G. PULLA REDDY COLLEGE OF PHARMACY

(AUTONOMOUS)

Mehdipatnam, Hyderabad- 500028
Affiliated to Osmania University; Approved by PCI; Accredited by NAAC;
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ABSTRACT BOOK

One Day Seminar on

"INNOVATIONS IN PHARMACEUTICAL RESEARCH-2025

ORAL & POSTER PRESENTATIONS"

6th December 2025

Leading the Tradition of Quality & Excellence ....

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VISION

G. Pulla Reddy College of Pharmacy envisages to become the centre of excellence for research in Pharmacy. It aims to contribute significantly to drug development and drug discovery.

MISSION

G.Pulla Reddy College of Pharmacy aims to be on forefront in imparting the disciplined and quality Pharmacy education. The Graduate & Post-graduate students shall be groomed as responsible & highly acclaimed professionals in the Pharmaceutical Arena.

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B. Pharm

M. Pharm - Pharmaceutics
Pharmacology
Pharmaceutical Analysis
Pharmaceutical Regulatory Affairs

Pharm. D

TGEAPCET CODE: GPRP
TGPGECET CODE: GPRP1

INVITATION

G. PULLA REDDY COLLEGE OF PHARMACY

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Cordially invited for

One Day Seminar on

Innovations in Pharmaceutical Research- 2025

Oral & Poster Presentations

6th December, 2025 at 10:30 am

G. PULLA REDDY AUDITORIUM

PROGRAM SCHEDULE

09.30 - 10.30 A.M : Registration
10.30 - 11.00 A.M : Inauguration

Chief Guest
Prof. V. Balakista Reddy
Chairman
Telangana Council of Higher Education
Hyderabad

Guest of Honour
Dr. Ajit Nair
Head - Regulatory Sciences
Global Regulatory Division
Bristol Myers Squibb, Hyderabad

11.00 - 12.00 P.M : **G. Pulla Reddy Memorial Oration Lecture**

Distinguished Guest of Honour & Speaker
Prof. Krishna Devarakonda
M.Pharm, Ph.D, FCP. AvH Fellow
Chief Scientific Officer, 6S Pharma LLC., Belle Mead, NJ
Adjunct/Visiting Professor, University of Pacific, Stockton, CA
Topic: Drug Discovery & Development - Challenges & Opportunities

12.00 - 12.15 P.M : Tea Break
12.15 - 01.15 P.M : Lecture II

Guest of Honour & Speaker
Mr. Vivek M K Dubey
Director Product Development
Lotus Pharmaceutical Co. Ltd., Hyderabad
Topic: Evolving Global Standards - Challenges in Regulatory Affairs

01.15 - 02.00 P.M : Lunch Break
02.00 - 04.30 P.M : Research Presentations - Oral & Poster
04.30 - 05.00 P.M : Valedictory function
Prizes & Certificates Presentation

Dr. B. Madhava Reddy
Principal, GPRCP, Hyderabad

Leading the tradition of Quality & Excellence . . . .

PROF. KRISHNA R. DEVARAKONDA, M.Pharm, Ph.D. FCP.AvH Fellow
Chief Scientific Officer, 6-S Pharma Inc., New Jersey.
Adjunct/Visiting Professor of Pharmaceutical Sciences,
University of the Pacific, California, USA.

Prof. Krishna R. Devarakonda is a distinguished pharmaceutical scientist and educator with over four decades of experience spanning academia, industry, and research. He has made significant contributions to clinical pharmacology, drug discovery, and development, with expertise in designing and interpreting pharmacology-centric clinical studies for NDA and ANDA submissions.

He has held senior leadership roles including Vice President of Clinical Development and Head of Clinical Pharmacology at Mallinckrodt Pharmaceuticals, and has successfully mentored more than 25 Ph.D. candidates and 60 M.Pharm students. Currently, he serves as Founder & CSO of 6-S Pharma Inc., Senior Scientific Adviser to Sironax LLC and Isha Therapeutics LLC, and Co-Principal Investigator at Daya Drug Discoveries LLC.

Prof. Devarakonda is a Fellow of the American College of Clinical Pharmacology and recipient of numerous honours, including the Prof. M. L. Khorana Memorial Award, Mallinckrodt Innovation Award, and Covidien Innovation Award. He has authored over 200 publications, book chapters, and conference abstracts, and holds more than 10 patents.

