PHARMA FRONTLINE



Faculty of Pharmacy Sri Adichunchanagiri College of Pharmacy





Department of

ISSUE #9

Dept. of Pharmaceutics & Regulatory Affairs



SUSTAINABILITY

- **NEPA Process**
- innovations field recent in of sustainable pharmaceuticals and pharmaceutical processes.

ARTIFICIAL INTELLIGENCE MODELS

- Introduction
- Role of AI in Medical Laws
- Al and Medical Negligence Cases in Ghana
- Ethical and Legal Considerations



EMA EUROPEAN MEDICINES AGENCY

REGUALATORY UPDATES FORUM

EMA: Shortage

EMA: CMC

EMA: GMP

USFDA

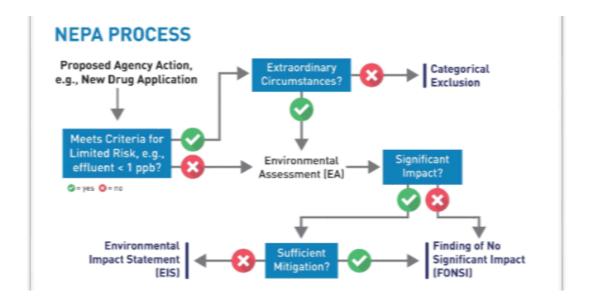
PIC/S

ICH

SUSTAINABILITY

In todays rapidly evolving world sustainability, has become a critical imperative, and healthcare is no exception, adopting sustainable practices within the healthcare sector is essential for protecting both the environment and health of future generations. We being the health pioneers must understand role of sustainable pharmaceutical practices in revolutionizing the healthcare industry by leveraging our expertise, technology and resources

Sustainable pharmaceuticals or processes has also obtained key roles in terms of various international regulatory standards for example USFDA's National Environmental Act (NEPA) 1969 this act requires all the federal agencies assess the environmental impact of their actions and to ensure that the interested and affected public is informed of the environmental analyses. This is governed by the USFDA's 21 CFR Part 25



THE RECENT INNOVATIONS IN FIELD OF SUSTAINABLE PHARMACEUTICALS AND PHARMACEUTICAL PROCESSES

The pharmaceutical industry is increasingly adopting sustainable practices to minimize environmental impact and enhance efficiency. Here are some recent innovations in sustainable pharmaceuticals:

GREEN CHEMISTRY IN DRUG DISCOVERY

AstraZeneca has integrated Green Chemistry principles into its drug discovery and development processes. This approach focuses on reducing hazardous substances, minimizing waste, and improving energy efficiency. Techniques such as late-stage functionalization allow for more sustainable modifications of drug molecules, and the use of machine learning optimizes chemical reactions, reducing waste and energy consumption.

SUSTAINABLE PACKAGING SOLUTIONS

Aluflexpack introduced the 4∞ Form, a pharmaceutical blister pack made entirely of lacquered aluminum. Aluminum's recyclability ensures that the packaging can be reused indefinitely without losing its properties, offering a sustainable alternative to traditional packaging materials.

ECO-DESIGN AND GREEN CHEMISTRY INTEGRATION

Boehringer Ingelheim is applying eco-design and green chemistry principles across the entire lifecycle of its medicines. This strategy aims to minimize environmental footprints by designing processes that are both efficient and sustainable.

FUSION-BASED MANUFACTURING TECHNOLOGIES

The adoption of fusion-based manufacturing technologies in pharmaceutical production has led to reduced environmental impact and improved drug bioavailability. By eliminating the use of solvents, these methods streamline manufacturing processes, reduce costs, and accelerate development timelines.

SUSTAINABLE PHARMACEUTICAL MANUFACTURING PRACTICES

Advancements in additive manufacturing (AM) and microfluidics are contributing to more sustainable pharmaceutical manufacturing. These technologies enable precise control over drug formulation and production, leading to reduced waste and improved efficiency.

CARBONACEOUS MATERIALS FROM WASTE PHARMACEUTICALS

Research has demonstrated that waste pharmaceuticals can be converted into carbonaceous materials through hydrothermal carbonization. These materials have potential applications in water purification, offering a sustainable method to recycle pharmaceutical waste.

These innovations reflect the pharmaceutical industry's commitment to sustainability, focusing on reducing environmental impact, enhancing efficiency, and promoting the responsible use of resources.

