that are endeavoring to defeat the unmet challenges.

Keywords*: Hodgkin Lymphoma, Tumour microenvironment, Relapse, Immunotherapy, Cytokine, Chemotherapy*

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O-3

Biological Potential of New Thiadiazole Derivatives

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Abstract: Thiadiazole is a five-membered heterocyclic compound containing sulphur and nitrogen atoms at position 1,3,4. The unique electronic structure and bioisosteric nature of thiadiazole make it an important scaffold in drug design. The synthesis of thiadiazole derivatives involves the cyclization of appropriate precursors such as thiosemicarbazides, hydrazine derivatives or dithiocarbamic acid under oxidative or dehydrative conditions. Generally reagent like phosphorus oxychloride ($POCl_3$), sulphuryl chloride(SO_2Cl_2) or strong acids. Mainly thiosemicarbazide react with carboxylic acids or their derivatives results to the formation of substituted 1,3,4-thiadiazole. Alternatively oxidative cyclization of dithiocarbamates with halogenating agent leads to the formation of 1,2,5- thiadiazole. Numerous thiadiazole derivatives have been synthesized and evaluated for their therapeutic potential in treating various diseases. Thiadiazole derivatives are mainly used as antimicrobial, antifungal as drug resistant bacterial and fungal strains, anti-inflammatory, anti cancer, neuroprotective activity, anti- Alzheimer's, anti-Parkinson, anti-diabetic anti-hypertensive agents.They play a crucial role in glucose metabolism. Their cardiovascular activity includes vasodilation and antihypertensive activity contributing to novel treatment for hypertension and related conditions. Therefore, it must be necessary to collect more advanced knowledge to acknowledge the present ranking of thiadiazole and their derivative in pharmaceutical chemistry analysis.

Keywords: *Heterocyclic, bioisosteric, biological, thiadiazole, antimicrobial, antifungal, anti-Alzheimer, anti-Parkinson, anti-diabetic*

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O-4

3,5-Disubstituted thiazolidin-2,4-dione: Synthesis, Biological evaluation, and in-silico studies

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Abstract: A new series of 3,5-disubstituted thiazolidin-2,4-dione molecules was derived and characterized using various spectral techniques (^{1}H-NMR, IR, CHN, etc.) and physiochemical parameters. The molecules were derived using knoevenagel condensation followed by mannich reaction and further synthesized analogues were screened for their antioxidant and antimicrobial potential using DPPH free radical scavenging method and serial tube dilution method, respectively along with *in silico* studies (Docking and ADME parameters) to explore the drug-receptor interaction and drug likeness. In antimicrobial screening, the analogs MP2, MM6, MM7, and MM8 displayed promising activity while molecule MM4 exhibited better antioxidant potential in the series. In molecular docking analysis; the best-fitted analogs *i.e.*, MM6 and MM7 showed good interactions.

Keywords: *Schrodinger; Docking; Drug design; Antimicrobial; Antioxidant; thiazolidin-2,4-dione*

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O-5

Exosome-Based Nanomedicine: An Innovative Strategy for Targeted Drug Delivery Across the Blood-Brain Barrier in Alzheimer's Disease

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Abstract: The blood-brain barrier (BBB) is a selectively permeable physiological barrier that regulates the passage of substances into the central nervous system (CNS). Even though they are critical in maintaining brain homeostasis, the BBB severely restricts drug delivery, one of the most serious obstacles in the treatment of neurodegenerative disorders such as Alzheimer's disease (AD). Small-molecule drugs, biologics, and gene therapies are impermeable across the BBB due to the restrictive properties of the BBB, including tight junctions, efflux pumps, and metabolic enzymes. To bypass this barrier, novel drug delivery systems have been designed. These are nanoparticle-based carriers, receptor-mediated transcytosis, targeted ultrasound with microbubbles, and lipid-based drugs. Exosome-based nanomedicine is highly promising since it naturally penetrates the BBB and can transport therapeutic drugs, including neuroprotective molecules, monoclonal antibodies, and RNA-based therapies. Engineered exosomes are a highly promising platform for targeted drug delivery with low systemic toxicity and high drug bioavailability. Even with promising advancements, there are still some challenges, such as bulk-scale production, purification, cargo loading efficiency, and targeting specificity. Future studies should focus on optimizing exosome engineering, enhancing delivery platforms, and conducting large-scale clinical trials to assess safety and efficacy. By developing such new drug delivery systems, scientists can uncover novel therapeutic potential for Alzheimer's disease and other CNS disorders, ultimately leading to improved patient outcomes.

Keywords: *Blood-brain barrier (BBB), Alzheimer's disease (AD), Exosomes, Receptor-Mediated Transcytosis, Monoclonal Antibodies, Gene Therapy*

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O-6

Role of Artificial Intelligence in Nanoparticle Formulation design

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Abstract: Nanoparticle-based drug delivery systems have revolutionized pharmaceutical formulation by enhancing drug bioavailability, targeted delivery, and therapeutic efficacy. The integration of Artificial Intelligence (AI) in nanoparticle formulation design has significantly improved the precision, efficiency, and cost-effectiveness of developing novel drug delivery systems. AI-driven technologies such as machine learning (ML), deep learning (DL), and computational algorithms are widely employed to optimize critical formulation parameters including particle size, drug loading capacity, surface modification, and release kinetics. Predictive models can accurately forecast nanoparticle stability, drug entrapment efficiency, *in vivo* behavior and reducing the need for extensive experimental trials. Moreover, AI facilitates the identification of optimal excipients and formulation techniques, accelerating the design of nanoparticles for targeted and personalized drug delivery. This chapter explores the transformative role of AI in nanoparticle formulation design, highlighting its applications, advantages, and future potential in advancing pharmaceutical research.

Key words: *Artificial Intelligence, Nanoparticles, Machine Learning, Drug Delivery Systems, Particle Size Optimization, Deep Learning, Personalized Medicine, Drug Release Kinetics, Computational Modelling, Targeted Drug Delivery*

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O-7

Micelle-Based Drug Delivery: A Novel Therapeutic Approach for Osteoporosis Treatment

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Abstract: Osteoporosis is a progressive systemic skeletal disease characterized by reduced bone mass/density and micro-architectural deterioration of bone tissue, leading to enhanced bone fragility and consequent increase in fracture risk poses a significant global health burden, particularly among aging populations. It is a common condition affecting one in three women and one in 12 men, resulting in excess mortality and health and social services expenditure. This paper reviews the latest advancements in osteoporosis research, methods, and therapeutics focusing on its pathophysiology, risk factors, and diagnostic interventions. The study investigates the role of genetics, hormonal imbalances, and lifestyle factors such as diet and physical activity in the development of osteoporosis. Recent advancements in nanotechnology have introduced micelles as a promising drug delivery system, stem cell therapy, and the potential of bioactive molecules to enhance bone regeneration for osteoporosis treatment. Micelles' self-assembled nanostructure composed of amphiphilic molecules offers enhanced solubility, stability, and targeted delivery of therapeutic agents to bone tissues. Micelles can be functionalized with bone-targeting ligands, such as bisphosphonates or peptides, to achieve site-specific accumulation in osteoporotic bone, thereby enhancing therapeutic efficacy while minimizing systemic exposure. Additionally, stimuli-responsive micelles, designed to release drugs in response to pH, enzymes, or reactive oxygen species, further optimize drug delivery at the disease site. Preclinical studies have demonstrated the potential of micellar systems to improve the pharmacokinetics and pharmacodynamics of anti-osteoporotic agents, including bisphosphonates, anabolic drugs, and bioactive molecules. This paper aims to provide a comprehensive understanding of osteoporosis.

Keywords: *Osteoporosis, Micelles, Drug Delivery, Bone Regeneration, Nanotechnology*

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O-8

Nutraceuticals' role of dietary antioxidants in Pulmonary and Respiratory diseases

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Abstract: Dietary antioxidants are essential for reducing oxidative stress, which is a key factor in the development of several respiratory and pulmonary conditions, such as asthma, pulmonary fibrosis, and chronic obstructive pulmonary disorder (COPD). Reactive oxygen compounds (ROS) and the body's antioxidant defenses are out of balance during oxidative stress, which results in inflammation, airway remodeling, and compromised lung function. The potential of nutraceuticals—bioactive substances present in food and supplements—to reduce inflammation and oxidative stress in the respiratory tract has drawn interest. Important antioxidants that have shown protective effects in clinical and preclinical trials include vitamins C and E, flavonoids, carotenoids, and polyphenols. These antioxidants enhance lung function, lower inflammatory cytokines, and neutralize free radicals. Vitamin C, for example, is a strong water-soluble antioxidant that may help individuals with COPD experience fewer exacerbations. Fruit and vegetable polyphenols have also been shown to have broncho dilatory and anti-inflammatory effects. Additionally, nutraceutical therapies may have synergistic advantages in the management of chronic respiratory disorders, particularly when paired with a balanced diet. Although dietary antioxidants are a potential approach to respiratory health, more clinical research is required to determine the best dosage and the long-term effectiveness associated with these nutraceuticals in the treatment of lung diseases.

Keywords: *oxidative stress, anti-inflammatory, pulmonary fibrosis, flavonoids*

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O-9

Advancements in Therapeutic and Diagnostic Applications of Phytogenic Nanomaterials for Lung Cancer Management

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Abstract: Lung cancer is still a serious global health issue, and traditional therapy is hindered by drug resistance, toxicity, and non-selective activity against cancer cells. Phytogenic nanomaterials derived from plants provide a promising alternative since they are biocompatible, environmentally friendly, and show improved therapeutic efficacy. Such nanomaterials such as metallic, polymeric, lipid-based, and carbon-based nanomaterials have highly effective anticancer activities by inducing apoptosis, reactive oxygen species (ROS) production, targeted drug delivery, inhibition of angiogenesis, and immune stimulation. Phytogenic nanomaterials have shown efficiency in the treatment of lung cancer such as targeted drug delivery systems, chemotherapy triggered by phytogenic nanomaterials, photothermal therapy, and gene therapy. Targeted drug delivery occurs by ligand-functionalization of nanoparticles, improving specificity of therapy along with minimum systemic toxicity. Phytogenic nanoparticles also tackle drug resistance, increase chemotherapy, and allow release of the drug in a controlled manner. Gold nanoparticles, carbon nanotubes, and graphene oxide also offer photothermal therapy with local ablation of the tumor by heat. Gene therapies like RNA interference and CRISPR-Cas9 also increase therapeutic specificity. Apart from therapy, photogenic nanomaterials are used in diagnostics and imaging, which improve the early diagnosis of disease by biomarker sensing and improved imaging contrast. Through continued research and developments in the clinic, photogenic nanomaterials have the potential to transform lung cancer therapy into personalized, efficient, and safer treatments.

Keywords: *Phytogenic nanomaterials, lung cancer, drug targeting, apoptosis, reactive oxygen species (ROS), photothermal therapy*

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O-10

Molecular Docking and Drug-Receptor Interactions

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Abstract: Drug receptor interactions play a vital role in understanding how drugs produce both therapeutic and potential side effects. Various drug interactions include agonist and antagonist interactions, biased signaling, allosteric modulations, and many more. Different theories including occupation theory, rate theory, induced-fit theory, macromolecular perturbation theory, activation-aggregation theory and two-state model of receptor activation have successfully explained these interactions. The main computational technique used to predict these interactions is Molecular Docking. Molecular Docking plays a crucial role in structural molecular biology, computer-aided drug design (CADD) and drug discovery. The main objective of ligand-protein docking is to predict the three-dimensional as well as two-dimensional binding mode(s) or affinity of a ligand with the desired protein. Successful docking techniques employ a scoring function that ranks potential dockings accurately. Docking technique also helps in virtual screening and lead optimization, which further improves the efficiency of drug discovery process. The chapter is not only based on comprehensive information on drug receptor interactions, their types and theories along with that detailed methodology and the types of docking, but also includes a comparative study of various software available for the same.

Keywords*: Drug-receptor interactions, agonist, antagonist, molecular docking, binding affinity, virtual screening*

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O-11

A Review on Environmental Health

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Abstract: Environmental health studies the effects of environmental elements on human health, including climate change, chemical exposures, and the quality of the air and water. Environmental factors have an impact on the occurrence of diseases and general well-being, illustrating the intricate relationship between the environment and health. For example, contaminated water sources can cause gastrointestinal disorders, while air pollution is associated with cardiovascular and respiratory disorders. By changing disease patterns, impacting food security, and increasing the frequency of extreme weather occurrences, climate change makes these problems worse. In order to reduce hazards and advance health, environmental health requires a multidisciplinary strategy that integrates environmental research, public health policies, and community engagement. To protect public health, preventive actions are crucial. These include cutting emissions, improving waste management, and increasing water cleanliness. Additionally, educating communities and increasing awareness of environmental health hazards enables people to advocate for better surroundings and make educated decisions. In conclusion, environmental health is a vital field that emphasizes how crucial a safe and clean environment is to attaining the best possible health results.

Keywords: *Environmental health, air pollution, water quality, climate change, public health, disease prevention, community engagement, environmental science, health promotion, preventive measures*

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O-12

Phytopharmacological Investigation of *Basella alba* in the Treatment of Parkinson's disease

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Abstract: Parkinson's disease (PD) is a neurodegenerative condition that causes motor and cognitive deficits by gradually destroying dopaminergic neurons in the substantia nigra. Oxidative stress, neuroinflammation, and mitochondrial dysfunction are key contributors to PD pathology. *Basella alba*, a medicinal plant rich in flavonoids, alkaloids, saponins, and phenolic compounds, has been traditionally used for its neuroprotective, antioxidant, and anti-inflammatory properties. This study explores the phytopharmacological potential of *B. alba* in the treatment of PD. The bioactive compounds in *B. alba* have been reported decrease lipid peroxidation, scavenge reactive oxygen species (ROS), and enhance Neurotrophic factor that comes from the brain (BDNF) expression, which supports neuronal survival. Additionally, flavonoids in *B. alba* may modulate dopamine synthesis and inhibit microglial activation, thereby reducing neuroinflammation. Animal model studies suggest that *B. alba* extracts can improve motor coordination and cognitive functions by regulating cholinergic and dopaminergic pathways. Despite promising preliminary findings, further Study is required to isolate and characterize the active phytoconstituents responsible for neuroprotection. Extensive preclinical and clinical trials should be conducted to establish efficacy, optimal dosage, and safety profiles. If validated, *B. alba* could serve as a potential natural therapeutic alternative for PD management, offering neuroprotective benefits with fewer side effects compared to conventional pharmacological treatments.