His invited lectures worldwide have addressed topics such as precision medicine, model-based drug development, biowaivers, and translational research strategies. He has been recognized for his outstanding service to the scientific community through editorial leadership, advisory roles, and contributions to international conferences.

Beyond his professional achievements, Prof. Devarakonda is the founder of Sanatana Yoga Marg, a non-profit service organization dedicated to teaching yoga, pranayama, and meditation.

VIVEK M. K. DUBEY
Director – Pharmaceutical Development,
Lotus Pharmaceutical Co. Ltd., Hyderabad

Vivek M. K. Dubey is an accomplished pharmaceutical development leader with over 22 years of experience in research, formulation, and global product development. He has successfully directed cross-functional teams across geographies, delivering innovative formulations and complex project portfolios aligned with strategic objectives.

His scientific expertise spans oral and modified-release formulations, with a focus on advanced drug delivery technologies to improve therapeutic outcomes. Vivek has extensive experience in strategy design, project planning, budgeting, resource allocation, and risk mitigation, ensuring timely and high-quality execution of global programs. A strong advocate for regulatory compliance, he has fostered environments adhering to cGMP, GLP, HSE standards, and SOP-driven processes.

An alumnus of Mumbai University (M.Pharm, 2003) and NMIMS (Post Graduate Diploma in Management), Vivek began his career with Ranbaxy Laboratories (now Sun Pharmaceuticals) and has since contributed to leading pharmaceutical organizations including Dr. Reddy's Laboratories, Wockhardt Ltd., Jubilant Organosys, and Novartis Healthcare Pvt. Ltd.

He is credited with several patents in drug formulations and delivery systems, including innovations in stable oral benzimidazole compositions, modified-release formulations of antibiotics and muscle relaxants, and novel soft gelatin capsule technologies. His work has been published and presented at global scientific forums, reflecting his commitment to advancing pharmaceutical sciences.

DR. AJIT NAIR, M.Pharm, Ph.D. (Pharmacology)
Head – Regulatory Sciences,
Global Regulatory Division
Bristol Myers Squibb
Hyderabad.

Dr. Ajit Nair is a seasoned drug development professional with nearly three decades of experience in clinical development and medical affairs across oncology and general medicine. His career spans leadership roles in big pharma, clinical-stage biotechs, and CROs, where he has successfully guided programs through multiple phases of clinical development and regulatory interactions in diverse global settings.

He has extensive expertise in establishing and leading clinical development capabilities across the USA, EU, and APAC, managing multi-country teams of professionals, and driving innovation in regulatory sciences. His contributions are reflected in numerous publications and presentations at international scientific and medical conferences.

An alumnus of the Bombay College of Pharmacy, University of Mumbai, Dr. Nair is deeply committed to bridging academia and industry, fostering collaboration to advance drug development and patient care worldwide.

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ABSTRACTS OF ORAL PRESENTATIONS

ABSTRACTS OF POSTER PRESENTATIONS

ORAL PRESENTATIONS

PHARMACEUTICS

PCU-OP-001

ROLE OF POLYLACTIC CO GLYCOLIC ACID (PLGA) IN COSMETICS

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Poly(lactic-co-glycolic acid) (PLGA) is an FDA-approved biodegradable polymer that has emerged as a promising carrier system for controlled delivery of active ingredients in cosmetic formulations. This review synthesizes findings from multiple research articles to elucidate the multifaceted role of PLGA in modern cosmetic applications. PLGA functions primarily as an encapsulation matrix and controlled-release delivery vehicle, enabling improved skin penetration and bioavailability of cosmetic actives including antioxidants, anti-aging agents, and skin-conditioning compounds. The polymer exhibits tunable biodegradation kinetics based on the lactic acid to glycolic acid ratio, molecular weight, and particle size, allowing customization of release profiles for specific cosmetic applications. PLGA nanoparticles (typically 50â€“300 nm) demonstrate superior permeation enhancement compared to free actives, mediated through localized pH changes during polymer hydrolysis, which facilitates ionization modulation of encapsulated drugs and enhanced stratum corneum penetration. The nanoparticulate system protects labile cosmetic ingredients from premature degradation and oxidation while providing sustained release into the skin. Additionally, PLGA degrades into lactic and glycolic acidsnaturally occurring alpha-hydroxy acids with inherent exfoliating and hydrating propertiesthereby contributing additional cosmetic benefits beyond ingredient delivery. Surface modification strategies, including pegylation and ligand conjugation, further enhance targeting specificity and cellular uptake. Fabrication versatility enables production of various morphologies (nanospheres, microspheres, hydrogels) suitable for diverse cosmetic delivery applications. PLGA's biocompatibility, safety profile, and regulatory approval position it as an ideal biomaterial for functional cosmetics, particularly in anti-aging, skin-brightening, and acne-control preparations. This review highlights PLGA's potential for next-generation cosmeceutical formulations offering superior efficacy through advanced delivery technologies.