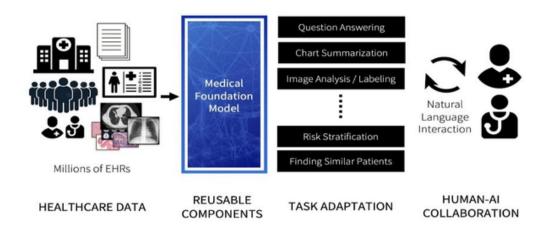
- (Dhruva R Nadig)

AI Models in Medical Laws

Provisions pertaining to liability allocation and causation are the main subjects of doctrinal study. The results of "but-for" and related tests show problems with distributed accountability and opacity in attributing algorithmic harm.

Nonetheless, provisions pertaining to proportionality and contributory culpability offer a way to achieve an equitable resolution.

Recommendations include requiring openness for medical AI approvals and codifying AI accountability through revised legislation and case law. For the benefit of the general public, it is crucial that existing laws continue to dynamically regulate evolving technologies. The goal of the analysis is to encourage regulatory changes that strike a balance between innovation, sufficient causality testing, and adaptable liability guidelines for medical harms caused by AI.



THE LEVERAGE OF AI ON ADVANCEMENT OF HEALTHCARE

INTRODUCTION

Medical laws serve as the foundation for regulating healthcare practices, protecting patients' rights, and ensuring medical professionals adhere to ethical and professional standards. In Ghana, Act 792 governs health professions and provides guidelines for handling medical malpractice. However, the complexities of medical negligence cases, coupled with increasing patient complaints, necessitate innovative approaches to legal adjudication and case management. Al models, particularly in legal and medical analytics, can enhance efficiency, objectivity, and fairness in resolving medical disputes.

The Role of AI in Medical Laws

Al models can be utilized in several aspects of medical law, including:

- 1.Legal Research and Case Analysis Al-powered legal research tools can quickly analyze past medical negligence cases, identify patterns, and provide precedents to inform legal judgments.
- 2.Risk Prediction and Prevention Al algorithms can assess medical procedures and patient data to predict potential negligence risks, assisting healthcare providers in mitigating malpractice claims.
- 3. Automated Documentation and Compliance Monitoring Al can streamline the documentation process, ensuring adherence to legal and medical standards.
- 4. Decision Support for Judiciary and Regulatory Bodies Al-driven decision support systems can provide judges and regulatory bodies with unbiased, data-driven insights for case adjudication.

Al and Medical Negligence Cases in Ghana

Despite the structured framework provided by Act 792, challenges such as prolonged legal proceedings, lack of comprehensive data analysis, and subjectivity in case rulings persist. All models can address these issues by:

- Enhancing Evidence Collection and Analysis Natural Language Processing (NLP)
 tools can extract key insights from medical records and witness statements.
- Improving Case Management Systems Al-driven platforms can categorize and prioritize cases, reducing backlog and ensuring timely resolutions.
- Facilitating Expert Testimonies AI simulations can reconstruct medical scenarios to provide clearer understanding of events leading to alleged negligence.

Ethical and Legal Considerations

While AI presents numerous advantages, its application in medical laws and negligence cases must be guided by ethical and legal principles. Key considerations include:

- Data Privacy and Security Ensuring patient confidentiality and compliance with data protection laws.
- Bias and Fairness AI models must be trained on diverse datasets to prevent bias in legal decisions.
- Accountability Establishing clear guidelines on AI accountability in legal proceedings.

ETHICAL

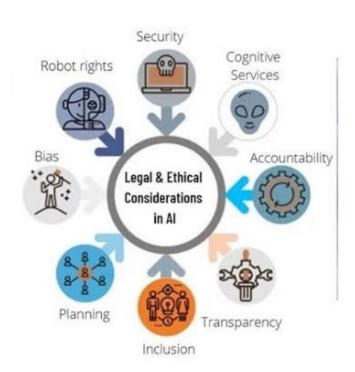
Regulation

Privacy

Mitigation of Bias

Transparency

Relavance



LEGAL
Governance
Confidentiality
Liability
Accuracy
Decision
making

-Shambhavi R

FEBRUARY 2025

REGUALATORY UPDATES FORUM

EMA: Shortage

ESMP: The European Shortages Monitoring Platform (ESMP) is live since 29 January 2025!