Keywords: *Basella alba, Parkinson's disease,Neuroprotection, Antioxidant activity, Dopaminergic pathways*

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O-13

Advancing Healthcare: The Rise and impact of Telemedicine

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Abstract: Broadly defined, telemedicine is the use of advanced telecommunications technologies to make diagnoses, conduct research, transferring patient data, and/or improving disease management and treatment in remote areas. For more than 20 years, telemedicine technologies have been promoted as answers to the problems of providing health services in a way that is efficient, affordable, and egalitarian. The success or failure of telemedicine may be significantly influenced by how the doctor-patient interaction and the sensory aspects of medical care are mediated via it. In this paper, we evaluate the pertinent social science literature that sheds light on the sensory aspects of telemedicine. We include viewpoints and research from other disciplines and fields that we think can further scholarship on this subject, in addition to taking into account significant pertinent work done in the sociology of health and sickness. We argue that sensory judgments have become, in part, a sense of sensors when physicians, patients, and other healthcare professionals implement telemedicine. A useful theoretical approach for future research into telemedicine and other digital health technologies is to view patients and healthcare professionals as always and already digital data assemblages of flesh-code-space-place-affect-senses that require specific types of body work and data sense-making

Keywords: *Telemedicine, Health, Medical care, technology, Patient.*

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O-14

Pharmacotherapy in Chronic Disease Management: A Holistic Approach

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Abstract: Chronic diseases that result in increased morbidity, mortality, and cost of care are diabetes, hypertension, cardiovascular disease, chronic obstructive pulmonary disease, or (COPD), and autoimmune diseases. As it mitigates symptoms, retards the course of the disease, and improves the patient's quality of life, effective pharmacotherapy is a critical component to the management of most diseases. But for the maximum impact, an integrated strategy of lifestyle intervention, patient education, and tailored therapy with medication is required. More specifically focused on a patient's genetic status, biomarkers, and phase of disease are drugs to give improved results of treatment as the extent of personalized medicine increases. But the issue of polypharmacy in patients with multi-morbidities calls for the optimization of drug therapy with lesser adverse effects and drug interactions. Non-drug therapy is also needed for chronic disease management alongside drugs. In a bid to reduce the chances of illness and improve the patient's outcome, food alteration, regular exercise, stress reduction, and behavior modification all play their roles. Traditional medicines being used more and more as part of the regular treatment schedule like acupuncture and herbal drugs are also in consideration in the book. The contribution of mental illness to chronic disease causation is addressed, and the relevance of comorbidity treatment in depression and anxiety. Chronic disease can be successfully treated; patients can be encouraged, and in the end long-term health gained by integrating drugs with holistic and multidisciplinary treatment. To offer an integrated, patient-focused strategy to chronic disease treatment, this chapter offers recommendations to maximize both pharmacologic and non-pharmacologic therapies.

Keywords: *Chronic diseases, Pharmacotherapy, holistic Approach*

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O-15

Micro to Macro: The Role of Nanotechnology in Transdermal Systems

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Abstract: Transdermal drug delivery systems (TDDS) have emerged as a promising alternative to conventional drug administration, offering controlled release, improved bioavailability, and enhanced patient compliance. Recent advancements in nanotechnology have revolutionized TDDS by enabling efficient drug transport across the skin barrier, overcoming limitations such as poor permeability and low drug absorption. This study explores the integration of nanotechnology in TDDS, focusing on nanocarriers such as liposomes, nanoemulsions, microneedles, solid lipid nanoparticles (SLNs), and nanostructured lipid carriers (NLCs). These systems enhance drug penetration, prolong systemic circulation, and allow for targeted delivery. Microneedle arrays, an innovative approach, create transient microchannels in the skin, facilitating painless and non-invasive drug administration. Additionally, nanoemulsions and lipid-based carriers improve drug solubility and stability, optimizing therapeutic outcomes. Smart transdermal patches incorporating biosensors and artificial intelligence (AI) for personalized drug release are also gaining attraction. However, challenges such as formulation stability, large-scale manufacturing, and regulatory hurdles remain critical barriers to widespread adoption. These latest materials and technologies shaping the future of transdermal nanomedicine while addressing potential challenges and safety concerns. The convergence of nanotechnology with transdermal drug delivery is paving the way for next-generation, patient-friendly therapeutics that maximize efficacy while minimizing side effects. As research advances, Nanotechnology-based TDDS will change medicine by offering a painless, effective, and customizable way to deliver drugs, making treatments easier and more efficient.

Keywords: *TDDS, Nanotechnology, Microneedles, Smart Patches, Drug Penetration.*

POSTER PRESENTATION ABSTRACTS

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P-1

Exosomes in Parkinson's Disease

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Abstract: One important neuropathological feature of Parkinson's disease (PD), a common neurodegenerative illness, is the accumulation of misfolded and aggregating α-synuclein. According to recent research, pathogenic α-synuclein may spread throughout the brain through extracellular vesicles like exosomes. Critical information on how exosomes used may contribute to pathology in Parkinson's disease can be gained from their capacity to transfer molecules and genetic material across cells, including mRNA and microRNAs that have been linked to the disease. To ensure site-specific targeting of the recipient cells, artificial exosomes are can be loaded with particular therapeutically active molecules, including medicines, proteins, long noncoding RNAs, and short interfering RNAs. Another interesting medication delivery method is exosomes. Since most macromolecular medications are blocked by the blood-brain barrier, the brain is a challenging target for medications of all kinds. The creation of vehicles for accurate transport to the brain is one of the main obstacles. Therapeutic substances, such as polypeptide and genetic therapy molecules, may be delivered into the brain by targeted exosomes. Function of exosomes in glaucoma, retinal disorders, and corneal illnesses, to serve as a resource for future research on the pathophysiology, diagnosis, and management of ocular disorders. We concluded by providing a more thorough summary of the potential and difficulties of exosomes in precision medicine. The progressive neurodegenerative condition known as Parkinson's disease (PD) is typified by bradykinesia, stiffness, and tremor. Significant advancement has been made in determining the precise mechanism causing this.

Keywords: *Parkinson's disease (PD), pathogenic α-synuclein, genetic therapy, exosomes*

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P-2

Evolution in Treatment of Hodgkin Lymphoma: Current and future approaches

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Abstract: Hodgkin Lymphoma (HL) is one of the most dispersed cancers which occurred in adolescent and young adults. Around 20% patients suffered progression or relapse after standard treatment of chemotherapy regimens. The availability of Hodgkin Reed Sternberg (HRS) cells is a significant feature of this tumour. Numerous cell and cell mediated interactions and a profusion of cytokines in the tumour microenvironment inclusively tasks to promote HRS cell growth and survival. Deviating and integral activation of signal transduction pathways core are an assay mark characteristic of HL. Genetic lesions put up these dysfunctioning pathways and evasion of the immune system through a diversification mechanism is alternative significant of HL. While considerable elucidation of the HL biology has entitled advancement in their therapies. Multiple modifications of treatment approaches, with methodical therapies at their core, have made Hodgkin Lymphoma a highly curable cancer and improving outcomes in the relapsed or refractory adjustment. Patients feedback have improved recent with the advancement of novel therapies and are vindicate of a greater understanding of the HL biology and translational medicines. Antibody based therapies, more collectively immunotherapies, are leading the change in the way we treat this disease. This review looks at the tumour antigen-directed immunotherapies, and immune blockade inhibitors that are endeavour to defeat the unmet challenges.

Keywords*: Hodgkin Lymphoma, Tumour microenvironment, Relapse, Immunotherapy, Cytokine, Chemotherapy*

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P-3

The Integration of AI in Advancing Pharmaceutical Research and Development

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Abstract: Artificial intelligence (AI) has significantly impacted the medical field by enhancing efficiency and innovation. An important aspect of pharmaceutical society is drug designing and development. However, there are still many obstacles present in the research progress and can be removed by implementing artificial intelligence. But still there is many issues present in the pipeline of drug research and development. This chapter highlighted the transformative effect of AI at all stages of the process of drug discovery and development such as in target identification, drug modelling, process automation, optimization of formulation, ADME prediction, clinical trials, drug repurposing and personalized Medicine. Large biological dataset was utilized to identify targets using AI algorithms. Need of in vivo and in vitro testing is minimized using AI algorithms build on the basis of biological and pharmacokinetic data. Using AI, Associated risk with drug delivery can be detected at early stages and optimize the drug formulation by predicting release of drug. Still, many issue are facing during drug research and development such as biasness, ethical consideration, data availability, and there is need to be address these issues. Future developments could involve unbiased AI algorithms, techniques for data augmentation and legislative measure to ensure data reliability. The integration of AI into drug research and development will establish a new era of pharmaceutical innovation in the pharmaceutical industry.

Keywords: *Pharmaceutical Research, AI, Drug Research, ADME, Clinical Trials*

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P-4

Homomorphic Encryption for Secure Machine Learning in Pharmaceutical Research

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Abstract: Homomorphic encryption (HE) is a cryptographic method that allows computations to be performed on ciphered data without requiring decryption, making it a promising technology for privacy-preserving machine learning (ML) in pharmaceutical sciences. To ensure conformity with stringent privacy regulations (including HIPAA, GDPR), this study analyzes the fusion of HE and ML to allow secure data sharing among pharmaceutical companies, healthcare facilities, and research institutions. A wide variety of HE systems have been researched in personalized medicine, disease prediction, and drug discovery, for example, Partially Homomorphic Encryption and Fully Homomorphic Encryption. While studies show that HE-based ML can achieve accuracy similar to classical ML methods there are problems with high computational overhead and pair across encryption and scalability limits remain major barriers to its widespread use. Advancements in hardware acceleration, cloud computing, and hybrid encryption methods have the potential to ameliorate these limitations. Although stressing the need for more research to increase efficiency and scalability, this review also highlights the potential of HE to revolutionise secure pharmaceutical data processing.

Keywords: *homomorphic encryption, machine learning, privacy-preserving AI, drug discovery*

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P-5

Phytochemicals in Neurological Diseases: Mechanisms and Therapeutic Potential

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Abstract: The complex biology of neurological disorders, such as multiple sclerosis, epilepsy, Parkinson's disease, and Alzheimer's disease, plus the dearth of long-term, reliable medications make them extremely difficult to treat. Instead of altering the condition, current therapy techniques mostly concentrate on managing its symptoms. Nevertheless, a growing body of research indicates that plant-derived phytochemicals have intriguing neuroprotective qualities that might lessen neurodegeneration and support brain health. It has been demonstrated that these phytochemicals, which include flavonoids, terpenoids, and polyphenols, have positive effects through anti-inflammatory, anti-apoptotic, and antioxidant pathways. These substances have a key role in the development of neurodegenerative illnesses by lowering oxidative stress, preventing the aggregation of neurotoxic proteins, and controlling neuroinflammatory pathways. Notwithstanding encouraging preclinical and clinical results, issues with bioavailability, pharmacokinetics, and targeted administration continue to be significant obstacles to turning these substances into potent neurotherapeutics. Databases including PubMed, Science Direct, and Springer were used to conduct the literature review. With a focus on their molecular processes, therapeutic uses, and potential future developments in neuropharmacology, this book chapter examines the many roles that phytochemicals play in neurological disorders. New plant-derived medicinal approaches for the treatment of neurodegenerative diseases may be made possible by the advancement of this field of study. We offer a current summary of the pathophysiological causes, clinical characteristics, and methods for diagnosing and treating epilepsy in the most prevalent neurodegenerative diseases.

Keywords: *Neurodegenerative disease, phytochemicals, treatment, bioavailability, advancement*

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P-6

Implementing green building materials and sustainable construction practices in pharmaceutical facilities

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Abstract: The pharmaceutical industry plays a crucial role in providing essential health products, but its environmental impact, particularly in terms of energy consumption, waste generation, and resource usage, is significant. Using green building materials and sustainable construction techniques in pharmaceutical facilities provide a viable way to lessen environmental issues as the need for sustainability grows throughout industries. The advantages, difficulties, and solutions related to incorporating green building methods into the planning and construction of pharmaceutical facilities are examined in this study. The carbon footprint of pharmaceutical facilities can be decreased by using green building materials such recycled concrete, locally produced cork, stone, and clay, and low-emission materials like bamboo and recycled steel. The operational footprint of pharmaceutical facilities is further decreased by sustainable construction techniques including water-efficient technology, renewable energy systems (like solar panels and geothermal heating), and site design optimization. Beyond environmental benefits, green construction strategies encourage healthier interior environments for both employees and customers. Pharmaceutical firms that implement these strategies might improve their brand image, acquire a competitive edge, and perhaps receive financial incentives such as tax credits or grants. In the pharmaceutical business, energy-efficient HVAC systems are critical for maintaining the controlled environments required for drug manufacture, storage, and retail activities. These systems save operational expenses by using less energy while maintaining consistent temperature, humidity, and air quality—all of which are crucial for the integrity of sensitive pharmaceutical items like vaccines and pharmaceuticals. They help to reduce the carbon footprint of pharmaceutical plants by cutting energy usage, which aligns with the industry's increased focus on sustainability.

Key Words: *Green building materials, energy efficiency, sustainable construction, pharmaceutical facilities, eco-friendly design, and environmental impact*

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P-7

Therapeutic Potential of Phytoconstituents in Epilepsy: A Natural approach to seizures management

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Abstract: Millions of people worldwide suffer from epilepsy, a chronic neurological condition marked by frequent seizures. Despite improvements in pharmacological therapies, many patients still have unfavorable side effects or limited effectiveness from traditional antiepileptic medications (AEDs). As a result, there is now more interest in investigating alternative therapy possibilities, especially those derived from natural sources. Bioactive substances called phytoconstituents, which are derived from plants, have demonstrated encouraging anticonvulsant qualities, making them a possible supplement or substitute for conventional AEDs. The neuroprotective, anti-inflammatory, and antioxidant properties of certain phytoconstituents, including as flavonoids, alkaloids, terpenoids, and phenolic compounds, have been thoroughly investigated and may be responsible for their anticonvulsant action. These substances are thought to prevent or lessen the incidence and severity of seizures by altering important molecular targets such ion channels, neurotransmitter systems (such as glutamatergic and GABAergic pathways), and oxidative stress pathways. Many compounds like resveratrol, quercetin and berberine exert anticonvulsant effects via multiple pathway, including calcium channel modulation and inhibition of neuro-inflammation. Additionally, certain phytochemicals work in concert with already available AEDs to improve their therapeutic results. Even while preclinical research shows great promise, there are still few clinical trials available, and more investigation is needed to completely comprehend the safety, effectiveness, and mechanisms underlying phytoconstituents anticonvulsant effects. The expanding significance of phytoconstituents in the treatment of epilepsy is highlighted in this abstract, along with the necessity of more research to include them into contemporary therapeutic approaches.