Keywords: Poly(lactic-co-glycolic acid) (PLGA), Biodegradable polymers, Nanoparticles

PCU-OP-002

3D PRINTING OF PHARMACEUTICALS

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Three-dimensional printing technology, also called as additive manufacturing technology, an emerging technology that is transforming pharmaceutical manufacturing by enabling precise, customizable drug delivery system. It allows the fabrication of complex dosage forms with tailored shapes, drug release profiles, and combinations of multiple active ingredients. Techniques such as Fused deposition modeling, Inkjet printing system support the production

of personalized medicine, improving therapeutic efficacy and patient compliance. In addition to the successful commercialization of SpritamR in 2015, there has been a succession of Triastek's 3D- printed drug applications that have received IND approval from FDA. This presentation highlights the overview on 3D printing technology, its significant potentials, advantages & disadvantages, challenges and global applications

Keywords: Three-dimensional printing, Additive manufacturing,Customizable drug delivery

PCU-OP-003

PH-SENSITIVE TUMOR-TARGETED DRUG DELIVERY

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pH is a measure of how acidic or basic a substance is. In the human body, normal tissues have a pH around 7.4, which is close to neutral. However, the tumour microenvironment is usually mildly acidic. This natural difference in pH can be used to deliver cancer medicines more accurately and safely. pH-sensitive tumour-targeted drug delivery systems are designed to respond to this acidic environment. They use nanoparticles or similar carriers that remain stable at normal pH but release the drug when they reach the acidic tumour site. This selective release helps the medicine act mainly on cancer cells while reducing harm to healthy tissues. These systems improve therapeutic efficiency by enhancing drug stability, prolonging circulation time, reducing off-target effects, and promoting better uptake inside cancer cells. This approach increases treatment effectiveness and lowers side effects, making it a promising method for targeted cancer therapy. This presentation highlights the mechanism, design principles, advantages, and recent research developments in pH-sensitive tumour-targeted drug delivery systems.

Keywords: pH, tumour microenvironment, acidic pH, nanoparticles, selective targeting

PCU-OP-004

PLGA-BASED GEFITINIB NANOCRYSTALS: EFFECT OF PERCENT GLYCOLIC ACID ON PARTICLE SIZE, DISSOLUTION, FORMULATION STABILITY, AND IN-VIVO EFFICACY

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In the given research work, a series of PLGA formulations with varying glycolic acid content was prepared and characterized. The formulations showed decreasing particle size with increasing glycolic acid content. Formulations with higher glycolic acid content (e.g., 75:25 PLGA) exhibited smaller particle sizes compared to lower glycolic acid formulations (e.g., 50:50 PLGA or 25:75 PLGA). SEM images revealed spherical, smooth surface morphology.

DSC, XRD indicated Gefitinib-loaded nanocrystals prepared using PLGA were in an amorphous or partially crystalline state. No distinct crystalline peaks were observed, suggesting that Gefitinib was primarily in an amorphous form within the PLGA matrix. In vitro dissolution studies demonstrated that formulations with higher glycolic acid content exhibited faster drug release rates compared to lower glycolic acid content. Increasing glycolic acid content enhanced the dissolution and release of Gefitinib from PLGA nanocrystals. Stability studies showed all formulations remained stable (physically, dissolution) under different storage conditions. (In-vivo) Tumour xenograft models showed that PLGA formulations with higher glycolic acid content exhibited superior pharmacokinetic profiles, enhanced tumour accumulation, and therapeutic efficacy compared to lower glycolic acid formulations, suggesting that optimizing the glycolic acid in PLGA enhances the in vivo performance of Gefitinib-loaded nanocrystals for cancer therapy. Hence, optimization and development of PLGA-based formulations for cancer treatment can be possible.

Keywords:poly(lactic-co-glycolic acid), nanocrystals, Gefitinib, tyrosine kinase inhibitor, solubility enhancement.