- Pre-live 28 November 2024 with a core set of functionalities (routine) - training session for the routine reporting of CAPs under ESMP.
- ESMP User guide for marketing authorization holders which provides guidance on the notification process
 step by step on the new platform-, and also ESMP
 Implementation Guide for National Competent
 Authorities and ESMP Implementation Guide for
 Marketing Authorisation Holders which provides
 reference codes to use.
- On 2 February 2025, the use of the platform becomes mandatory for reporting CAP shortages to EMA (national reporting requirements for MAHs remain applicable).
- In addition to routine reporting, the full version of the ESMP comprises functionalities for reporting data on nationally and CAP medicines during crisis and crisis preparedness situations for MAHs and NCAs.

• SPP&SMP:

- <u>Guidance for industry on implementing shortage</u>
 <u>prevention plans (SPP)</u>
- <u>Guidance for industry on implementing shortage</u>
 <u>mitigation plans (SMP)</u>
- A pilot on 4 molecules is on going.

Updated Union list of critical medicines

- UCML (revised December 2024) identifies essential medicines whose supply continuity in the EU is crucial to avoid shortages
- includes innovative medicines and generic medicines for human use covering a wide range of therapeutic areas – such as vaccines and medicines for rare diseases.
- Listed medicines will be prioritised for EU-wide actions to strengthen their supply chains and minimise the risk of supply disruptions
- EMA uses this list in the establishment of a product management database to support the standardisation of product information in the EU/EEA
- A Q&A document gives guidance on the methodology, the list usage, its implications for stakeholders such as MAHs, national authorities, wholesalers and distributors.

EMA: CMC

- New concept paper on the development of a guideline on assessment and reporting of mechanistic models used in the context of model informed drug development
- published for a two-month public consultation period.
- The drafting of the actual guideline will start in 2025 with expected completion in 2026.
- Mechanistic models, i.e. mathematical or computer models that integrate biopharmaceutical, physico mechanical, (patho)physiological and pharmacological processes, along with population characteristics, are frequently and increasingly used in all phases of the drug research and development life cycle.
- A new guideline on the assessment and reporting of these models is needed.
- Mechanistic models covered by this new guideline include, but are not limited to,
 Physiologically Based Pharmacokinetic (PBPK), Physiologically Based Biopharmaceutics
 (PBBM) and Quantitative Systems Pharmacology (QSP) models.

EMA: GMP

• EU GMP guide Annex 8: Sampling of starting and packaging materials: Glycerol and other excipients at high-risk of DEG/EG contamination

- Appendix 1 on Acceptable intakes established for N-nitrosamines; EMA/562717/2024 /Rev. 7) has been recently updated.
- EMA guideline on coordinating GMP inspections for centrally authorized products applies from January 2025

USFDA

- FDA issues final guidance on "Advanced Manufacturing Technologies Designation Program"
- offers a framework to request a drug manufacturing method be designated as an advanced manufacturing technology (AMT).
- should expedite development and assessment of applications
- comments received during consultation were taken into account, including clarifying:
 - the AMT designation process
 - the information that should be included in an AMT designation requests,
 - the roles and responsibilities of various entities that might be involved in the development or use of designated AMTs,
 - the relationship between the AMT Designation Program and other FDA programs addressing emerging/advanced technologies.
- FDA will provide notification when this guidance receives approval for full implementation and continues to accept requests for AMT designation.
- FDA have released a draft guidance on the use of Artificial Intelligence to support regulatory decision-making.
- emphasizes importance of defining the context of use for an AI model, and then applying a risk-based credibility assessment framework to establish and evaluate the credibility of an AI model.
- describes different options by which industry may engage with the Agency on issues related to AI model development, with an emphasis on early engagement to set expectations for the appropriate credibility assessment for a given AI tool, and to identify potential challenges.
- soliciting feedback on the credibility assessment approach, and on whether its evolving structures for AI oversight are sufficient.