Keywords: *Epilepsy, phytoconstituents, neuroprotection, GABA & Glutamate.*

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Nanotechnology in Neurodegenerative Diseases

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Abstract: The field of nanotechnology has emerged an intriguing approach in the management of neurodegenerative disorders such as Parkinson's, Alzheimer's, Huntington's, Dementia and Amyotrophic lateral sclerosis. Nanotechnology-based drug delivery such as liposomes, micelles, solid lipid nanoparticles, dendrimers, and nano-emulsions, allows targeted drug delivery, reduced systemic toxicity, enhanced BBB penetration in the domain of neurodegenerative disorders. Drug target to the brain remains challenging for hydrophilic and macromolecular drugs from crossing into CNS which urges the need of different routes, nanocarriers and nanostructures for reducing the key hallmarks of neurodegeneration. The key signs of degeneration of the brain such as oxidative stress, protein aggregation, and neuroinflammation, can be modulated by modified nanoparticles while enabling sustained and controlled drug release. Large-scale clinical translation, long-term toxicity, and biocompatibility are still issues in spite of these developments. To improve targeting effectiveness, optimise nanomaterial properties, and guarantee human application safety, more research is essential. The management of neurodegenerative diseases could potentially be entirely transformed by combining nanotechnology with genomics, AI, and personalised medicine. The latest developments in nanotechnology-based approaches, their therapeutic ramifications, and the obstacles that need to be overcome for clinical success are examined in this chapter.

Keywords: *AI, BBB, CNS, Dendrimers, Nanotechnology, Neuroinflammation*

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Innovative SNEDDS for Targeted and Personalized Drug Delivery"

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Abstract: Self-Nanoemulsifying Drug Delivery Systems (SNEDDS) resulted in innovative approaches for improving the bioavailability and solubility of poorly water-soluble drugs. Conventional SNEDDS provide several benefits, such as improved dissolution and medication absorption rates. However, because of the less precise release of drug at the location of action, traditional targeted drug delivery is limited. In recent times, additional focused advancements, such as innovative materials for new SNEDDS formulations, smart delivery systems, and personalised medicine, have emerged as a result of advances in treatment innovation. This chapter will discuss the most recent advances in SNEDDS, namely stimuli-responsive SNEDDS, which play a role in drug release in response to different environmental stimuli such as pH, temperature, as well as enzyme activity. Targeting ligands like as peptides, nanoparticles, or monoclonal antibodies are used to deliver antineoplastic medications more effectively, minimising systemic adverse effects. The prospective use of artificial intelligence (AI) along with machine learning (ML) in developing SNEDDS formulations is underlined as a foundation for predictive modelling for stability augmentation, absorption, and personalisation. Furthermore, personalised SNEDDS accelerates the arrival of competent rapid care by incorporating pharmacogenomic data, making it relevant in providing prescription formulations to a single patient with enhanced efficacy and fewer side effects. Despite these gains, several challenges remain, which include formulation stability, suitable scaling, as well as regulatory approval. However, with breakthroughs in research and multidisciplinary collaboration, the successful translation of novel SNEDDS into the clinic may pave the way for new-generation drug delivery systems which are more effective, patient-centered, and therapeutically relevant.

Keywords*: SNEDDS, Bioavalability, Targeted drug delivery, Personalised medicines, Stimuli- responsive delivery, Artificial intelligence (AI), Machine learning (ML), Controlled drug release.*

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Innovative Strategies in Ocular Drug Delivery: From Basic Formulations to Advanced Technologies

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Abstract: Ocular drug delivery presents unique challenges due to the eye's complex anatomy, protective barriers, and rapid clearance mechanisms. These factors limit drug absorption and therapeutic effectiveness. Traditional formulations, such as eye drops and ointments, often have poor bioavailability. To tackle these challenges, researchers have developed innovative drug delivery technologies that enhance drug retention, prolong therapeutic effects, and improve patient compliance. Advanced strategies, including nanoparticles, liposomes, and microneedles, show significant potential in overcoming ocular barriers by enabling controlled and sustained drug release. Nanocarriers enhance drug solubility, enable targeted delivery, and reduce side effects while improving therapeutic efficiency. Additionally, novel approaches such as contact lens-based drug delivery, implantable drug-eluting devices, and gene therapy are emerging as revolutionary solutions for treating chronic and degenerative ocular diseases. These cutting-edge technologies not only optimize drug delivery but also minimize the frequency of administration, leading to better patient adherence and improved treatment outcomes. This study provides a comprehensive analysis of the evolution of ocular drug delivery systems, ranging from conventional formulations to the latest technological breakthroughs. Future research and clinical development in this field will play a crucial role in advancing ophthalmic therapies, ultimately facilitating more effective, patient-friendly, and long-lasting treatments.

***Keywords**: Ocular drug delivery, nanoparticles, liposomes, microneedles, bioavailability, nanoemulsions*

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Immuno-Oncology Agents for Cancer Therapy

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Abstract: Despite the introduction of T-cell engagers (TCE) and checkpoint inhibitors (ICI), focusing on the immune system has shown to be a successful cancer treatment approach. Additionally, a record number of new investigative agencies and businesses are joining the IO industry. "Exactly what makes I-O transformative?" is a subject that several stakeholders have been thinking about in response to continuous efforts to create value assessments for innovative therapeutics. Assessing the unique qualities and characteristics of various treatments. The immune oncology mechanism and the various IO agents and their functions as immune oncology agents will be covered in this book chapter. We aimed to provide an objective, neutral, scientifically curated, and timely updated review of all the current IO agents in clinical development and the clinical trials testing these agents to assist the main stakeholders in the field in understanding the most recent IO landscape. Our evaluations were founded on data gathered from a wide range of reliable and open sources.

A more accurate description of the advantages of I-O therapy will enable a more comprehensive evaluation of those advantages, serve as a model for the planning and ranking of upcoming clinical trials, and give health insurance companies a road map for maximizing coverage for patients with cancers that qualify for I-O therapy.

Keywords: *Immunotherapy, immune-oncology, Carcinogenesis, leukemia*

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Wearable AI – An Innovative Approach to Healthcare

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Abstract: Artificial Intelligence (AI) is transforming various industries, with healthcare being one of the most impacted. AI refers to the simulation of human intelligence in machines, enabling them to learn, analyze, and make decisions. The integration of AI with wearable technology has revolutionized the health industry, offering real-time monitoring, early disease detection, and personalized treatment solutions. Recent advancements in AI-powered healthcare include smartwatches detecting irregular heart rhythms, biosensors for continuous glucose monitoring, and AI-driven ECG patches for cardiac health assessment. Innovations such as AI-integrated smart glasses assist visually impaired individuals, while AI-enhanced hearing aids improve auditory experiences. These technologies enable remote patient monitoring, reducing hospital visits and ensuring timely medical interventions. AI's role in healthcare extends to chronic disease management, predictive analytics, and post-surgical recovery tracking. Machine learning models analyse health patterns to predict potential risks, while wearable devices assist in managing diabetes, hypertension, and neurological disorders. AI-powered telemedicine and virtual health assistants further enhance patient care by offering remote consultations and medication reminders. Despite its potential, wearable AI faces challenges such as data privacy concerns, high costs, and accuracy limitations. Ensuring secure patient data, improving affordability, and enhancing AI reliability remain critical. Future advancements, including non-invasive diagnostics, AI-driven implants, and 5G-enabled connectivity, promise to make healthcare more accessible and efficient. With continuous innovation and responsible AI integration, wearable AI is set to redefine healthcare, making it smarter, predictive, and patient-centric.

Keywords: *Artificial Intelligence, AI-driven ECG patches, AI integration, AI faces challenges*

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Rheumatoid Arthritis: Pathophysiology, Diagnosis, and Emerging Therapeutic Strategies

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Abstract

Rheumatoid arthritis (RA) is a chronic autoimmune disorder marked by ongoing joint inflammation, synovial hyperplasia, and the erosive destruction of cartilage and bone. Dysregulated immunological processes are the principal pathogenic factors, encompassing the activation of autoantibodies such as rheumatoid factor (RF) and anti-citrullinated protein antibodies (ACPAs). The inflammatory cascade triggers excessive cytokine synthesis, notably tumor necrosis factor-alpha (TNF-α) and interleukins, resulting in pain, stiffness, and functional impairment of the joints. The etiology of RA remains multifaceted, with genetic predisposition, environmental influences, and epigenetic modifications as the primary contributors. Early diagnosis and categorization criteria encompassing clinical signs, serologic markers, and imaging techniques are crucial in preventing irreversible joint degeneration. Traditional therapy techniques encompass disease-modifying antirheumatic medications (DMARDs), nonsteroidal anti-inflammatory medicines (NSAIDs), glucocorticoids, and biologic therapies targeting principal inflammatory pathways. Recent advancements in precision medicine, including Janus kinase (JAK) inhibitors and tailored synthetic DMARDs, have improved patient outcomes by offering more effective and personalized treatment options. Notwithstanding significant progress, difficulties like as medication resistance, adverse effects, and sustained illness management persist.

Keywords: *Rheumatoid Arthritis, Disease-modifying Antirheumatic Medications (DMARDs), Autoimmunity, Inflammatory cytokines, Precision medicines*

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Nanorobotics in Cancer Treatment: A Revolutionary Approach

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Abstract: Cancer remains a leading global health challenge, causing millions of deaths each year. Addressing it requires innovative approaches to improve early detection, enhance treatment precision. Nanorobotics is an emerging field with the potential to transform cancer diagnosis and treatment. Nanorobotics must operate at the atomic, molecular and cellular level, typically ranging in size from 1 to 100 nanometer. They can easily travel in the blood stream to reach the target site. Nanorobots can perform number of functions such as medicine delivery, surgical procedure, recognize cancer cell biomarkers, monitoring and diagnosis and photothermal therapy etc. These microscopic machines, engineered at the nanoscale, are designed to navigate the human body, detect cancer cells, and deliver targeted therapies with high accuracy. Nanorobots can be categorized into biological (DNA-based, protein-based), synthetic (carbon nanotubes, quantum dots), and hybrid nanorobots, each tailored for specific medical applications. Protein-based molecular nanorobots can convert the chemical energy ATP (adenosine triphosphate) into mechanical motion. The nanorobot is designed with blood energy harvesting capability and the accumulation of electricity in a capacitor, that forms the main body of the nanorobots. Most of these nanorobots function as targeted and self-propelled smart nano-carriers or nano drug delivery system, enhancing the efficiency and safety of chemo-radio or photodynamic therapy. Despite their potential, nanorobots face challenges like biocompatibility, immune responses, and high costs. Future advancements in AI, biomimetic materials, and self-powered systems aim to enhance precision, enabling safer, more effective, and targeted cancer treatments with reduced side effects.

Keywords: *Nanorobotics, Photodynamic therapy, Carbon nanotubes, Cancer*

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Unlocking the Therapeutic Potential of Boswellia serrata: Discovering its Medicinal Properties and Health Benefits as a Natural Remedy

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Abstract: Boswellia serrata, a revered herb in traditional Ayurvedic medicine, has been employed for centuries to alleviate various health ailments. This comprehensive review endeavors to unlock the therapeutic potential of Boswellia serrata by delving into its medicinal properties and health benefits.

A thorough examination of existing literature reveals that Boswellia serrata possesses potent anti-inflammatory, antioxidant, and anti-arthritic properties, rendering it an efficacious remedy for conditions such as arthritis, asthma, and inflammatory bowel disease. Moreover, the herb has demonstrated anti-cancer, anti-diabetic, and neuroprotective effects, underscoring its potential as a natural remedy for promoting overall well-being.

The review also highlights the herb's potential in addressing modern health concerns, such as stress, anxiety, and digestive disorders. Furthermore, it discusses the potential interactions between Boswellia serrata and conventional medications, emphasizing the need for further research.

Keywords: *Boswellia serrata, Therapeutic potential, Medicinal properties, Anti-inflammatory, Antioxidant, Natural remedy*

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Revolutionizing Pharmaceuticals: The impact of Artificial Intelligence on Research and Innovation

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Abstract: Artificial intelligence (AI) is revolutionizing the pharmaceutical industry by enhancing research and innovation processes. The integration of AI technologies, such as machine learning, natural language processing, and data analytics, is streamlining drug discovery, development, and clinical trials. By analysing vast datasets, AI can identify potential drug candidates, predict their efficacy, and optimize chemical structures, significantly reducing the time and cost associated with traditional methods. In drug discovery, AI algorithms can sift through millions of compounds to uncover novel therapeutic targets and biomarkers, enabling researchers to focus on the most promising candidates. Furthermore, AI-driven simulations and predictive modelling facilitate the design of clinical trials, improving patient selection and trial outcomes. This not only accelerates the development timeline but also enhances the likelihood of regulatory approval. AI is also transforming personalized medicine by enabling the analysis of genetic, environmental, and lifestyle factors that influence drug response. This allows for the development of tailored therapies that maximize efficacy and minimize adverse effects. Additionally, AI-powered tools are improving pharmacovigilance by monitoring real-world data to identify safety signals and adverse drug reactions post-market. Despite the immense potential, challenges such as data privacy, algorithmic bias, and the need for regulatory frameworks remain. Nevertheless, the ongoing collaboration between AI technologists and pharmaceutical researchers promises to unlock new avenues for innovation, ultimately leading to more effective treatments and improved patient outcomes. As the field continues to evolve, AI is poised to play a pivotal role in shaping the future of pharmaceuticals

Keywords: *AI, Research, Innovation, AI-Powered tools*

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Miracle Tree of Life: Harnessing the Power of Moringa oleifera for Optimal Health and Wellbeing

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Abstract: Moringa oleifera, a plant native to the Indian subcontinent, has been revered for centuries for its medicinal, nutritional, and economic benefits. This review aims to provide a comprehensive overview of the therapeutic potential, medicinal properties, and health benefits of Moringa oleifera.

A thorough examination of existing literature reveals that Moringa oleifera possesses potent antioxidant, anti-inflammatory, and antimicrobial properties, making it an effective remedy for various health conditions, including diabetes, hypertension, and cancer. The plant's leaves, seeds, and pods are rich in essential nutrients, including vitamins, minerals, and amino acids.

The review also highlights the potential of Moringa oleifera in addressing modern health concerns, such as obesity, cardiovascular disease, and mental health disorders. Furthermore, it discusses the potential applications of Moringa oleifera in food, cosmetics, and pharmaceutical industries.

This review provides insights into the potential of Moringa oleifera as a natural remedy for promoting optimal health and wellbeing, and highlights the need for further research to fully explore its therapeutic potential.