PCU-OP-005

BIODEGRADABLE AND STIMULI-RESPONSIVE DRUG DELIVERY SYSTEM FOR TREATMENT OF RHEUMATOID ARTHRITIS

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Rheumatoid Arthritis is a chronic and systemic autoimmune disease accompanied by inflammation. This condition causes joint pain and loss of function in patients. Treatment options for this include NSAIDS and DMARDS. This requires precise immunomodulation to avoid adverse side effects. Application of Biodegradable and Stimuli-responsive Drug Delivery Systems aids in solving this issue. These are designed to safely degrade and release therapeutic agents in response to specific stimuli like pH, redox conditions and enzymatic activity. By achieving localized and controlled release of anti-inflammatory and immunosuppressive agents, these systems minimize systemic toxicity and enhance therapeutic efficacy. I will discuss the underlying mechanisms of stimuli-responsive drug delivery system. I will address the benefits that this DDS has over conventional systems and also the challenges that come with this like biocompatibility, scalability, cost of production.

Keywords: Biodegradable, Stimuli-responsive drug delivery, rheumatoid arthritis, immunomodulation, pH sensitive, redox sensitive

PCU-OP-006

MACHINE LEARNING-ENHANCED 3D PRINTING FOR PRECISION DRUG DELIVERY SYSTEMS

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3D-printed medicines represent an innovative approach to personalized drug therapy by using additive manufacturing to create dosage forms tailored to individual patient needs. This technology allows precise control over drug dose, shape, size, and release characteristics, making it especially useful for patients requiring customized treatment, such as children, elderly individuals, and those with complex medical conditions. Various 3D-printing techniques—like fused deposition modelling, inkjet printing, and stereolithography—enable the production of tablets with multiple drugs, flexible dosing, or rapid disintegration. 3D printing also supports on-demand manufacturing in hospitals and pharmacies, reducing the need for mass production and minimizing medication waste. Additionally, it can improve patient compliance by designing user-friendly dosage forms and combining multiple medications into a single unit. Although challenges such as regulatory approval, printing accuracy, and quality control remain. 3D-printed medicines hold great potential to transform the future of personalized healthcare.

Keywords: Machine learning, 3D printing, personalized medicine, precision drug delivery, additive manufacturing, controlled release, pharmaceutical technology.

PCU-OP-008

FORMULATION DEVELOPMENT OF MUCOADHESIVE BUCCAL TABLET OF NARATRIPTAN

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It was the hope that by creating and testing mucoadhesive buccal pills, the bioavailability and therapeutic potential of Naratriptan may be enhanced for the treatment of headache. Reduced oral bioavailability is a result of naratriptan's extensive first-pass digestive system. This led to the decision to give supported drug discharge via buccal administration rather than the hepatic digesting system. Mucoadhesive buccal tablets were made using coordinate compression with a number of common and designed polymers, such as sodium starch glycolate, crospovidone, and croscarmellose sodium. Definitions were derived by analysing the following pre- and post-compression parameters: bulk thickness, thickness, point of rest; hardness, thickness, friability, medicate substance, list; medicate discharge. There was no deviation from the allowed range for any of the evaluation criteria. F4 was chosen as the best developed definition due to its remarkable mucoadhesive characteristics, maintained discharge profile, and maximum medication release of 99.72% over eight hours. The results show that Naratriptan mucoadhesive buccal tablets are a good way to treat headaches since they increase the drug's bioavailability and have delayed positive effects. Sodium starch glycol, crospovidone, croscarmellose, and naratriptan are the main terminology.

Keywords: Naratriptan,sodium starch glycolate, crospovidone and croscarmellose

PCU-OP-009

ECOFRIENDLY GREEN SYNTHESIS OF ZINC OXIDE NANOPARTICLES USING FICUS DALHOUSIEAE LEAF EXTRACT AND ITS ANTHELMINTIC ACTIVITY

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In this work, Zinc oxide nanoparticles were synthesised using Ficus dalhousieae leaf extract. The synthesised ZnONP's were characterised using X-Ray diffraction [XRD], FTIR Analysis, Scanning electron Microscopy [SEM] and UV Visible Spectroscopy. The XRD data showed that ZnO is amorphous. FTIR spectra peak at 344.4 cm^{-1} indicated absorption bands for ZnO nanoparticles. The UV Visible spectrum showed 360nm of absorption suggesting presence of ZnONP's. The nanoparticles were seen to be spherical in shape as seen by the SEM image. The anthelmintic activity evaluated using Indian earthworm showed the best results at 100ug/ml concentration of ZnO nanoparticles.