PIC/S

PIC/S sets global standards for Remote GMP Inspections:

- PIC/S has issued a guidance and an aide-mémoire, applicable from January 2025, aiming for a harmonized approach among PIC/S members:
- for planning and conducting remote and hybrid assessments among PIC/S member countries.
- categorize remote assessments into fully interactive, partially interactive, and desktop assessments, depending on the level of interaction with the NCA
- common definitions and terminologies,
- recommends taking a risk-based approach to determine the suitability of a site for remote assessment.
- The aide-mémoire provides best practices for inspectors to plan, execute, and follow up on remote and hybrid assessments,

ICH

- ICH published FAQs for eCTD v4 (Topic M8): Electronic Common Technical Document (eCTD), January 20, 2025.
- includes detailed information on the benefits, implementation, and transition process of the eCTD version 4.0.
- highlights the significant advantages of this version, such as document reuse, streamlined submission processes, and improved metadata management. It explains why eCTD v4.0 is being implemented instead of updating eCTD v3.2.2, emphasizing the need for a more responsive and versatile standard. It also outlines the transition process for companies moving from prior version to the new one.

New Drug Approvals



• <u>Alyftrek</u>

Date of Approval: 12/20/2024

Active ingredient: vanzacaftor, tezacaftor, and

deutivacaftor

Treatment for: To treat cystic fibrosis

Ensacove

Date of Approval: 12/18/2024 Active ingredient: ensartinib

Treatment for: To treat non-small cell lung

cancer

• Yorvipath

Date of Approval: 8/9/2024

Active ingredient: palopegteriparatide

Treatment for: To treat hypoparathyroidism

• Leqselvi

Date of Approval: 7/25/2024 Active ingredient: deuruxolitinib

Treatment for: To treat severe alopecia areata

• Kisunla

Date of Approval: 7/2/2024

Active ingredient: donanemab-azbt Treatment for: To treat Alzheimer's

disease

• Ohtuvayre

Date of Approval: 6/26/2024 Active ingredient: ensifentrine Treatment for: To treat chronic

obstructive pulmonary disease

• <u>Unloxcyt</u>

Date of Approval: 12/13/2024 Active ingredient: lcosibelimab-ipdl Treatment for: To treat cutaneous

squamous cell carcinoma

• Rapiblyk

Date of Approval: 11/22/2024 Active ingredient: landiolol

Treatment for: To treat supraventricular

tachycardia

Highlights and Students Achievements

II Jai Sri Gurudev II

Faculty of Pharmacy Sri Adichunchanagiri College of Pharmacy



INTERNATIONAL E-CONFERENCE

EMERGING TRENDS IN **PHARMACEUTICAL** SCIENCES- RESEARCH TO MARKET

ORGANIZED BY FACULTY OF PHARMACY-SRI ADICHUNCHANAGIRI COLLEGE OF PHARMACY, B G NAGARA

DATE: 24TH & 25TH FEB 2025

Dr. Bharathi D R

ORGANIZING SECRETARY Dr. TY Pasha Dept. of Ph.Chemistry

Dr. K Naga Prashant Dept. of Ph.Chemistry





Certificate of Participation

This certificate is proudly presented to

Miss SAHANA YADAV L

Student, from Sri Adichunchanagiri College of Pharmacy had participated in the two-day International E-Conference On *EMERGING TRENDS IN PHARMACEUTICAL SCIENCES- RESEARCH TO MARKET* organized by Department of Pharmaceutical Chemistry. Sri Adichunchanagiri College of Pharmacy, Faculty of Pharmacy, Adichunchanagiri University on 24th & 25th February 2025.





Dr T Y Pasha

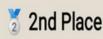




Winner - Pharmaceutics



DR.SYED AHMED IIZHAR Sultan ul uloom College of Pharmacy



POORNIMA K N

Vivekananda institute of pharmaceutical sciences



NIYATI SHAH

Subhash University CONSOLIDATE PRIZE: SAHANA YADAV

From Bench to Market: "Preclinical Evaluation and

Translation Pathway of Novel Antifungal Drug' E-Poster ID: ETPSRM-PCEU-029

METHODOLOGY

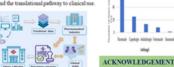
threat of antifungal resistance, coupled with limited drug riscores the urgent need for new therapeutic agents to com-ions, which cause approximately 1.5 million deaths annua on explores the preclinical evaluation and translational The preclinical evaluation of the novel antifungal drug included in vitro studies amminga oring included in vitro studies to assess activity against estistant strain, PK-PD modeling to predict clinical efficacy, and in vitvo attales to evaluate safety and effectiveness in animal models. Additionally, toxicology studies determined potential side effects, while innovative approaches explored immunotherapy and inhaled formulations as administry the transcript. ng PK-PD properties, and le



ges. Outline preclinical strategies for acy, safety, and PK-PD properties of novel