Keywords: *Moringa oleifera, Miracle Tree, Therapeutic potential, Antioxidant, Anti-inflammatory, Natural remedy*

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Synthesis, characterisation, computational approach and priliminary resulted pharmacological activity of Thiazolidinone containing drug compounds

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Abstract: Thiazolidinone derivatives are a class of heterocyclic compounds with significant therapeutic potential, owing to their diverse pharmacological activities, including antimicrobial, anti-inflammatory, anticancer, and antidiabetic properties. The synthesis of thiazolidinone-containing drug compounds has garnered significant interest in medicinal chemistry due to their unique structural features and bioactive potential. This review explores the various synthetic routes employed for the preparation of thiazolidinone derivatives, highlighting the use of one-pot reactions, cyclization methods, and modifications of starting materials to obtain target molecules with optimal properties. The characterization of these compounds is typically carried out using a combination of spectroscopic techniques such as NMR, IR, UV-Vis, and mass spectrometry, which confirm the structure and purity of the synthesized compounds.Computational approaches have been extensively used to predict the pharmacological behavior of thiazolidinone derivatives, including molecular docking, quantum mechanical calculations, and molecular dynamics simulations. These techniques help to understand the binding affinity of the compounds to specific biological targets, as well as the stability and reactivity of the compounds in various environments. The computational studies complement experimental findings, providing insights into the molecular interactions that govern the pharmacodynamics of thiazolidinones. Preliminary pharmacological evaluations of thiazolidinone-based compounds have shown promising results in various in vitro and in vivo models. For example, certain derivatives exhibit significant antibacterial and antifungal activities, while others demonstrate potent antioxidant, antidiabetic, and anticancer effects. These findings suggest that thiazolidinone derivatives hold substantial promise as lead candidates for the development of novel therapeutic agents. In conclusion, thiazolidinone-containing drug compounds represent a dynamic and versatile class of molecules with a wide range of pharmacological properties. The combination of synthetic strategies, advanced characterization techniques, computational modeling, and early-stage pharmacological screening paves the way for the rational design and development of thiazolidinone-based therapeutics with improved efficacy and safety profiles.

***Keywords*:** *Thiazolidinone, pharmacological evaluations, pharmacodynamics , therapeutics*

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Allicin and Cardiovascular Health: A Natural Remedy for Hypertension and Cholesterol

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Abstract: Allicin, a sulfur-containing bioactive compound derived from garlic (*Allium sativum*), has garnered significant attention for its potential cardiovascular benefits. This chapter explores the therapeutic role of allicin in managing hypertension and cholesterol, two major risk factors for cardiovascular diseases. Allicin exerts its antihypertensive effects by promoting vasodilation through nitric oxide modulation, reducing oxidative stress, and inhibiting the renin-angiotensin system. Additionally, its hypocholesterolemic properties stem from its ability to inhibit hepatic cholesterol synthesis, enhance bile acid excretion, and modulate lipid metabolism. Several clinical studies have demonstrated that regular consumption of garlic or allicin supplements can reduce systolic and diastolic blood pressure and improve lipid profiles, including lower total cholesterol, LDL cholesterol, and triglyceride levels. Furthermore, allicin's antioxidant and anti-inflammatory properties contribute to endothelial function and overall cardiovascular protection. Despite these promising effects, factors such as bioavailability, dosage standardization, and potential interactions with anticoagulants require further investigation. This chapter provides a comprehensive review of the mechanistic insights, preclinical and clinical evidence, and future prospects of allicin as a natural remedy for cardiovascular health, emphasizing its potential integration into therapeutic strategies for hypertension and hyperlipidemia management.

Keywords: *Allicin, Hypertension, Cholesterol, Cardiovascular health, Garlic*

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Advancing Patient Care: The Impact of Evolving Pharmacy Practice

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Abstract: The contemporary healthcare landscape necessitates essential shift in pharmacy practice, moving beyond traditional dispensing roles to embrace advanced, patient-centered models. This abstract explores the different aspects of advanced pharmacy practice (APP) in optimizing therapeutic outcomes and enhancing patient well-being. APP encompasses a range of expanded roles, including medication therapy management (MTM), collaborative practice agreements (CPAs), and pharmacist-led clinics. MTM empowers pharmacists to conduct comprehensive medication reviews, identify drug-related problems, and optimize medication regimens, leading to improved adherence and reduced adverse events. CPAs facilitate interprofessional collaboration, granting pharmacists prescriptive authority and enabling them to manage chronic diseases, such as diabetes and hypertension, in partnership with physicians.

Pharmacist-led clinics demonstrate significant improvements in disease management through patient education, medication adjustments, and ongoing monitoring. The integration of pharmacogenomics into clinical practice allows for personalized medication selection and dosing, minimizing adverse drug reactions and maximizing therapeutic efficacy. Evidence consistently supports the positive impact of APP on patient outcomes, including improved glycemic control, blood pressure management, and anticoagulation safety. By leveraging their expertise in pharmacotherapy, pharmacists play a crucial role in enhancing medication safety, reducing healthcare costs, and promoting patient-centered care. This abstract underscore the importance of fostering the continued development and implementation of advanced pharmacy practice models to meet the evolving needs of patients and the healthcare system.

Keywords: *pharmacy practice, adverse drug events, medication safety*

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Addressing Schizophrenia in the Elderly: Advances and Best Practices in Geriatric Healthcare

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Abstract: Schizophrenia is a chronic and disabling mental disorder affecting millions worldwide, including a growing elderly population. According to research, CTE progresses over time as a result of anomalies in the brain, with genetic, autoimmune, and psychological impacts among the contributing variables. Cognitive impairment (memory and attention deficiencies), negative symptoms (emotional withdrawal, loss of desire), and positive symptoms (hallucinations, delusions) are the three categories of symptoms. Healthcare advancements center on novel treatments including intranasal implanted drug delivery devices, individualized medication informed by CYP2D6 enzyme analysis, and early diagnosis using biomarkers and neuroimaging.

In addition to comorbidities, drug sensitivity, and age-related cognitive loss, treating schizophrenia in the elderly poses special difficulties. Customized pharmaceutical and non-pharmacological treatments, such as cognitive-behavioral therapy, lower-dose antipsychotics, and organized social support, are all part of geriatric healthcare. Programs for caregiver and family education aid in stress reduction and enhance treatment compliance. Furthermore, digital rehabilitation techniques like virtual reality and serious games are becoming popular ways to improve older patients' quality of life and cognitive function. Optimizing the treatment of schizophrenia in older populations requires a comprehensive, multidisciplinary strategy that incorporates medical, psychosocial, and technological approaches.

Keywords: *Geriatric Healthcare, Cognitive Impairment, Biomarkers, Personalized Medicine, Digital Rehabilitation, Caregiver Support*

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Polymeric nanoparticles in sunscreen: a cutting-edge approach in cosmetics for melanoma prevention

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Abstract: Melanoma, the most lethal form of skin cancer is primarily induced by prolonged ultraviolet (UV) radiation exposure leading to oxidative stress, DNA mutations and immune dysregulation. Conventional sunscreens suffer from low efficacy, rapid degradation, inadequate skin retention, poor photostability, frequent reapplication needs and potential systemic absorption necessitating advanced photoprotective strategies. Polymeric nanoparticles (PNPs) offer a transformative approach in cosmetic science as sunscreen formulations offering superior UV shielding, enhanced skin retention, controlled release and permeation of active ingredients. Biodegradable polymers such as poly(lactic-co-glycolic acid) (PLGA), chitosan and polycaprolactone (PCL) serve as effective carriers for UV filters like titanium dioxide (TiO_2), zinc oxide (ZnO) and natural antioxidants improving photostability while minimizing skin irritation and systemic toxicity. Additionally the encapsulation of antioxidants and anti-inflammatory agents strengthens melanoma prevention by mitigating UV-induced damage and supporting immune surveillance. Beyond sun protection polymeric nanoparticle-infused cosmetics offer multifunctional benefits including prolonged efficacy and enhanced skin aesthetics. Despite their promising potential, challenges such as large-scale production, regulatory approval and long-term safety assessments remain critical for clinical translation. This review highlights the role of PNP-based sunscreens as a next-generation cosmetic innovation for melanoma prevention, emphasizing the need for further research to optimize their formulation, biocompatibility and therapeutic potential.

Keywords: *Polymeric nanoparticles, Sunscreen, Melanoma, UV protection, Photostability, Cosmetics*

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Vaccine Evolution: Pioneering Designs and Delivery Strategies

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Abstract: The design of vaccines has been completely transformed by recent developments in molecular genetics, immunology, structural biology, bioinformatics, and nanotechnology. New immunogens, enhanced adjuvants, and sophisticated immunological monitoring methods have all resulted from these advancements. However, a lack of knowledge about the fundamentals of human vaccinology makes it difficult to turn these discoveries into effective vaccinations. For vaccine development to be successful, a deeper understanding of protective immunity, immune evasion tactics, and immune response regulation is essential. For long-term protection, next-generation vaccines need to stimulate both effector and memory immune responses. Important issues like immune evasion and pathogen diversity have been addressed by emerging technology. Recombinant vaccination platforms provide improved immunogenicity and precisely tailored immune activation. These platforms include viral vectors, DNA and mRNA vaccines, and formulations based on nanoparticles. To increase vaccination stability and efficacy, these strategies combine synthetic biology, computer modeling, and optimal delivery methods.

Formulation methods enhance bioavailability and antigen release, ensuring a strong immune response. Systems biology and AI optimize antigen selection and predict immune responses, advancing vaccine design. These innovations promise safer, more efficient, and accessible vaccines, revolutionizing global immunization efforts. Next-generation techniques will boost conventional vaccine efficacy and accelerate pandemic responses, strengthening disease prevention and global health security.

Keywords: *Next-generation vaccines, Immunogens, Vaccine adjuvants, Recombinant Vaccine, Immune evasion, Synthetic biology, Nanoparticle formulations, Antigen selection.*

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Role of Nanomedicine in cancer treatment

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Abstract: Cancer is regarded as the most hazardous disease in the world. The incidence and mortality of cancer have been rising annually in recent years. However, traditional treatments like immunotherapy, chemotherapy, and gene therapy have drawbacks such poor targeting, medication deterioration, and unintended adverse effects. The low toxicity, bioavailability, and targeting, nanomedicines represent a new alternative. Nanomedicine has enormous potential to enhance cancer detection, therapy, and patient outcomes as science and technology advance, bringing us one step closer to a time when cancer can be controlled more successfully and with fewer adverse effects. The potential of various nanomaterials, such as organic, inorganic, and composite nanoparticles, to overcome the drawbacks of traditional treatments is being investigated. Nanomedicine has enormous potential to enhance cancer detection, therapy, and patient outcomes as science and technology advance, bringing us one step closer to a time when cancer can be controlled more successfully and with fewer adverse effects. There is great potential for improving therapeutic outcomes when using nanomedicine in oncological treatment. Although there are still challenges in translating preclinical research into clinical settings, nanotechnology is steadily advancing and will improve the efficacy of immunotherapy, gene therapy, and chemotherapy, creating new avenues for personalized cancer treatment. The advancements in nanotechnology have led to the creation of agents in nanomedicine, which have proven to be effective as a promising therapeutic tool in the treatment of many cancer types. With further research aiming at improving therapeutic efficacy and delivery mechanisms, the future of nanomedicine in cancer treatment appears bright.

Key words: *Nanomedicine, nanomaterial, immunotherapy, gene therapy*

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Probiotics, Prebiotics, and Synbiotics: A Holistic Approach to Immune Health

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Abstract: The gut microbiota has a significant impact on both innate and adaptive immunity, which in turn shapes immunological responses. Diet, lifestyle, and external environmental factors all influence the dynamic relationship between the immune system and microbiota. New developments in probiotics, such as genetically modified strains and next-generation probiotics (NGPs), have encouraging medicinal promise for immunological regulation. At the same time, prebiotics have drawn interest due to their ability to specifically encourage the growth of beneficial microorganisms; new compounds and tailored nutrition plans are two important developments in this field. In the field of microbiome research, synbiotics—a blend of probiotics and prebiotics—offer specific health advantages through clever formulations. These developments have important ramifications for medicinal uses and functional meals. The promise of microbiota therapies in illness prevention and management has been highlighted by their exploration of immune response modulation in infectious and autoimmune diseases. The effectiveness of these strategies in boosting immunological health is revealed by recent clinical research. The most recent advancements in probiotics, prebiotics, and synbiotics are covered in this review, with a focus on how they affect immune system performance and illness prevention. The possibility of developing new therapeutic approaches and individualized health interventions increases with the integration of recent advancements in microbial science.

Keywords: *Microbiota, Short-Chain Fatty Acids (SCFAs), Bifidobacterium, Probiotics, Prebiotics, Galactooligosaccharides (GOS), Synbiotic*

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Plant Power: Natural Approaches to Skin Cancer Prevention

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Abstract: Skin is the uppermost layer of the body that protects us from ultraviolet rays, sunlight, pollution, and microbes. The incidence of skin cancer is increased day by day due to the exposure of skin to harmful ultraviolet rays, fitzpatrick skin, alfresco occupation, papillomavirus and skin diseases are various factors responsible for the onset of skin cancer. Skin cancer cause 6,850 deaths in 2025. Skin cancer affects approximately 2.6 percent of Europeans, 0.1 percent of Africans and Americans, and 0.6 percent of Hispanics. There are two types of skin cancer melanoma and non-melanoma skin cancer. In non-melanoma skin cancer, epidermal cells are affected, about 70-75% of basal cells and 20-25% of squamous cells are responsible for skin cancer. Skin cancer can be treated surgically, with radiation, or by administering a chemical dose. Chemotherapeutic agents have severe side effects as well as a slew of other issues, natural approaches to various cancers may be preferable. Plants produce chemical complexes obtained from their roots, bulbs, barks, leaves, and stems and show strong influence in fighting cancer or acting as lead compounds in developing new medicines.

Keywords: *Melanoma, non-melanoma, fitzpatrick skin, Chemotherapeutic agents, Plants product.*

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Therapeutic Insights into *Aegle Marmelos*: A Natural Approach to Disease Management

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Abstract: *Aegle marmelos* (Bael) is one of the most well-known medicinal plants with tremendous therapeutic possibilities. Traditionally, it has been extremely revered in Ayurveda, Siddha and other indigenous medicinal systems for the treatment of various diseases, including gastrointestinal disorders, infections and metabolic diseases. The presence of its diverse pharmacological activities is due to the presence of bioactive compounds in this plant, such as alkaloids, flavonoids, tannins, and coumarins. This chapter illustrates its high efficiency, when comes to antioxidant, anti-inflammatory, antimicrobial, and antidiabetic activities among others, establishing this compound as a new leading molecule in natural medicine. *Aegle marmelos* also has hepatoprotective, cardioprotective, and immunomodulatory activity, adding up to its medicinal value. Modern applications of *Aegle marmelos* extend beyond traditional usage and find their way into pharmaceutical formulation, nutraceuticals, and cosmeceuticals. This plant's gathering increasing attention in herbal drug development and functional food products. But, given its considerable therapeutic potential, rigorous clinical trials and data standardization need to be carried out to prove its efficacy and to use it safely in conventional medicine. This chapter focuses on the phytochemistry, pharmacological properties, and modern applications of *Aegle marmelos*, highlighting its potential as a health care tool and future research opportunities. Due to the prevailing trend of herbal medicine and natural therapeutics, *Aegle marmelos* has an appreciable potential in drug discovery of new therapeutic agents.