Keywords: Nanoparticles, SEM, XRD, ZnO

PCU-OP-010

NANOTECHNOLOGY: A NEW ERA IN TARGETED CANCER THERAPY

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Nanotechnology has emerged as a transformative tool in cancer therapy by enabling targeted drug delivery, improved diagnosis, and reduced toxicity. Nanotechnology offer a promise for the targeted delivery of drugs, genes and protein to tumor tissue and therefore alleviating the toxicity of anticancer agent in healthy tissues. Cancer is one of the leading causes of death worldwide. Deaths from cancer are continuously rising worldwide with a projection of about 12 million deaths from cancer in 2030. Nanotechnology is one of the most rapidly growing fields in the 21^{st} century. To subside the disadvantages of conventional cancer therapeutics, nanotechnology has been given considerable attention. This presentation highlights the role of various nanoparticles such as liposomes, dendrimers, gold nanoparticles, and polymeric carriers in enhancing therapeutic efficacy. Nanocarriers improve drug solubility, protect drugs from degradation, and selectively target tumor tissues through passive and active mechanisms. Additionally, nano-based approaches support advanced imaging, photothermal therapy, and immunotherapy. It is demonstrated how nanotechnology can help solve one of the most challenging and longstanding problems in medicine, which is how to eliminate cancer without harming normal body tissue. The unique characteristic of Nanomedicine i.e. their high surface to volume ratio enables them to tie, absorb, and convey small biomolecule

like DNA, RNA, drugs, proteins, and other molecules to targeted site and thus enhances the efficacy of therapeutic agents. Overall, nanotechnology represents a promising platform to revolutionize cancer treatment and support personalized medicine.

Keywords: Nanotechnology, Cancer therapy, Nanoparticles, Liposomes, Dendrimers, Polymeric carriers, Photothermal therapy, Immunotherapy

PCU-OP-011

MICRONEEDLE PATCHES: REVOLUTIONIZING TRANSDERMAL DRUG DELIVERY

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Microneedle technology has revolutionized the administration process of pharmaceuticals with a minimal and painless method of administering medications through the stratum corneum (the outermost layer). They create micro-channels (100 - 900 micrometres) that bypass the skin's layers, open up the dermal capillary space, and provide an avenue to deliver drugs directly into the dermis while maintaining patient comfort and compliance during treatment. There are five major types of microneedle patches: solid, hollow, coated, dissolving, and hydrogel, each with its own advantages. Recent advances in 2024-2025 demonstrate far better efficacy: over 80% efficiency in drug delivery by bubble microneedles in just 20 seconds, compared to 10% by traditional means. Main clinical applications include influenza and COVID-19 vaccines, dengue vaccine, diabetes management by insulin delivery, resistant infection treatment with antibiotics, and immunotherapy with biologics. Advantages with this technology include painless self-administration, improved patient compliance, enhanced bioavailability, 70-100%, with avoidance of first-pass hepatic metabolism. Though there are various challenges regarding the standardization of manufacturing and stability of formulation, microneedle patches have bright future commercial prospects. Vaccines and products dealing with diabetes, approved by the FDA, are expected to arrive in the market by 2026-2027. This emerging technology represents one way in which pharmaceutical research gives importance not only to therapeutic efficacy but also to patient experience, changing the face of chronic disease management and vaccination strategies around the world.

Keywords: Microneedles, Transdermal delivery, Drug Innovation, Patient Compliance, Minimally Invasive.