RATIONALE OF THE STUDY



RESULTS & DISCUSSION

CONCLUSION The rise of antifungal resistance highlights the need fo

Ms. Sahana Yadav L, a final-year B. Pharmacy student from the Department of Pharmaceutics, secured Consolidation Prize in the E-Poster Presentation competition at the Two-Day International E-Conference on Emerging Trends in Pharmaceutical Sciences - Research to Market, organized by Sri Adichunchanagiri College of Pharmacy on February 24-25, 2025. She presented her research titled "Preclinical Evaluation and Translation Pathway of Novel Antifungal Drug," which focused on novel antifungal agents, their preclinical evaluation, and potential market translation. She expressed her heartfelt gratitude to her mentor, Mrs. Mallamma T, Assistant Professor, Department of Pharmaceutics, for her constant guidance and support. She also acknowledged Dr. Prakash Goudanavar, Head of the Department of Pharmaceutics, for his encouragement and valuable insights. Her achievement is a proud moment for the department and serves as an inspiration for fellow students.

Faculty Achievements





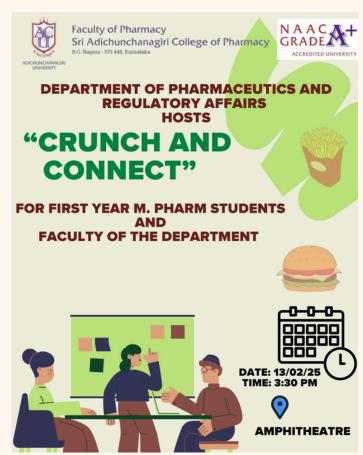




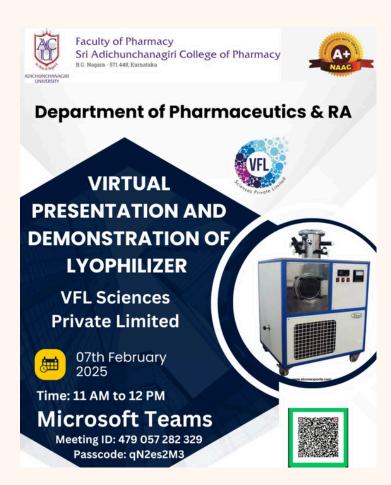




DEPARTMENT ACTIVITIES







PUBLICATIONS

Research/Review articles published -06

Ind. J. Pharm. Edu. Res., 2025; 59(1s):s138-s150.

Chitosan-Based Linezolid Dry Powder Inhalers: A Novel **Approach for Targeted Pulmonary Delivery in Tuberculosis**

Mallamma Thippeswamy¹, Girish Meravanige²-*, Predeepkumar Narayanappa Shiroorkar², Prakash Goudanavar¹-*, Nimbagal Raghavendra Naveen¹, Nagaraja Sreeharsha³

Department of Pharmaceutics, Sri Adichunchanagiri College of Pharmacy, Adichunchanagiri University, B. G. Nagar, Karnataka, INDIA.
**Department of Biomedical Sciences, College of Medicine, King Faisal University, Al-Haha, SAUDI ARABIA.
**Department of Pharmaceutical Sciences, College of Clinical Pharmacy, King Faisal University, Al-Hold, Al-Haha, Kingdom of SAUDI ARABIA.
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**The College of College of Pharmacy, King Faisal University, Al-Hold, Al-Haha, Kingdom of SAUDI ARABIA.
**The College of Pharmacy College