Keywords: *Aegle marmelos*, *Medicinal plants*, *Phytochemicals*, *Antioxidant activity*, *Traditional medicine*, *Herbal formulations*

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Integrations of AI in Advancing Pharmaceutical Field

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Abstract: Artificial Intelligence (AI) is transforming the discovery and development of new medicines. AI tools, such as machine learning and data analysis, enable scientists to identify potential drug candidates more quickly and accurately. These tools analyse vast amounts of data, predict drug interactions, and help select the most promising compounds for further testing, saving both time and costs compared to traditional methods. One major advantage of AI in medicine is its ability to accelerate drug discovery. AI can analyse molecular structures and suggest potential new medicines, reducing the need for lengthy and expensive laboratory experiments. Additionally, AI enhances clinical trials by selecting suitable patients, monitoring treatment outcomes, and predicting side effects. By optimizing trial design, AI increases the chances of success while minimizing failures. AI also plays a crucial role in personalized medicine by tailoring treatments to individual patients based on their genetic makeup, environment, and lifestyle. However, challenges remain, including data privacy concerns, regulatory compliance, and ensuring AI's accuracy. To address these issues, collaboration among researchers, companies, and regulators is essential for the safe and effective implementation of AI in medicine. In conclusion, AI is revolutionizing drug research by making it faster, more cost-effective, and personalized. As AI technology advances, it will continue to drive the development of better medicines and improved healthcare solutions for all.

Keywords: *Pharmaceutical Research, AI, Drug Research, ADME, Clinical Trial*

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Exploring the Anti-cancer Potential of Pyrazole-Based Compounds: (SAR) Structure-Activity Relationships and Therapeutic Promise

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Abstract: In the drug discovery field, pyrazoles and their derivatives have garnered many attentions, particularly in the development of novel anticancer medicines. With three carbon atoms and two nitrogen atoms inside ring, these five-membered aromatic heterocyclic compounds have a unique structure that contributes to their polarity and reactivity. Pyrazoles are versatile frameworks for drug discovery because of their wide range of biological activities, which include anti-inflammatory, anticancer properties. Therapeutic promise of several pyrazole-based drugs has been highlighted by their approval for clinical use, including celecoxib and crizotinib.

It is easier to create tailored anticancer drugs since the pyrazole ring can accept a variety of replacements. Pyrazoles have recently been found to be strong inhibitors of key cancer targets, such as tubulin, c-Met, and VEGFR-2, all of which are important for angiogenesis, tumor growth, and metastasis. Additionally, pyrazole derivatives, a particular class of pyrazoles, have shown strong anticancer activity and the ability to inhibit the growth of tumor cells. Their structure-activity relationship (SAR) has provided valuable information for improving the anticancer efficacy of these molecules. Pyrazoles are a class of chemicals with a broad pharmacological profile that show great promise for future research in cancer treatment. This could lead to the development of new, more potent, and selective anticancer medicines.

Keywords*: Pyrazole, Anti-Cancer, c-Met receptor, VEGFR-2 receptor, Tubulin Polymerization.*

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Regulatory and ethical considerations for drug delivery system for anticancer drugs

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Abstract: Cancer can be understood as a complex disease condition characterized by uncontrolled growth of abnormal cells caused by tissue injury. Uncontrolled cell division and resistance to cell death are the main hallmarks and multiple approaches have been developed including chemotherapy, radiotherapy and surgical treatments. These have been plagued by the frequency and severity of side effects and patient discomfort. The major challenge is cells can resist apoptosis and develop tolerance. The research in the field of oncology stands as a beacon of hope and innovation which is the ultimate need of the hour. Cancer targeting by multiple drug delivery systems, owing to their selective targeting, efficacy, biocompatibility and drug payload, provides an attractive alternative treatment. The bioavailability and stability of drugs are crucial issues and there are numerous challenges with oral delivery leading to biocompatible nano-drug delivery systems such as lipid, polymeric, and hybrid nanocarriers. Besides the scientific pursuit regulatory and ethical considerations are mandatory. Prioritizing patient well-being is the foremost ethical principle by weighing the potential benefits against the risks. Informed consent before participating in a clinical trial with comprehensive information about the study, its potential risks, and benefits must be shared. It is important to ensure equality and diversity and no discrimination on race, gender, or socioeconomic status. Upholding research ethics and maintaining transparency in research findings is a vital ethical duty. Avoiding conflicts of interest such as financial ties to pharmaceutical companies in the best interest of patients must be maintained. Researchers must try to create a balance between scientific progress and ethical considerations. The role of the USFDA in the regulation of anticancer drug therapies is immense. It summarizes interactions with public, the pharmaceutical industry, academia, government agencies and patient. Regulatory and ethical considerations in oncology clinical research must remain at the forefront. Giving priority to patient's well-being, upholding research ethics, and striking a balance are all essential facets of this challenging yet hopeful journey. The ultimate goal is to provide innovative anticancer treatment regimen with companion diagnostics that are truly beneficial for patients.

Keywords: *Cancer, uncontrolled cell division, multiple drug delivery systems, regulatory and ethical considerations*

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Nutrition and its Impact on Health

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Abstract: Nutrition plays a crucial role in maintaining overall health and well-being. A balanced diet provides essential macronutrients—carbohydrates, proteins, and fats—as well as micronutrients, including vitamins and minerals, which are vital for physiological functions. Proper nutrition supports immune function, enhances cognitive performance, regulates metabolism, and reduces the risk of chronic diseases such as obesity, diabetes, cardiovascular disorders, and certain cancers. Malnutrition, including both undernutrition and overnutrition, leads to severe health consequences, affecting physical growth, mental development, and overall quality of life. Dietary patterns, including the Mediterranean diet, plant-based diets, and nutrient-dense meal plans, have been linked to improved health outcomes. The gut microbiome, significantly influenced by diet, plays a pivotal role in digestion, immunity, and even mental health. Lifestyle factors, such as physical activity and hydration, further contribute to nutritional status and overall health. Recent advancements in nutritional science highlight the importance of personalized nutrition based on genetic, metabolic, and lifestyle factors. Public health initiatives focus on promoting nutrition education, food security, and healthy eating habits to combat malnutrition and diet-related diseases. As global dietary patterns shift, there is an increasing need to address nutrition-related health concerns through policy-making, awareness campaigns, and individual dietary choices. Understanding the relationship between nutrition and health is essential for fostering a healthier society and enhancing life expectancy.

Keywords: *Nutrition, Health, Diet, Chronic Diseases, Metabolism, Gut Microbiome, Nutritional Science, Public Health, Personalized Nutrition, Malnutrition.*

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In-vitro evaluation of the anti-arthritic activity of hydroalcoholic extract of seeds of *Aesculus Indica* Colebr

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Abstract: Rheumatoid arthritis (RA) is a chronic autoimmune disorder that leads to joint inflammation, pain, and disability. Conventional treatments, while effective, are often associated with adverse effects and high costs, highlighting the need for alternative therapeutic approaches. *Aesculus indica* Colebr., commonly known as Indian horse chestnut, has been traditionally used for its medicinal properties, particularly in managing inflammatory conditions.

The present study investigates the in-vitro anti-arthritic potential of the hydroalcoholic extract of *Aesculus indica* seeds. Phytochemical analysis confirmed the presence of bioactive compounds known for their anti-inflammatory and antioxidant properties. The extract was evaluated using HRBC membrane stabilization, protein denaturation inhibition, and DPPH radical scavenging assays to assess its potential to reduce inflammation and oxidative stress.

The results demonstrated promising anti-arthritic activity, supporting the traditional use of *Aesculus indica* in managing RA. These findings suggest that the plant extract could serve as a natural alternative for arthritis treatment. Further, in-vivo studies and clinical investigations are required to establish its therapeutic efficacy and safety for potential pharmaceutical applications.

Keywords: *Rheumatoid arthritis, HRBC membrane stabilization, Aesculus indica*

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Herbal Medicated Chewing Gum: A Novel Approach to Drug Delivery and Wellness"

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Abstract: The study and development of oral medication has advanced recently due to scientific and technical advancements. The results of these investigations show how crucial the oral route is for patients. The precision of medication administration is critical for achieving a good therapeutic effect in a variety of pharmaceutical products. As a drug delivery method, herbal medicated chewing gum (HMCG) has gained widespread acceptance in the clinical and pharmaceutical domains. Compared to traditional oral treatments, this method provides benefits for both local treatment and systemic effects via absorption through the buccal, sublingual, and gastrointestinal tracts. It is an innovative drug delivery system that combines the therapeutic benefits of medicinal herbs with the convenience of chewing gum. Various herbal extracts, including those with antimicrobial, anti-inflammatory, and analgesic properties, have been incorporated into chewing gum formulations. This review explores the formulation techniques, evaluation parameters, and therapeutic applications of HMCG, highlighting its potential as a novel and effective alternative to conventional dosage forms in herbal medicine.

Keywords: *Herbal medicated chewing gum, Drug delivery system, Buccal absorption, Herbal extracts, Patient compliance, Oral health,*

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Artificial Intelligence in Healthcare

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Abstract: Simulating human cognitive processes is the goal of artificial intelligence (AI). The rapid advancement of analytics techniques and the growing availability of healthcare data, it is bringing about a paradigm shift in the healthcare industry. We examine the state of AI applications in healthcare now and talk about their prospects. AI is applicable to both organized and unstructured healthcare data. Popular artificial intelligence (AI) approaches include natural language processing for unstructured data and machine learning techniques for structured data, such as the traditional support vector machine and neural network and the more recent deep learning. Cardiology, neurology, and cancer are three major illness areas that use AI techniques. Researchers and medical professionals are paying attention to artificial intelligence (AI) in the healthcare industry. Few prior research has examined this subject from a multidisciplinary standpoint, encompassing the fields of accounting, business and management, decision sciences, and health. Artificial intelligence (AI) has been developing rapidly in recent years in terms of software algorithms, hardware implementation, and applications in a vast number of areas. In this paper, we provide an overview of the most recent advancements in AI applications in biomedicine, such as living aid, disease diagnosis, biomedical information processing, and biomedical research. This review aims to maintain pace of current scientific achievements, comprehend the technologies that are available, recognize the enormous potential of AI in biomedicine, and inspire researchers in related fields. One may argue that the use of AI in biomedicine is still in its infancy, much like AI itself. Rapid advancements are anticipated shortly, and new advances and breakthroughs will keep pushing the boundaries and expanding the application of AI. To demonstrate the prediction of epileptic seizure events and the filling of a defective bladder, two case studies are presented.

Keywords: *Artificial intelligence, Healthcare, Biomedicine, Technologies, Medical*

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Revolutionizing Blood Cancer Treatment: Nanotechnology to Targeted Delivery at Sites and Detection of Early Cancers

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Abstract: Leukemia, lymphoma, and multiple myeloma are all blood cancers that arise in the bone marrow and lead to disruption of hematopoiesis by leukemic cell overproduction. All these cancers also lead to disruption of immunity and normal blood cell formation with severe physiological implications. Conventional therapies like chemotherapy, radiation, and bone marrow transplantation have enhanced survival but are generally characterized by severe side effects because they are non-selective. Nanotechnology has, in the last few decades, transformed blood cancer diagnosis and treatment by facilitating targeted drug delivery platforms, reducing toxicity, and enhancing therapeutic effectiveness. Nanoparticles, liposomes, and polymer-based delivery systems increase drug bioavailability and allow for targeted tumor delivery with reduced normal cell toxicity. Furthermore, nanotechnology-based imaging modalities facilitate early diagnosis and real-time tracking of disease development, thereby facilitating personalized treatment regimens. Immunotherapies and gene editing technologies like CAR-T cell therapy and CRISPR have also facilitated increased utilization of precision medicine in hematologic malignancies. Nanotechnology integration into immunotherapeutic regimens could potentially enhance prognosis in patients as well as the rate of relapse. In this review, blood malignancy pathophysiology, traditional treatment barriers, and emerging nanotechnology-based diagnostic and therapy modalities are discussed. Studies on targeted therapies ongoing will enhance specificity and therapy efficacy, long term reshaping blood cancer management in the next few years.

Keywords: *Leukemia, Blood Cancer, Nanotechnology, Targeted Therapies, Immunotherapy, Hematopoiesis*

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An Investigation on Startup Growth and Innovation Strategies

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Abstract: India is emerging as a global hub for innovation and entrepreneurship, driven by a gowing startup ecosystem. Initiatives like India's Startup India program have significantly boosted the startup ecosystem by easing compliance procedures, providing funding, and encouraging innovation. Successful startups often benefit from robust funding sources and mentorship, which enhance strategic decision-making, scalability, and market positioning. Case studies of successful Indian startups, for instance, companies like Flipkart, Ola (Mobility), Zerodha (FinTech) and Byju's (EdTech), illustrate real-world applications of innovation and customer-centric strategies. Startups face numerous challenges, including financial constraints, market competition, regulatory hurdles, and talent acquisition. However, government policies play a pivotal role in fostering entrepreneurship by offering tax incentives, funding support, and streamlined business regulations. Marwari business houses, like the Birla Group, exemplify strong CSR practices, diversified investments, and financial discipline. A proposed Startup Success Model (SSM) integrates innovation across economic, technological, organizational, societal, and environmental factors to foster sustainable growth. These include market demand, Research and Development, leadership, education, regulatory support, and sustainability-driven innovations. This framework helps understand how controllable variables (like leadership quality) and independent variables (such as market demand) influence dependent variables (outcomes like revenue growth), facilitating strategic planning and decision-making. This study addresses a gap in understanding how startups integrate digital technologies with organizational culture to achieve growth. It concludes that effective strategies for startup growth involve digital transformation, innovation management, and strategic planning. The societal impact includes promoting economic growth through innovative businesses, enhancing digital literacy, fostering collaborative innovation ecosystems, and encouraging sustainable practices. These outcomes contribute to societal benefits such as job creation, technological adaptation, and environmentally responsible business practices.