PCU-OP-012

NANOTECHNOLOGY BASED DRUG DELIVERY IN CANCER TREATMENT

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Abstract: Nanotechnology – Based Drug Delivery has become one of the most promising and innovative fields in modern cancer therapy, offering new possibilities for safer and more effective drug delivery system. Conventional chemotherapy has major limitations which effects several factors such as poor solubility of drugs, lack of selectivity, rapid elimination from the body, and severe toxicity towards healthy tissues. Nanotechnology-based drug delivery systems overcome these challenges by utilizing nanoscale carriers which include liposomes, polymeric nanoparticles, micelles, carbon nanotubes, and dendrimers. These nanocarriers are designed in such a way which improves the stability, bioavailability, and controlled release of anticancer drugs. Because of their small size and surface functionalization, nanoparticles can selectively accumulate into tumor tissues which enhances permeability and retention (EPR) effect, it ensures target delivery and minimize systemic side effects. Recent advancements have introduced smart and stimuli-responsive nanocarriers that release drugs only in response to specific tumor conditions such as acidic pH, elevated temperature, redox imbalance, or enzymatic activity. This controlled and precise release significantly helps and enhances therapeutic outcome and reduces the damage of healthy cells. Nanomaterials have also improved cancer diagnosis by enabling sensitive imaging, early tumor detection, and real-time monitoring of treatment progress through nano sensors and contrast agents. Despite the wide potential, though it is very advantageous there are challenges that need careful consideration, such as large-scale production difficulties, stability issues, excessive cost, regulatory barriers, and limited long-term safety data. However, Ongoing research continues to refine nanoparticle design, biocompatibility, and clinical translation. The integration of nanotechnology with personalized medicine, targeted therapy, and advanced imaging techniques is expected to shape the future of cancer management, diagnosis, and treatment. Overall, nanotechnology-based drug delivery represents a significant step forward in creating more efficient, patient-friendly, and innovative cancer treatments.

Keywords: Nanotechnology, Drug Delivery System, Cancer Diagnosis

PCU-OP-014

NANOTECHNOLOGY IN COSMETIC FORMULATIONS

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Nanotechnology has become an important advancement in the cosmetic field, offering new ways to improve the delivery and performance of active ingredients. By reducing materials to the nanoscale, cosmetic formulations can achieve better penetration, enhanced stability, and increased effectiveness. Common nanocarriers used in cosmetics include liposomes, nanoemulsions, niosomes, solid lipid nanoparticles, and polymeric nanoparticles. These systems help ingredients spread easily on the skin, protect them from degradation, and allow controlled or slow release for longer-lasting action. Because of these advantages, nanotechnology is now widely applied in anti-aging creams, sunscreens, skin-brightening products, moisturizers, and hair-care formulations.Despite its benefits, the use of nanoparticles has raised important safety concerns. Their extremely small size may allow deeper skin entry, which could lead to irritation or unwanted interactions within the body. As a result, continuous research is needed to understand their long-term effects and ensure consumer safety. Regulatory authorities also emphasize proper testing and risk assessment

before including nanoparticles in cosmetic products.The role of nanotechnology in modern cosmetics are focusing on its types, benefits, applications, and safety issues. Overall, nanotechnology provides promising opportunities to create more effective and innovative cosmetic products while stressing the need for responsible use and safety evaluation.

Keywords: Nanotechnology,Cosmeticformulations,Nanocarriers,Liposomes

PCU-OP-016

THE FUTURE OF DRUG THERAPY: AI-DRIVEN 3D PRINTING AND PERSONALISED MEDICINE

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The integration of Artificial Intelligence (AI) with Three-Dimensional (3D) printing is transforming the pharmaceutical industry, enabling faster, smarter, and highly personalised healthcare solutions. Advanced AI systems, such as Large Language Models and agent-based algorithms, are revolutionising drug development and clinical trials by predicting molecular interactions, optimising patient selection, and simulating preclinical processes. This accelerates drug discovery, reduces costs, and enhances safety and efficacy. At the same time, 3D printing allows the production of customised dosage forms, drug-releasing implants, and biocompatible scaffolds tailored to individual patient requirements. Innovative bio-inks and hydrogels, including decellularised extracellular matrices and smart polymers, are advancing regenerative medicine, supporting the engineering of skin, cardiac, and bone tissues with improved healing, angiogenesis, and functionality. Research demonstrates that 3D-printed tissue constructs combined with stem cells significantly outperform traditional treatments in clinical outcomes. Although challenges remain in material choice, regulatory approval, and maintaining cell viability, ongoing innovations in AI-driven predictions and 3D bioprinting are paving the way for precision, efficiency, and truly personalised therapies. This synergy of computational intelligence and biomanufacturing marks a transformative shift in pharmaceutical research, expanding the boundaries of modern medicine.