ABSTRACT
Introduction: Tuberculosis (TB) remains one of the leading causes of infectious deaths worldwide, ranking second only to COVID-19. The rise of Multidrug-Resistant (MDR) and Extensively Drug-Resistant (MDR) and Extensively Drug-Resistant (MDR) as the Statish highlights the critical need for novel and effective treatment approaches. Methodology: This research explores a targeted pulmonary drug delivery system using Dry Powder Inhalers (DPI) to administer the antibiotic Linezollid (Ltq) directly to the lungs. Biodegradable Microparticles (MPS) of Linezollid were synthesized using chitoson polymer via spray drying, with Critical Process Parameters (CPPs) such as inlet temperature, aspiration rate, and feed rate optimized to achieve desired Particle Size (PS) and Entrapment Efficiency (NEC). Comprehensive evaluations were conducted, including in vivo studies, stability testing, H37 RY strain sensitivity, particle size distribution, crystallinity, flow properties, and drug-polymer compatibility. Results and Discussion: The optimized batch of Linezollid (Ltq) MPs exhibited an impressive 89.57% entrapment efficiency of 19.5. These spherical particles demonstrated sustained drug release for up to 12 hr, with a process yelded of 75.91% and a moisture content of 1.58%. Importantly, the MPs showed significant inhibitory effects against the H37 RV strain of Mycobacterium tuberculosis across various concentrations. In vivo studies revealed a 55.2% increase in biosavalbality with the Ltd DPI formutation, which was 1.25 times higher than the oral tablet. Conclusion: This novel inhalation system holds the potential to reduce dosing frequency, minimizes side effects, and improve patient adherence, offering a mension effective TB management.

Keywords: Linezolid, Multi-Drug Resistant Tuberculosis (MDR-TB), Mycobacterium tuberculosis, Chitosan Microparticles, Pulmonary delivery.

Correspondence: Dr. Prakash Goudanavar Professor and Head, Department of Pharmaceutics, Sri Adichunchanag

Received: 12-07-2024: Accepted: 20-12-2024 Ind. J. Pharm. Edu. Res., 2025; 59(1s):s132-s137.

Bio-Simulation Studies of Valganciclovir Hydrochloride: Molecular Descriptor-Based QSAR Modelling and Swiss ADME Analysis Using in silico Models

Yashavanth Gangadhar¹, Amal Rasul Al Turaifi², Nimbagal Raghavendra Naveen², Prakash Goudanavar^{1, e} Santhosh Fattepur², Nagaraja Sreeharsha^{2,5,*}, Mohammed Monirul Islam⁶, Muhammad Shahzad Chohan⁶

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**Department of Pharmaceutics, Mys Siri College of Pharmacy, Off Snagarae Rande, Banagalore, Karnataka, INDIA.

**Department of Biomedical Sciences, College of Clinical Pharmacy, King Faisal University, Al-Ahsa, SAUDI ARABIA.

ABSTRACT

Alms To evaluate the pharmacokinetics and toxicity properties of Valganciclovir Hydrochloride, a potent arbitral agent, using in silico models. Background: Valganciclovir Hydrochloride is an FDN-approved antiviral agent and understanding its pharmacokinetic and toxicological properties is critical for optimizating in true. Objectives: To assess the pharmacokinetic and toxicological toxicity profile and bisactive characteristics of Valganciclovir Hydrochloride using computational in silico models. Materials and Methods: Upinsit's Rule of Five was applied to evaluate the compound's solubility and intestinal absorption properties. The drug's plasma protein binding and Blood-Brial Barrier (IBB) penetration were also assessed to understand its stitistibution profile. Clearance rates were calculated to evaluate how efficiently the compound is eliminated from the body. Additionally, the LD, value of Valganciclovir Hydrochloride was estimated using a rat toxicity model to understand its toxicity threshold. Pharmacological activities were further assessed using the PASS online severe to evaluate its bisactive properties and potential toxic effects on non-tumor cell lines. Besults: Valganciclovir Hydrochloride devisibilited high solubility and a moderate rate of intestinal absorption. The drug showed to by plasma protein binding and poor BBB penetration, suggesting that its distribution is primarily localized within the body. The compound demonstrated a low clearance rate of 5 mil. Prinkfix, Toxicity analysis revealed an estimated LD, value of 3,080,000 mg/kg via the eral route; indicating a relatively high toxicity threshold. The PASS analysis highlighted various biscartive properties without any toxic effects on non-tumor cell lines, with a Probability of occurrence (Pa) value lower than 0.5, further supporting the non-toxic profile in the compound.

Keywords: In silico Modelling, Valganciclovir Hydrochloride, Pharmacokinetics, Toxicity Assessment, Molecular Descriptor, QSAR Modelling.

Dr. Prakash Goudanavar, Professor and Head, Department of Pharmaceutics, Sri Adichunchanagiri College of Pharm Adichunchanagiri University, B.G.Na Karnataka, INDIA. Email: pgoudanavar01@gmail.com

Dr. Nagaraja Sreeharsha Department of Pharmaceutical Sc

Revised: 01-11-2024; Accepted: 12-11-2024.