Keywords: *Innovation, startup, business growth, scalability, technology, funding, validation, economic development*

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Pharmacological Potential of *Elaeocarpus ganitrus*: A Comprehensive Review with Insights from Animal and Docking Studies

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Abstract: *Elaeocarpus ganitrus*, or Rudraksha, is a medicinal plant in Ayurvedic medicine that has been used traditionally for its spiritual and medicinal properties. In accordance with past usage, chemical structure, and present scientific research—namely, in silico docking analysis and animal models—this review evaluates its potential pharmacology. *E. ganitrus* is reported to have been employed since ancient times to cure neurological and psychiatric diseases such as hypertension, stress, anxiety, depression, and epilepsy. It is also well known for its nephroprotective, immunostimulatory, antibacterial, anti-inflammatory, antidiabetic, and anti-ulcer activities. Numerous bioactive metabolites like alkaloids (e.g., rudrakine and elaeocarpine), flavonoids (e.g., quercetin), tannins, and indolizidine alkaloids have been reported from phytochemical investigation, which is credited with its broad range of medicinal actions. Pharmacological research proved that it is endowed with anxiolytic, anti-diabetic, CNS depressive, and gastroprotective activities. Histopathological examination testified to the strong anti-ulcer activity of the *E. ganitrus* methanolic extract. Central role of its constituents (lupeol, ursolic acid) interacting with M3 cholinergic receptors was also confirmed by in silico docking experiments, which indicate its anticancer therapeutic and gastroprotection potential. Apart from that, green synthesis of silver nanoparticles using extracts of *E. ganitrus* also displayed superior antibacterial, antifungal, and anticancer activity. The research unravels the potentiality of the plant to replace the synthetic drugs with its medical versatility and justification for its traditional applications. Nevertheless, additional advanced clinical trials would be needed to confirm its efficacy and safety. From this vast study, *E. ganitrus* hold the potential for new pharmacologic therapies.

Keywords- *Elaeocarpus ganitrus, Rudraksha, Pharmacological potential, in silico docking, Neuropharmacology*

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Immunization for Disease Prevention

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Abstract: One of the most effective and reasonably priced methods in public health history is vaccination. Given that vaccinations prevent millions of illnesses, disabilities, and deaths annually, they are the most effective way to avoid infectious diseases. Additionally, vaccines are now available to prevent a variety of autoimmune, non-infectious, and even cancerous disorders. The development of new generation vaccines and the changing epidemiological profile of many diseases that can be prevented by vaccination have led to a considerable shift in the objectives and focus of today's immunization policy. Immunocompromised patients must receive vaccinations to prevent infection-related morbidity and mortality. Immunization programs have reduced childhood mortality, enhanced primary care infrastructure in developing nations, and enabled women to better plan their families, all of which have had positive effects on health, society, and the economy. Because vaccinations reduce illness and mortality, they contribute to economic growth worldwide. It has been estimated that vaccinations yield an annual return on investment of 12% to 18%. A longer life expectancy is a result of vaccination. It is increasingly understood that wealth fosters health, and long, healthy lives are a requirement for prosperity. Therefore, vaccines are effective instruments to lessen health inequities and income disparities. Improving the usage of current vaccinations and creating new ones are effective ways to lower the prevalence of diseases that can be prevented and the fatalities that result from them.

Keywords*: Vaccination, diseases, immunity, policies, health*

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Molecular Mechanisms and Treatment Strategies for Hyperpigmentation

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Abstract: Human skin pigmentation and melanin synthesis vary greatly and are impacted by UV exposure, genetics, and some drugs. Hyperpigmentation, in which pigment seems to overflow, and hypopigmentation, in which pigmentation is reduced, are the two primary forms of skin pigmentation. Albinism, melasma, vitiligo, Addison's disease, post-inflammatory hyperpigmentation, medication interactions, dermatitis, and acne vulgaris are the most common skin pigmentation disorders in clinical practice. The dermatological disease known as hyperpigmentation of the skin causes the skin to become darker or discoloured. Hyperpigmentation disorder treatments frequently have low patient compliance and take a very long time to show effects. Various antioxidant therapies have been found to be effective in treating hyperpigmentation in numerous trials; in this review, we mainly focus on Niacinamide, vitamin C, glutathione, and vitamin E etc. Everyone should use sunscreen and photoprotection to protect themselves from UV and visible light. The initial line of treatment for hyperpigmentation is the topical use of conventional medications such as hydroquinone, kojic acid, and glycolic acid. Oral formulations of therapeutic agents like as tranexamic acid, melatonin, and cysteamine hydrochloride are next administered. second-line strategies are laser therapy given under the supervision by experienced specialists.

Keywords: *Hyperpigmentation, photoprotection, antioxidant therapies, Sunscreens, dermatological condition*

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Application of Artificial Intelligence in Drug-Drug Interaction Prediction

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Abstract: Drug-Drug Interactions (DDIs) are a major concern in clinical pharmacology, often leading to adverse drug reactions, therapeutic failure, or increased toxicity. Conventional methods for predicting DDIs are time-consuming and limited by incomplete knowledge of drug properties. The emergence of Artificial Intelligence (AI) has revolutionized the prediction of DDIs by offering fast, accurate, and automated solutions. AI techniques such as Machine Learning (ML), Deep Learning (DL), and Natural Language Processing (NLP) play a crucial role in identifying potential drug interactions by analysing vast biomedical data, chemical structures, and pharmacological properties. AI-based models like Random Forest, Support Vector Machines (SVM), and Graph Neural Networks (GNNs) have shown remarkable efficiency in predicting both known and unknown DDIs. Additionally, NLP algorithms extract DDI information from biomedical literature and electronic health records, enhancing pharmacovigilance systems. The integration of AI in DDI prediction not only improves drug safety but also accelerates personalized medicine approaches. This chapter highlights the various AI techniques, their applications, and future perspectives in Drug-Drug Interaction prediction, paving the way for more effective and safer pharmacological therapies.

Key words*: Artificial Intelligence, Drug-Drug Interactions, Machine Learning, Deep Learning, Pharmacovigilance, Personalized Medicine*

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Biopharmaceuticals and mRNA-Based Drug Delivery Systems: A New Paradigm in Therapeutics

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Abstract: Biopharmaceuticals represent a rapidly evolving class of therapeutic agents that have transformed the treatment of various diseases, including cancer, infectious diseases, and genetic disorders. Among them, mRNA-based drug delivery systems have gained significant attention due to their high precision, scalability, and ability to induce protein expression within cells. The recent success of mRNA vaccines against COVID-19 has accelerated research into mRNA therapeutics for personalized medicine. mRNA-based delivery systems utilize lipid nanoparticles (LNPs) and other nanocarriers to protect the fragile mRNA molecule, enhance cellular uptake, and improve bioavailability. Despite their promising applications, challenges such as mRNA instability, immunogenicity, and targeted delivery remain critical areas for optimization. This chapter highlights the advancements, challenges, and future perspectives of mRNA-based drug delivery systems, emphasizing their potential to revolutionize the landscape of biopharmaceutical formulations in precision medicine.

Keywords: *mRNA therapeutics, Biopharmaceuticals, Drug Delivery Systems, Lipid Nanoparticles, Precision Medicine, Gene Therapy*

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Exploring the Link between Diabetes and Alzheimer's Disease: The Hidden Connection

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Abstract: Diabetes mellitus and Alzheimer's disease are two disorders that are quite common and have a substantial impact on the quality of life of an individual. Recent research has provided evidence that suggests there may be a connection between the two disorders. This review aims to provide a concise summary of the current understanding regarding the connection between Alzheimer's disease and diabetes. Based on the data that is now available, it appears that diabetes is linked to an increased risk of developing Alzheimer's disease. It has been demonstrated that insulin resistance and inflammation, both of which are characteristics of diabetes, have a role in the aetiology of Alzheimer's disease. In addition, the accumulation of beta-amyloid protein, which is a typical feature of Alzheimer's disease, has been associated to insulin resistance as well as inflammation. It is possible that gaining an understanding of the connection between Alzheimer's disease and diabetes could lead to the creation of innovative therapeutic approaches that can be used for the prevention and treatment of these medical conditions. Ultimately, an integrated approach combining metabolic management, neuroprotection, and personalized medicine could revolutionize the way we prevent and treat both diabetes and Alzheimer's, significantly improving patient outcomes and quality of life.

Keywords: *neuroprotection, personalized medicine, insulin resistance, Alzheimer's disease, diabetes, beta-amyloid protein, inflammation*

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Non-Animal Modelling Approaches for Testing of Drug and Drug Products

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Abstract: Non-modelling methods offer appropriate alternatives to traditional in vivo or computational modelling approaches used in the evaluation testing of pharmaceuticals and other medicinal products. These methods focus on empirical tests, biological tests, and the application of advanced technologies in order to assess the safety, effectiveness, and quality of pharmaceutical goods. Their involvement mitigate the necessity of animal models, ensure compliance with regulatory requirements, and enhance the accuracy of the results. A systematic literature review will be undertaken with the aid of PubMed, Research Gate, Science Direct and Google Scholar in finding relevant studies. A widely accepted non-modelling technique is the use of in vitro test systems, i.e., cell culture-based testing that is expected to better simulate in vivo human conditions as compared to the say animal models. These tests can assess drug's cytotoxicity, pharmacodynamics and even potential interactions thereby providing drug developers very critical information at the early stages. Another key approach is high-throughput screening (HTS) that enables rapid assessment of a large number of compounds or formulations for various biological functions, including receptor binding or enzyme inhibition. The economic model of drug testing and development as a business is greatly aided by advancements in bioinformatics and relative laboratory tools such as mass spectrometry and chromatography which provide detailed and refined information regarding the stability and composition of the drugs, even without animal models. These techniques help ascertain the degree of purity, strength, and shelf life of drugs and thus, ensure their safety and efficacy when first used on human subjects. In addition to minimizing the chances of negative effects while enhancing the positive outcomes, non-modelling methods are important for promoting greater ethics in pharmaceutical research, whiter compliance, and improving the standards of drug testing.

Keywords: *Non animal modelling, Research, Bio-informatics, Cytotoxicity, Computational technologies, alternative methods*

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Recent and Advances in the Management of Diabetic Retinopathy

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Abstract: Diabetic retinopathy (DR) is one of the most common and severe microvascular complications of diabetes mellitus, leading to irreversible vision loss if left untreated. It remains a significant global health challenge, affecting millions of people worldwide. Recent advances in the understanding of the molecular mechanisms underlying DR have led to the development of innovative diagnostic tools and therapeutic approaches. This chapter provides a comprehensive overview of the recent advances in the management of diabetic retinopathy, including pharmacological treatments, emerging drug delivery systems, and artificial intelligence-based diagnostic technologies. The role of anti-VEGF agents, corticosteroids, gene therapy, and nanotechnology-based formulations in the treatment of DR is discussed. Moreover, the integration of artificial intelligence in early detection and automated grading systems has shown promising results in enhancing screening and diagnosis. Despite significant progress, several challenges such as drug delivery limitations and personalized therapy need further investigation. This chapter highlights the current advancements and future prospects in the management of diabetic retinopathy, paving the way for innovative *and effective treatment strategies.*

Keywords: *Diabetic Retinopathy, Anti-VEGF Therapy, Artificial Intelligence, Gene Therapy, Nanotechnology, Drug Delivery Systems*

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Using mechanical engineering principles in bioprinting organs or tissue models that can be used for testing drug efficacy and safety, reducing the reliance on animal models

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Abstract: Drug testing, organ development, and tissue modeling can all be significantly improved by incorporating mechanical engineering principles into bioprinting, which lessens the need for animal models. By carefully layering bioinks made of living cells and biomaterials, bioprinting makes it possible to create three-dimensional tissue and organ models. Bioprinted tissues can be designed to replicate the mechanical characteristics of human organs, such as elasticity, stiffness, and shear stress, by utilizing mechanical engineering concepts including structure analysis, material selection, and mechanical testing. Replicating the intricate activity of genuine tissues and organs requires these qualities. In order to optimize the mechanical properties of bioprinted tissues for use in drug efficacy and safety testing, this study investigates the application of mechanical engineering. Preclinical models that are more ethical and accurate can be produced by creating tissues that more closely resemble human physiological conditions, which lessens the need for animal research. Drug interactions may be tested in a more realistic setting because to the meticulous calibration of the mechanical characteristics of bioprinted tissues, which mimic factors like blood flow, pressure and organ movement. Furthermore, this method paves the way for personalized medicine, in which tissues unique to each patient can be bioprinted to forecast how each person will react to medications. This discovery opens the door to more ethical, efficient, and dependable drug testing by utilizing mechanical engineering to improve bioprinting, providing a substitute that enhances patient outcomes and therapeutic development. In the end, combining these fields promises to revolutionize the way that drug safety and efficacy are evaluated.

Keywords: *Bioprinting, mechanical engineering, tissue models, drug testing, organ modeling, animal testing reduction, cellular bioprinting, in vitro models.*

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Albumin-based Nanoparticles: A Potential tool in targeted Drug Delivery in breast cancer

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Abstract: Breast Cancer is a serious illness in females and the top cause of death among women. Chemotherapeutic products are still unable to approach tumour tissue at sufficient levels and have some serious side effects, including immune system damage due to nonspecific targeting, inadequate solubility, and being unable to enter the core of tumours, resulting in impaired treatment with reduced dose and low rate of survival. Albumin-based nanoparticles can be engineered to recognise malignant cells and provide selective and precise medication delivery while avoiding interact with healthy cells. Albumin is a versatile and functional protein that is immunogenic, biodegradable, non-toxic, and biocompatible, more excellent stability, enhanced permeability and retention effect, and precise targeting that making it an ideal candidate for developing drug delivery systems. Albumin nanoparticles are particularly fascinating since they are well tolerated and have no negative effects. They have a high binding capacity to numerous medicines with diverse physicochemical and structural features. These characteristics sparked a lot of interest in the creation of albumin nanoparticles that could transport chemotherapeutic medications with minimal adverse effects. Various ligands can be utilised to change the surface of albumin nanoparticles, allowing tumour-targeted drug delivery. Multifunctional albumin nanoparticles are another revolutionary method for successful breast cancer therapy. By the promising use of advanced nanotechnology, the efficacy of chemotherapeutics can be improved further via different albumin-based nanoparticles targeted drug delivery approach.

Keywords: *Breast cancer, albumin nanoparticles, chemotherapy, targeted approach, biodegradable*

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Evaluation of Pharmacological Potential of Tolfenamic Acid in Traumatic Brain Injury

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Abstract: Traumatic brain injury (TBI), a number of pathogenic processes including as excitotoxicity, mitochondrial dysfunction, neuroinflammation, and oxidative stress begin. Tolfenamic acid, which is an anti-inflammatory drug used for central nervous system (CNS) disorders and cognitive dysfunctions. The main objective of this study was to understand the pathological mechanisms further and determine whether therapy with Tolfenamic acid has neuroprotective effects following TBI. Wistar Rats were randomly divided into different groups: control group, TBI+Vehicle treated group, Sham group (false injury group) and TBI+ Tolfenamic acid groups (2 doses i.e. 25 mg/kg, 50 mg/kg, i.p.). For induction of TBI, weight drop model was used and 30 minutes after TBI, the Tolfenamic acid was administered intraperitoneally. Then, the behavioural tests were performed at different time points i.e. at day 1, 7, 14 and 21. At day 21, various biochemical tests were performed to evaluate the neuroprotective effect of Tolfenamic acid after TBI. In addition to enhancing the blood-brain barrier's integrity and reducing the pathogenic effects of TBI, Tolfenamic acid also suppressed oxidative stress, oedema development and cognitive dysfunctions. These results elucidate that Tolfenamic acid protects against neurodegenerative processes and oxidative stress in animal models of traumatic brain injury.