Keywords: Artificial Intelligence, 3D Bioprinting, Personalised Medicine, Drug Delivery Systems, Tissue Engineering, Regenerative Medicine, Agent-based Algorithms

PCU-OP-017

OCUSERTS-A NOVEL DRUG DELIVERY SYSTEM

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The field of Ocular drug delivery is one of the interesting and challenging endeavors facing the pharmaceutical scientist. The most frequently used dosage forms i.e. ophthalmic solutions and suspensions are compromised in their effectiveness by several limitations, leading to poor ocular bioavailability. In ocular inserts the films are directly applied in the cul-de-

sac,improving ocular bioavailability by increasing the duration of contact with corneal tissue, thereby reducing thefrequency of administration. Ocular inserts are defined as preparationswith a solid or semisolidconsistency,whose size and shape are especially designed for ophthalmic application (i.e., rods orshields). Ocular diseases require localized administration of drugs to the tissues around the ocular cavity. In the recent years, there has been explosion of interest in the polymer-based delivery devices. Utilization of the principles of controlled release as embodied by ocular inserts offers an attractive approach to the problem of prolonging pre-corneal drug residence times. In the present update, the authors discuss the basic concept of ocular inserts as drug delivery system and examine the few inserts, which are available in the market or are being developed by pharmaceutical companies for drug delivery. The article discusses about the various structures of the eye, its anatomy with the various diagrams of it. This article further states the classification and the various mechanisms of drug diffusion into an eye with special attention to biological/clinical performances, and potential for future applications and developments.

Keywords: Ocuserts, Drug diffusion, drug delivery

CU-OP-018

BIODEGRADABLE POLYMERS: A NOVEL APPROACH IN DRUG DELIVERY SYSTEM

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New polymers are continuously developed for new therapeutic applications. New and modified polymer chemistries that offer distinctive degradation and drug delivery are being identified and evaluated simultaneously. Biodegradable polymers have profound applications in drug delivery. For attaining sustained and controlled drug delivery, these polymers are modified to develop drug carriers such as nanoparticles, microparticles, microspheres, and matrix devices etc. This review explains the use of biodegradable polymers and their drug delivery systems for local or targeted and controlled/sustained drug/gene delivery. It explicitly presents various types of biodegradable polymers, their properties, and characterization parameters along with their promising pharmaceutical as well as drug delivery applications.

Key words: Biodegradable polymers, Drug delivery systems, Controlled release, Targeted delivery, Regenerative medicine

PCU-OP-019

ORGANOID-NANOPARTICLE MODEL: AN INNOVATIVE APPROACH FOR DRUG DEVELOPMENT AND DELIVERY

L. Jassica Rani, Sreeja Gajula, Dr. Sudha Bansal, Dr. A. Srinivasa Rao

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Nanoparticles are solid colloidal particles of size ranging from 1 to 100 nanometers made up of different materials like metals, polymers, inorganic-clay; designed for controlled and targeted drug delivery. The drug molecules are incorporated within the macromolecule for controlled release. Organoids are miniature in-vitro 3D tissues grown from stem cells that resemble the derived organs in structure and function. Organoids are used to model and study genetic or infectious diseases, metabolic disorders, organ specific disorders, cancers and neurodegenerative disorders. This technology helps to combat the drawbacks of traditional use of two-dimensional cell cultures and animal models. It can be used for drug screening for their toxicity and pharmacokinetic profile and also for precision medicine, helping in making an individualized treatment plan. It has proven to be reliable method for cancer research and drug development process. The use of 2D models provides an oversimplified environment that often leads to inaccurate understanding of behavior of nanoparticles from lab to in-vivo. Engineered nanoparticles are integrated into the organoid system for high throughput drug delivery and toxicity screening. The integrated model of organoid-nanoparticle lead to advancement in research and development of nanomedicine. The aim of this presentation is for providing insight on the working of the integrated organoid-nanoparticle and its relevance in clinical pharmacology and precision medicine, highlighting its role in cancer research. Future perspectives focus on integrating artificial intelligence and organ-on-chip platforms to further enhance predictive accuracy and clinical relevance.

Key words: Organoid, Nanoparticles, Drug delivery, Drug development

PCU-OP-020

AI IN PHARMACY

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Artificial Intelligence is rapidly transforming the pharma sector by enhancing decision making, automating complex process, and improving patient outcomes. In pharmaceutical research, AI accelerates drug discovery through predictive modelling. In hospital &community pharmacy practice, AI powered tools support medication dispensing, detecting drug-drug interaction by using software. In pharmaceutical manufacturing & quality control, AI enables process optimization, real time monitoring & reduced variability, supporting regulatory companies. Overall, AI innovations are shaping pharmacy by increasing efficiency, accuracy & personalization, ultimately contributing to safer and more effective healthcare delivery.This presentation highlights on the introduction, applications of AI in pharma & healthcare, advantages & disadvantages, current challenges, scope for further research, pharmaceutical companies that use AI.