Contents lists available at ScienceDirect

Journal of the Indian Chemical Society





Pro Transferosome Loaded Gefitinib Novel Tablet for pulmonary drug delivery: Optimization and characterization

Krishna Swaroop ^{1, 1}, Basavaraju S.B ^{1,} Samathoti Prasanthi ^{1, 1}, Prakash Goudanavar ^{1, 0}, Nimbagal Raghavendra Naveen ^{1, 0}, Nagaraja Sreeharsha ^{1, 1}, Girish Meravanige ^{1, 1}, Afzal Haq Asif ¹

- of Semendad Geisens, College of Medicine, King Franci University, Al-Abra, 1970, Engine of Sead Arabia of Humanisation, I delikrotherungiv Coloring of Humanis, Administratively University, Edi Kingen, Kernstella, India of Humanisation, Mel School of Humanisation Sciences, Mohan Balas University Grandidis Seri Volyveikenham College of Humanisation, Mel School of Humanisation, Series, Administrative Trades, Table of Humanisational Sciences, College of Clinical Pharmacy, King Faind University, Ad-Abra, 1974, Raphin of Seadi Anabia of Humanisational Sciences, College of Clinical Pharmacy, King Faind University, Ad-Abra, 1974, Raphin of Seadi Anabia of Humanisational Sciences, College of Clinical Pharmacy, King Faind University, Ad-Abra, 1974, Raphin of Seadi Anabia

The aim of this study is to optimize and characterize gestimis-based Peterstandersoone tablets for pulmonary drug delivery. Gestitush is a chemotherapy drug used primarily for the treatment of certain types of non-small cell lang clarcer (SGCLG). It is a member of the tyroise kinase inhibitor (TRI) class of medications. Gestitush works by targeting and inhibiting the applearmal growth factor receptor (GGRI) years last inside the which has impact on the growth and predifferation of malignant cells. The extensive nurface region of the respiratory system provides as ideal site for bocalized anti-cancer drug delivery within the lungs. Gestitush loaded Partameterosones (PT) were prepared by using rotary silm evaporation method. The Boc-behakes statistical design was utilized to optimize the formaliation and identify the variable parameters that impact the varietie size, area potential and entraprantes efficiency. Really, the formalistical Gestitush Protramsferosones was undergo direct compression method, which was evaluated for weight variation tent. Thickness tent, distances used, distingergation text, frish-bility text, and Dissolution text. The GFT-based LMBI powders, particularly 0 GFT PTS (lijed phase-to-carrier tails of 12.50 w/m), showed remarkable frombility, as indicated by a foreveale angle of proper GOR) and a caccillent compressibility index due to their small and homogeneous particle size. The prepared GFT PT had high excepanisation efficiencies (GFR) singging from 52.2 a Go 8% to 75.6 a 1.12%, with Westella sizes varing it more approached to the contraction of the contracti

nding author. Department of Pharmaceutical Sciences, College of Clinical Pharmacy, King Faisal University, Al-Hofuf, Al-Alsa, 31982, Kingdom of

d 9 September 2024; Received in revised form 22 November 2024; Accepted 8 December 2024

file online 20 December 2024
6522/O 2024 folkun Chemical Society. Published by Elsevier B.V. This is an open access article under the CC BY licens//creativecommons.org/license/by/4.0/).

European Journal of Pharmaceutical Sciences 204 (2025) 106951



Contents lists available at ScienceDirect

European Journal of Pharmaceutical Sciences



Formulation optimization of chitosan surface coated solid lipid nanoparticles of griseofulvin: A Box-Behnken design and in vivo

pharmacokinetic study Nagaraja Sreeharsha a.b.1,***, Samathoti Prasanthi 6,1, Gudhanti Siva Naga Koteswara Rao 4,

Lakshmi Radhika Gajula ", Nikita Biradar '-', Prakash Goudanavar ', Nimbagal Raghavendra Naveen '-', Predeepkumar Narayanappa Shiroorkar ", Girish Meravanige ", Mallikarjun Telsang ", Afzal Haq Asif ',