Keywords: *Tolfenamic acid, Cognitive dysfunction, Neuroprotective response, Traumatic brain injury.*

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P-48

Herbal plants used in treatment of rheumatoid arthritis

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Abstract: Rheumatoid arthritis is a chronic, progressive, disabling autoimmune disease characterized by systemic inflammation of joints, damaging cartilage and bone around the joints. It is a systemic disease which means that it can affect the whole body and internal organs such as lungs, heart and eyes. Although numbers of synthetic drugs are being used as standard treatment for rheumatoid arthritis but they have adverse effect that can compromise the therapeutic treatment. Unfortunately, there is still no effective known medicinal treatment that cures rheumatoid arthritis as the modern medicine can only treat the symptoms of this disease that means to relieve pain and inflammation of joints. It is possible to use the herbs and plants in various forms in order to relieve the pain and inflammation in the joints. There are so many medicinal plants that have shown anti rheumatoid arthritis properties. So the plants and plant product with significant advantages are used for the treatment of rheumatoid arthritis.

Keywords: *Rheumatoid arthritis, Autoimmune disease, Herbs, Joints, Medicinal plants, Systemic inflammation*

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Harnessing Artificial Intelligence for Advancing Nanotechnology-Based Formulations

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Abstract: Artificial Intelligence (AI) is transforming the field of nanotechnology-based formulations by streamlining design, optimization, and quality control processes. Nano formulations, including nanoparticles, nanoliposomes, and solid lipid nanoparticles, offer significant advantages in drug delivery, such as improved bioavailability and targeted therapy. However, these formulations face critical limitations, including complex synthesis procedures, batch-to-batch variability, scalability challenges, and time-consuming trial-and-error optimization. AI-driven techniques, such as machine learning, deep learning, and predictive modelling, provide powerful tools to address these limitations. By analysing vast datasets, AI algorithms can predict optimal formulation parameters, enhance reproducibility, and minimize resource-intensive experimental work. Computational approaches, such as molecular docking and artificial neural networks, facilitate precise nanoparticle design, improving drug loading, stability, and release kinetics. Moreover, AI-assisted process control ensures real-time monitoring and adjustment of formulation parameters, enhancing quality assurance. This review explores the integration of AI in nanotechnology-based formulations, focusing on its role in formulation design, process optimization, and regulatory compliance. The potential of AI to accelerate formulation development while reducing costs and improving scalability is discussed. Additionally, challenges related to data availability, algorithm transparency, and regulatory acceptance of AI-driven nano formulations are highlighted. By harnessing AI's capabilities, nanotechnology can overcome existing formulation obstructions and pave the way for innovative, efficient, and personalized therapeutic solutions. This convergence of AI and nanotechnology holds immense promise for advancing drug delivery and precision medicine.

Keywords: *AI-driven nano formulations, Nanotechnology, AI algorithms*

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P-50

Importance of medication adherence in healthcare

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Abstract: The effectiveness of treatment, patient outcomes, and general public health are all greatly impacted by medication adherence, which is a crucial component of healthcare. The degree to which patients take their medications as directed, including the appropriate dosage, frequency, and duration, is referred to as adherence. Patients are more likely to have better chronic disease management, better acute illness recovery, and lower hospitalisation rates when they follow their prescribed treatment plans. Conversely, non-adherence may result in treatment failure, the advancement of the disease, and higher medical expenses. Healthcare providers frequently deal with this issue, which leads to less than ideal treatment results and costs healthcare systems money in avoidable problems. prescription adherence is affected by a number of factors, such as forgetfulness, complicated prescription schedules, side effects, a lack of knowledge about the condition, financial limitations, and a lack of confidence in medical professionals. Healthcare providers are essential in helping patients overcome these obstacles by teaching them the value of following recommended treatments, offering support, and utilising resources like medication reminders or streamlined drug schedules. Furthermore, adherence can be improved by patient-centered care that prioritises individual needs, shared decision-making, and open communication. Ultimately, by reducing hospitalisation rates, minimising complications, and guaranteeing more effective use of resources, increasing medication adherence not only improves individual health but also lessens the overall strain on healthcare systems. Medication adherence is therefore essential to achieving the best possible health outcomes and ensuring the long-term viability of healthcare systems around the globe.

Keywords: *Medication adherence, Healthcare systems, Adherence, Non-adherence*

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Current understanding and treatment of Congestive heart failure

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Abstract: Congestive heart failure (CHF) is a complex clinical syndrome characterized by the heart's inability to pump sufficient blood to meet the body's metabolic needs. It is a major public health concern, often resulting from underlying conditions such as coronary artery disease, hypertension, or cardiomyopathy. CHF leads to fluid accumulation, pulmonary congestion, and systemic edema, presenting with symptoms like dyspnea, fatigue, and exercise intolerance. Diagnosis involves clinical evaluation, imaging studies, and biomarkers, while management focuses on optimizing heart function through pharmacological agents (e.g., ACE inhibitors, beta-blockers), lifestyle modifications, and in some cases, surgical interventions like heart transplants or device implantation (e.g., pacemakers). Early detection and treatment are vital to improve quality of life and reduce morbidity and mortality. Current research continues to explore novel therapies, including gene therapy and regenerative medicine, to offer hope for more effective long-term solution.

Keywords: *Congestive heart failure, heart failure, cardiovascular disease, coronary artery disease, hypertension, cardiomyopathy, fluid retention, dyspnea, biomarkers, pharmacological treatment, heart transplant, pacemaker, regenerative medicine*

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Antioxidant activity of *Cymbalaria muralis*

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Abstract: The aim of the current study is to evaluate the antioxidant potential of plant *Cymbalaria muralis* (family Plantaginaceae). This plant is a perennial herb which is distributed all over the world. This plant species is initially introduced in India for ornamental purpose but now it is naturalized. In India, it is traditionally used in the treatment of Diabetes. *Cymbalaria muralis* extracts (methanolic and aqueous extracts) were prepared by soxhlation, and antioxidant activity was evaluated using DPPH. % DPPH radical scavenging activity was calculated using formula: Absorbance control- Absorbance test / Absorbance control × 100. Both the extracts have possessed notable antioxidant activity. Among both extracts, methanolic extract has shown greater antioxidant activity in comparison to aqueous extract.

Keywords: *Cymbalaria muralis, extracts, DPPH, antioxidant*

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Biopolymers in Nanaotechnology

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Abstract: Nanotechnology has attracted significant interest from biopolymers owing to their inherent biocompatibility, biodegradability, and functional versatility [14]. Natural-derived macromolecules including polysaccharides (e.g. chitosan, alginate, cellulose), proteins (e.g. gelatin, silk fibroin) and nucleic acids stand as binding candidates to generate distinct nanomaterials from the natural materials with various applications. With the properties of self-assembly, stimuli-response, and bioadhesion, they have been incorporated into drug delivery systems, biosensors and tissue engineering scaffolds. The application of biopolymer-based nanocarriers for targeted and controlled drug delivery with high therapeutic efficacy and low systemic toxicity has been the most spectacular nanomedicine advancements. Stimuli-responsive nanoparticles that release drugs at specific sites in response to pH, temperature, or enzymatic activity have been developed in recent years. whereas biopolymer-based nanocomposites have been employed in gene therapy, wound healing, and regenerative medicine, and can use their structural similarity to extracellular matrix to manipulate cellular interactions. However, the scalability, stability, and mechanical properties are still challenging to systematically optimize in biopolymer-based nanomaterials. Some issues related to batch-to-batch variability, sterilization and regulatory compliance need to be addressed in order to facilitate their clinical translation. ⑷These limits can potentially be overcome by advances in nanofabrication techniques, chemical modifications, and hybrid nanostructures. We summarize recent advancements in biopolymer-based nanotechnology, including their synthetic methods, physicochemical properties, and biomedical applications.

Key words: *Biopolymers, Nanotechnology, Drug Delivery, Polysaccharides, Proteins, Biodegradability*

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Possible role of Lisinopril and Protocatechuic Acid in Scopolamine-Induced Memory Impairment in rat

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Abstract: Memory impairment and cognitive dysfunction, particularly considered as a hallmark of various neurodegenerative disorders, namely Alzheimer's disease, Parkinson's and other conditions that particularly affect certain part of brain like hippocampus in which it disturbs the normal brain functioning. When there is disruption in normal brains condition can lose the ability to recall the information correctly. The scopolamine-induced memory deficit model that widely disrupts the signalling of hippocampal acetylcholine, particularly used in study of cognitive impairment and potential therapies. Angiotensin-converting enzyme (ACE) inhibitor such as Lisinopril especially used for hypertension management and apart from this having neuroprotective potential by enhancing the cerebral blood flow, reducing the oxidative stress and also modulating the renin-angiotensin system (RAS). A natural compound, Protocatechuic Acid (PCA) have shown promising protective effect in neuronal damage that linked to the oxidative stress a key contributer in cognitive decline. The main purpose of this study is to target multiple pathways like oxidative stress, inflammation, and neurotransmitter modulation that combine aim to increase the therapeutic afficacy rather than in individual treatments.This study also investigates at whether the use of PCA and Lisinopril in together could work better or using both in separately against scopolamine-induced memory deficits.This research finds whether their complementary mechanisms may provide a novel , multi-target plan of action to reduce memory impairment, offering insights into potential treatment for cognitive disorders.Findings may provide innovative therapeutic approaches for memory related condition as well as neurodegeneration.

Keywords: *Memory impairment, Oxidative stress, neuroprotection, inflammation, Angiotensin-converting enzyme*

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Terpene- Based Antitumor Compositions: A Patent Landscape

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Abstract: Cancer is a serious public health concern and one of the main causes of mortality worldwide. Surgical removal, chemotherapy or hormonal therapy, radiation therapy, or a combination of these can all be used as treatment for cancer. But some cancer therapy poses significant challenges due to chemoresistance, high toxicity, recurrence, and metastasis.As a result, developing novel therapeutic agents for cancer remains a top priority in order to expand the variety of viable treatments.Natural products are a potential source of chemical substances, among which,one family of organic compounds that exhibits a wide range of biological activities, such as anti-inflammatory, antioxidant, and anti-cancer capabilitiesisterpenes, which make them attractive candidates for drug development. By inducing cell cycle arrest, decreasing the early phases of carcinogenesis, blocking cancer cell differentiation, and initiating apoptosis, among other ways, several terpenoids have been shown to have anticancer effects. The patent landscape pertaining to terpene-based anti-cancer formulationsis highlighted in this chapter. This analysis offers insights into the novel formulations, synthesis techniques, and therapeutic uses of terpene-based anti-cancer compounds through a thorough evaluation of patents. By means of a thorough analysis of patent databases, this chapter clarifies the wide array of terpene-derived formulations intended to target different forms of cancer. This book chapter also looks at the obstacles, opportunities for therapy, and future paths for terpene-based anti-cancer drug development and commercialization with the patent landscape analysis emphasizes the increased interest and investment in terpene-based anti-cancer compounds, as well as the various techniques and developments that are fuelling this booming field of research.

Keywords: *Terpenes, anti-cancer, patent databases, compositions, therapeutic potential*

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Therapeutic strategies for Human Metapneumovirus (HMPV)

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Abstract: In 2001, the isolation of HMPV from numerous young infants in the Netherlands led to its identification, posing a significant risk to susceptible populations. No standardized treatments exist for HMPV, except supportive care. The primary approach to managing the condition involves symptomatic treatment, achieved using over-the-counter medications to alleviate pain and temperature, alongside hydration and rest for recovery. Ribavirin, a nucleoside analogue, has demonstrated anti-HMPV activity in laboratory experiments; however, clinical investigations have produced inconsistent outcomes regarding its efficacy. Research on HMPV-specific monoclonal antibodies and RSV-targeted therapies indicates that monoclonal antibodies are therapeutically beneficial. The identical tactics employed for drug repositioning are being applied to current medications in search of anti-HMPV efficacy. Although significant progress has been made, challenges in vaccine development persist, prompting researchers to continue their efforts on live attenuated and subunit vaccine options, as well as the complexities of the immune response. Non-pharmaceutical preventive strategies, including hand hygiene, surface disinfection, and isolation during outbreaks, are crucial for mitigating the spread of HMPV, especially among younger and older demographics. Antiviral medicines that suppress viral replication and transcription, together with host-directed therapies, are anticipated to see more innovation. This chapter addressed a greater number of therapeutic modalities developed to manage the complications associated with HMPV infection.

Keywords: *HMPV, Therapies, Strategies, Transcription, Monoclonal Antibodies*

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Plasma Biomarkers for Neurodegenerative Disorders

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Abstract: Biomarkers assist in assessing disease stages, progression rates, and helps in enhancing clinical diagnosis by improving the accuracy of differential diagnoses. The main obstacle to neurodegenerative diseases diagnosis is their heterogeneity. These plasma biomarkers have greatly increased our knowledge of the temporal course, risk factors and diagnosis. Neurofilament light chain (NfL), GFAP, and amyloid-beta tau proteins are the main diagnostic markers for Alzheimer's disease (AD). Alpha-synuclein, NfL and DJ-1 are the primary biomarkers for diagnosing Parkinson's disease (PD). Mutations in TDP-43 and SOD1, neurofilament light chain (NfL), phosphorylated neurofilament heavy chain (NfH) are the Amyotrophic Lateral Sclerosis indicators. In the case of HD disease, mHTT and NfL are affected by the disease; while in the case of Multiple Sclerosis disease, NfL, GFAP, and myelin breakdown products are affected. These advancements are expediting the creation and clinical testing of therapeutic candidates, as well as the identification of patients exhibiting modest biological indicators of disease who meet the criteria for early therapeutic intervention. In this chapter, we focus on plasma biomarkers, which could be potentially useful in the daily medical practice of selected neurodegenerative diseases.

Keywords: *Biomarkers, Alzheimer, Parkinsons, Huntington, Therapeutics, Plasma*

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Mechanisms and Management Strategies for Drug-Resistant Epilepsy: Advances, Challenges and Future Directions

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Abstract: Drug-resistant epilepsy (DRE) is a severe neurological disorder with the inability to achieve adequate seizure control despite the use of several antiseizure medications. Although there are multiple drugs with different modes of action for the management of epilepsy, 20–30% of epilepsy patients are resistant to such drugs. Knowledge about DRE is important because of its significant impact on patient life. Drug resistance mechanisms in epilepsy are multidimensional and include pharmacokinetic and pharmacodynamic mechanisms, genetic and molecular determinants, and disease-related factors. Correct diagnosis of DRE depends on clinical assessment, drug testing, and other diagnostic tests to determine causative factors and customize treatment. Treatment of DRE involves pharmacotherapy, together with non-pharmacological strategies like surgery as well as emerging modalities such as gene therapy and precision medicine. Despite all these advances, optimizing treatment efficiency and availability still poses challenges. Future research directions in DRE include the discovery of new therapeutic targets, enhancing diagnostic accuracy, and the development of personalized treatments. This review emphasizes the need for a multidisciplinary approach to address the complexity of DRE with the aim of enhancing patient outcomes and the understanding of this complex condition.

Keyword: *Neurological disorder, Epilepsy, Drug-resistance, Clinical assessment, Drug testing*

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Tannins in wound healing

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Abstract: The healing of wounds (both acute and chronic) is always challenging and has become a major health concern especially in patients with diabetes. Herbal medicines are always preferable over chemical (allopathic) drugs due to wide safety margin, natural origin, less side effects etc. Secondary plant metabolites including alkaloids, saponins, tannins, terpenes etc. are of utmost significance due to their versatile biological activities. Tannins, especially tannic acid, are one of the phenol derivatives naturally produced by plants as metabolic products which possess antioxidant, antimicrobial, and anti-inflammatory properties etc. Tannins can be extracted from *Entada phaseoloides*, *Terminalia chebula*, *Lafoensia pacari*, etc. Although the exact mechanism by which tannins help in healing of wound is still not clear. But it is believed that they promote wound healing either by scavenging free radicals, by enhancing capillary vessels formation, by regulating matrix metabolism and fibroblast proliferation. Tannins activate macrophages by modulating inflammatory cytokines, growth factors and activating Erk pathway also aids in wound healing. The present study has been focused on compiling the role of tannins in treatment of wounds which can help the researchers working in this area for further development.

Keywords: *Wound, Tannins, Secondary metabolites, Antioxidant, Antimicrobial*

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Benzimidazole Moiety: Insights into Its Structural Diversity, Biological targets, and Therapeutic Applications

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Abstract: The benzimidazole moiety is a prominent heterocyclic structure that has garnered significant attention due to its diverse pharmacological properties. The main aim is to provide an in-depth exploration of the structural diversity of benzimidazole derivatives, emphasizing their modification strategies to enhance biological activity. The versatility of the benzimidazole core enables its binding to various biological targets, including enzymes, receptors, and DNA, contributing to a wide range of therapeutic applications. Notably, benzimidazole derivatives have shown efficacy in the treatment of cancers, parasitic infections, neurological disorders, and cardiovascular diseases. Moreover, the development of novel benzimidazole-based compounds continues to expand the scope of their medicinal potential. In which discussion of the chemical modifications of benzimidazole, its mechanisms of action, and the clinical advancements in its therapeutic use. In summary, the benzimidazole moiety stands as a valuable scaffold in drug discovery, offering promising possibilities for the development of next-generation therapeutics.

Keywords: *Heterocycle, Benzimidazole, SAR, Biological targets, Pharmacological activities*

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Alternative Methods for Developmental Toxicity Testing

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Abstract: The testing and analysis of developmental neurotoxicity is highly important in understanding the impact of potential chemical and environmental toxins on brain development. Analysis with model organisms like rodents provide some value, but raising them in vivo comes with extreme ethical limitations, interspecies differences, and long timelines. It is for this reason that DNT methods have been shifted to computer-aided programs (in silico) or purely in vitro testing. This chapter include: in silico and ex vivo testing with the unique use of human-induced pluripotent stem cells and neural progenitor cells. These new modified stem cells provide scientists with the hopeful ability to study other models of neurodevelopmental toxicity. Enhanced organoid models do this by augmenting the predictions of developmental toxicity through simulating multi-dimensional tissue interactions. These new techniques, together with miniature and chip organ systems, greatly enhance the precision and reliability of mechanistic studies and risk assessment. Furthermore, advancements in artificial intelligence and physiologically based pharmacokinetic or PBPK modeling enable scientists to predict a chemical's action in an organism, which enhances the ability to screen for toxicants. Because they share many genetic traits to humans, Zebrafish (Danio rerio) embryos exhibit enormous potential as do alternative cross species methodologies since they possess transparency in their brain structures and rapid development. Even so, alternative models on overwhelming neurotoxicity still face issues that relate to acceptance by regulatory bodies, validation and standardization. In this chapter, the other gaps are well articulated and some cross cutting issues such as the adoption of integrated testing strategies or ITS and equilibrium mechanisms are those undertaken for alternative methods to measure neurotoxic effects alongside or in place of the classical animal ones. These kinds of approaches contribute towards the fostering ethical methods and protecting human beings, especially children;s health from the risks posed by disorders in the brain.

Keywords: *Developmental toxicity, alternative testing methods, in vitro models, in silico models, brain organoids, neural progenitor cells, zebrafish embryos, AI in toxicology, omics technologies, 3Rs principle.*

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Role of Medicinal Plant – derived Nanoparticles Against Cancers

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Abstract: Cancer remains a leading cause of mortality worldwide, driving the quest for safer, more effective treatments. Conventional methods like chemotherapy and radiation, while potent, often result in significant side effects. Recently, nanoparticles derived from therapeutic plants have emerged as an innovative approach in cancer treatment. These nanoparticles leverage the medicinal qualities of plants combined with nanotechnology's advantages, such as enhanced bioavailability, targeted delivery, and controlled release. A comprehensive literature review was conducted using PubMed, ResearchGate, ScienceDirect, and Google Scholar to identify pertinent studies. Plant-derived phytochemicals, particularly from Curcuma longa , Withania somnifera , and Camellia sinensis , are rich in compounds that may inhibit cancer cell growth. By converting these bioactive agents into nanoparticle formats, their delivery to malignant cells can be optimized, thereby reducing collateral damage to healthy tissues. Studies suggest that plant-based nanoparticles can suppress cancer cell proliferation, induce apoptosis, and limit metastasis in various cancers, including breast, lung, and colon. Furthermore, plant-derived nanoparticles show lower toxicity and higher biocompatibility than synthetic alternatives. This review explores the mechanisms, benefits, and therapeutic potential of plant-based nanoparticles in cancer care. Understanding these mechanisms could support the development of novel, plant-derived nanotherapeutics as adjuncts or alternatives to traditional treatments, potentially leading to more personalized and minimally invasive cancer therapies. This fusion of herbal medicine and nanotechnology represents a promising direction in oncology

Keywords: *- Cancer, Nanotechnology; Phytochemicals; Apoptosis*

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The Revolutionary Impact of AI on Cardiovascular Medicine: Innovations in Drug Discovery and Treatment

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Abstract: Artificial intelligence (AI) has emerged as a revolutionary role in various disciplines, and one of its most promising applications is in the domain of drug development for cardiovascular disorders. Cardiovascular disease (CVDs), remain a leading cause of mortality worldwide, necessitating constant innovation in drug therapies. AI's integration into this field has the potential to accelerate the discovery of novel drugs, optimize treatment plans, and enhance patient outcomes. The ability of AI to process vast data set and performance complex analysis has significantly expedited the drug discovery process. Machine learning algorithms can predict potential drug candidates by analyzing molecular structures, biological interactions, and existing research data. This predictive power saves years in the traditional drug development timeline, reducing costs and increasing efficiency. In cardiovascular drug therapy, AI plays a pivotal role in tailoring treatment plans for individual patients. Machine learning models can analyze a patient medical history, genetic profile, and real time health data to recommend personalized drug regimens. As AI continues to evolve, it promises to user in new era of cardiovascular healthcare, providing more effective treatment and improving quality of life for patients around the world. The AI-driven integrated multiomic environment enables the researchers for studying the deeper phenotypic characters and bookmarks the discovery and development of the novel therapeutics.

Keywords: *Machine learning algorithms; cardiovascular disease; drug repurposing; clinical trials; phenotypic characters; multiomic environment*

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Combined Effects of Colorectal Carcinoma and Adenocarcinoma on Disease Progression and Clinical Outcomes

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Abstract: Colorectal cancer, often appearing as adenocarcinoma, is a very aggressive type of cancer that has a high risk of spreading to other parts of the body (metastasizing), making it a serious health issue. This combination of colorectal cancer and adenocarcinoma leads to a complicated situation where the cancer invades nearby tissues, affects the whole body, and spreads to other organs. Adenocarcinoma, which is the most common form of colorectal cancer, makes the disease even more harmful, causing severe problems like organ metastasis, repeated bleeding, and blockages in the intestines. This study focuses on understanding how the combination of adenocarcinoma and colorectal cancer affects the body. Colorectal adenocarcinoma, which represents the most common type of colorectal carcinoma, develops through a series of genetic and epigenetic changes that lead to the transformation of normal colonic epithelial cells into malignant cells. The findings of this study are expected to elucidate the combined effects of colorectal carcinoma and adenocarcinoma on disease progression. Because of its aggressive character and potential for broad metastases, colorectal carcinoma in conjunction with adenocarcinoma poses a considerable problem. The findings of this study emphasize the need of continual research, tailored care, and early identification.

Keywords- *Colorectal carcinoma, Adenocarcinoma, bowel obstruction*

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Pathophysiology of metabolic syndrome among premenopausal women with polycystic ovarian syndrome

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Abstract: Polycystic ovary syndrome (PCOS) is an endocrine-metabolic-reproductive condition, and is highly prevalent across the globe with 15–22% of women with child bearing age. It has diverse array of clinical manifestations, including ovulatory dysfunction, hirsutism, acne, alopecia, polycystic ovarian morphology (PCOM) and hyperandrogenism (HA). Insulin resistance (IR) and HA, being the hallmark of pathophysiology of PCOS, and gets aggravated by obesity. Other risk factors such as oxidative stress, defect in leptin-adiponectin pathway, autoimmunity, etc., too play a role in pathogenesis of PCOS. Females with PCOS are at a greater risk for metabolic syndrome (MS) or its individual components (e.g. abdominal obesity, hypertension, abnormalities of lipids, non-alcoholic fatty liver disease (NAFLD) or abnormal glucose tolerance), which can pose a higher risk for type 2 diabetes and cardiovascular disease in the future. MS is very common among women with PCOS affecting approximately 43%–47% which is approximately twice greater than that of normal women. Awaiting this scientific evidence, the clinicians should monitor patients with PCOS for metabolic dysfunction on a periodic basis and reinforce lifestyle modification and weight control at each clinical interaction. Judicious use of insulin-sensitizing agents like metformin should be considered in these patients wherever applicable. This review article focuses on pathophysiology and consequences of metabolic syndrome in PCOS.

Keywords: *Insulin resistance, Lifestyle modification, Metabolic Syndrome, Polycystic ovarian syndrome, Pathophysiology*

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Mechanisms of Drug Release from Nanostructured Lipid Carriers: Implications for Topical Antifungal Formulations

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Abstract: Nanostructured lipid carriers (NLCs) are a new generation of drug delivery systems. There are several mechanisms of drug release from NLCs, such as diffusion, lipid matrix erosion, and enzymatic degradation, and these factors work as one in the therapeutic efficacy. Passive diffusion is the principal release mechanism in which the drug diffuses from the lipid core into the skin according to concentration gradients. Fused drug or drug-enriched lipid crystals are formed in the liquid lipid matrix, and a less ordered combination of solid and liquid lipids leads to an imperfect crystalline lattice that favors a prolonged and sustained release of the drug. The enzymatic hydrolysis of lipid carriers by skin lipases is also controlled by drug release, increasing its bioavailability in the infection area. The role is also performed by the hydration and swelling of NLCs in controlling the rate of drug diffusion. Further, skin hydration is also enhanced by the occlusive nature of NLCs, which can further improve drug permeation across the stratum corneum. Extended drug retention within the infection site is guaranteed by the interaction of these mechanisms, minimizing systemic side effects and enhancing therapeutic efficacy. The mechanisms of these are known, which is vital for the development of effective NLC-formulated topical antifungal drugs.

Keywords: *Nanostructured Lipid Carriers, Drug Release Mechanisms, Antifungal Therapy, Topical Drug Delivery, Controlled Release.*

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Artificial Intelligence in Healthcare

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Abstract: Artificial Intelligence (AI) has emerged as a transformative technology in healthcare, driving advancements in patient care, operational efficiency, and drug development. Medical imaging and diagnostics, electronic health records (EHRs), robot-assisted surgery, illness prediction, drug development, and precision medicine are just a few of the vital fields in which it finds use. AI is used in medical imaging to evaluate complicated data from computed tomography (CT) and magnetic resonance imaging (MRI) images using deep learning algorithms, which enables earlier and more precise diagnosis. In a similar vein, AI improves EHR administration by finding patterns in patient data to support risk assessment and decision-making. With features like haptic feedback to increase accuracy, robotic surgical systems—which come with specialized equipment and high-definition cameras—assist surgeons in performing operations including cardiovascular, bladder, and rectal surgery. AI is also essential for anticipating conditions like diabetes, cancer, and heart problems, which allows for prompt treatment and improved patient outcomes. AI has been shown in recent research to help the treatment of chronic diseases, manage issues associated to diabetes, and identify lung cancer. By analyzing genomic, proteomic, and biological data, AI speeds up the process of finding new therapeutic targets and drug candidates. By integrating information from wearable technology and medical records to customize therapies to each patient's unique profile, precision medicine gains from artificial intelligence. All things considered, AI has enormous potential to improve healthcare's effectiveness, affordability, and accessibility, particularly in the fight against the growing number of infectious and non-communicable diseases.

Keywords: *Artificial Intelligence, chronic diseases, drug development,* diagnosis

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Role of Phytoconstituents in treatment of Urolithiasis

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Abstract: Urolithiasis, the formation of urinary stones, is a common condition that can lead to significant morbidity if not effectively managed. Phytoconstituents, bioactive compounds derived from plants, have attracted attention for their potential role in preventing and managing urolithiasis. These compounds exhibit several therapeutic properties, including anti-inflammatory, antioxidant, and diuretic effects, which may help reduce the formation, growth, and aggregation of urinary stones. Several phytoconstituents, such as alkaloids, flavonoids, terpenoids, and tannins, possess stone-dissolving properties, prevent the crystallization of urinary salts, and promote the elimination of stones through increased urine flow. This Abstract explores the mechanisms through which phytoconstituents influence the pathophysiology of urolithiasis, emphasizing their potential as natural alternatives or adjuncts to conventional treatments. Further, this abstract highlights the need for further clinical studies to validate the efficacy and safety of these compounds in the management of urolithiasis. This abstract provides a promising opportunity to improve patient outcomes in stone prevention and treatment.

Keywords*: Urolithiasis, phytoconstituents, crystallization, Diuretic*

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- Making a meaningful impact on society by organizing healthcare awareness programs designed to enhance public un derstanding and promote healthier lifestyles.
- Fostering professional ethics, effective communication skills and awareness of current trends by engaging students in lifelong learning programs.

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