Pavan Kumar Pavagada Sreenivasalu

- ommen of Harmaconical Sciences, College of Clinical Pharmacy, King Visial University, A-Holyd, A-Holas, 31982, Kinghorn of Sasal Arabia convenes of Pharmaconics, Volya Si College of Pharmacy, Of Sociquer Rook, Benglave, 5000055, Isalia convene of Pharmaconics, Volya Sichole of Pharmaconical Sciences, Mohan Balva University (Planehals Srev Volyanikehan College of Pharmaconics, Simboline Pharmaconical Sciences, Mohan Balva University (Planehals Srev Volyanikehan College of Pharmaconics, Simboline Pharmaconics, Simboline Pharmaconics, Simboline Pharmaconics, Simboline Pharmaconics, Simboline Pharmaconics, College of Pharmacy, Chiralahoga, Kamaniaka, 577502, India connesse of Pharmaconics, Sri Addistanchangeri College of Pharmacy, Addistanchangeri College of Pharmacy, Addistanchangeri College of Pharmaconics, Sri Addistanchangeri College of Pharmacy, Addistanchangeri College of Pharmaconics, College of Medicine, King Palad University, Advisa, 19182, Small Arabia connesses of Medicine, College of Globals Harmacy, King and Charlesia, College of Harmaconics, College of Clinical Harmaconics, Advisa, 19182, Small Arabia Connesses of Medicine, College of Globals Harmaconics, College of Clinical Harmaconics, Advisa, 19182, Small Arabia Small Arabia Connesses of Medicine College of Clinical Harmaconics, College of Developerity, King Annia Charmaconics, Advisa, Small Arabia Small Arabia Small Arabia Charmaconics, College of Clinical Harmaconics, College of Developerity, King Annia Charmaconics, Advisa, Small Arabia Small Arabia Small Arabia

1. Dr. Prakash S Goudanavar, Professor & Head

2. Dr Kiran Kumar G B. Professor

3. Dr. Ravi Kumar Reddy, Professor

4. Dr. Vedamurthy Joshi, Professor

6. Dr. Madhu B K, Assistant Professor Review Article

Leveraging Magnetic Nanoparticles for modern Oncology: Revolutionary Approaches to Colorectal Cancer Treatment and Future Advancements

In Press, (this is not the final "Version of Record"). Available online 26 February, 2025

Author(s): Chethan Patil[®], Prasiddhi Naik*[®], Mallamma T and Prakash Goudanavar

Published on: 26 February, 2025 Article ID: e22106812372775

DOI: 10.2174/0122106812372775250207074104

Price: \$95

JOURNAL OF NATURAL REMEDIES

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Exploring Ispaghula Husk in Drug Delivery: A **Comprehensive Review**

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Abstract

This comprehensive review provides an in-depth exploration of Inpughala husk as a natural polymer in the pharmaceutic landscape. Beginning with an overview of natural polymers, emphasising their eco-friendly attributes, the article classifies a elucidates the significance of these polymers in pharmaceutical applications. Focused on the Inpughalo husk, the review hinto its properties, pharmaceutical applications and stability considerations. A key emphasis is placed on the Importance polymer modification in advancing formulation development, covering diverse methodologies applied to Impughala husk. The article educations various day eldevery systems formulated using this natural polymer, showcasing its adaptability is considerated using this natural polymer, showcasing its adaptability is considerated or in the control of the properties of the pro

Najor Findings: This review highlights kappaho hask as an co-friendly and biocompatible natural polymer with significant pharmaceutical applications. It possesses excellent swelling, gel-forming, and bioachesive properties, making it suitable for controlled-release and mucosdhesive drug delivery systems. Various chemical and physical modifications enhance its solubility stability, and drug-carrying capacity. Recent patients demonstrate its growing importance in novel pharmaceutical formulations Future research should focus on advanced modifications and expanding its role in innovative drug delivery platforms.

Keywords: Controlled-release, Ispaghula Husk, Natural Polymer, Polymer Modificatio

Abbreviations: APIs: Active pharmaceutical ingredients; DNA: Deoxyrbonucleic acid; FTIR: Fourier transforms infra Gram; IBS: Irritable bowel syndrome; IPN: Interpenetrating polymer network; Kcal: Kilocalorie; LDL: Low-density lipop NMR: Nuclear magnetic resonance; RNA: Ribonucleic acid; SCFA: Short-chain fatty acids; UV: Ultraviolet; XRD: X-Ray diffr

1. Introduction

The use of natural polymers in pharmaceutical drug development has gained significant importance due

by the human body, is an inherent characteristic of natural polymers. Being able to minimise the side effects and improve patient safety is vital for medication delivery

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