Key words: Artificial intelligence, drug discovery, medication dispensing, quality control, process optimization, reduced variabilities, regulatory companies

PCU-OP-021

IMPLANTABLE MICROCHIP: THE FUTURISTIC DRUG DELIVERY SYSTEM

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There is no doubt that controlled and pulsatile drug delivery system is an important challenge in medicine over the conventional drug delivery system in case of therapeutic efficacy.However, the conventional drug delivery systems often offer a limited by their inability to drug delivery which consists of systemic toxicity, narrow therapeutic window, complex dosing schedule for long term treatment etc.Therefore, there has been a search for the drug deliverysystem that exhibit broad enhancing activity for more drugs with less complication. More recently, some elegant study has noted that, a new type of micro-electrochemical system or MEMS-based drug delivery systems called microchip has been improved to overcome the problems related to conventional drug delivery. Moreover, micro fabricationtechnology has enabled to develop the implantable controlled released microchip devices with improved drug administration and patient compliance. In this article, we have presented an overview of the investigations on the feasibility and application of microchip as an advanced drug delivery system.

Key words: MEMS, microchip, micro fabrication technology

PCU-OP-022

COMPARATIVE PERFORMANCE OF A BIFONAZOLE MICROSPONGE GEL AND COMMERCIAL FORMULATION FOR TOPICAL ANTIFUNGAL THERAPY

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Topical drug delivery systems require optimal rheological and release characteristics to ensurepatient compliance, stability, and therapeutic performance. This study aimed to formulate andevaluate a bifonazole-loaded microsponge gel and compare its physicochemical and rheologicalproperties with a marketed formulation. Microsponges were prepared using a quasi-emulsionsolvent diffusion technique and optimized based on entrapment efficiency, particle size, andproduction yield. The optimized formulation (B3) demonstrated high entrapment efficiency(90%) and uniform spherical porous morphology, confirmed through SEM. The microspongeswere incorporated into a Carbopol-based gel system to develop a 1% w/w bifonazolemicrosponge gel. In vitro drug release studies revealed sustained release behavior, withapproximately 80% drug release over 8 hours, compared to the faster release observed in lowerpolymer formulations. Rheological assessment demonstrated pseudoplastic behavior, where themicrosponge gel exhibited higher viscosity at low shear rates and structural flexibility understress. Compared with the marketed product, the microsponge gel

showed superior mechanicalresilience, better spreadability, and controlled deformation behavior. The findings suggest thatthe bifonazole-loaded microsponge gel offers enhanced rheological stability and sustainedrelease, making it a promising alternative to conventional formulations for effective topicalantifungal therapy.

Key words: Microsponges, Sustained release, Topical drug delivery

PCU-OP-023

APPLICATION OF CYBERSECURITY IN PHARMACEUTICAL INDUSTRY

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Cybersecurity in the pharmaceutical industry is crucial for protecting sensitive patient data, intellectual property, and critical infrastructure from threats like data breaches and ransomware. Applications include implementing network segmentation, identity and access management, and Data Loss Prevention (DLP) tools to protect R&D and manufacturing data, as well as using advanced AI and machine learning to detect and respond to cyber threats in real-time. Other applications involve using virtual patching to protect against known vulnerabilities, securing the Internet of Things (IoT) medical devices, and ensuring compliance with regulations like HIPAA and GDPR by implementing security solutions and regularly auditing third-party vendors. By applying cybersecurity across these areas, pharmaceutical companies can protect not only their financial assets and reputation but also patient safety and public health.

Key words: Cybersecurity, Patient data, Intellectual property, Data loss prevention, Vulnerabilities, HIPAA and GDPR

PCU-OP-024

ARTIFICIAL INTELLIGENCE (AI) AND MACHINE LEARNING (ML)INNOVATIONS IN PHARMACEUTICAL INDUSTRY

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Introduction: Artificial intelligence (AI) and machine learning (ML) are reshaping the pharmaceutical industry by streamlining drug discovery, enhancing clinical trial management, and enabling advances in personalized medicine.

Purpose: This presentation aims to explain the core principles of AI and ML, identify current research and development challenges within pharma, and highlight how AI/ML techniques lead to improved drug development and patient outcomes.

Method: The approach includes outlining AI/ML fundamentals, describing supervised, unsupervised, and reinforcement learning methods, and presenting real-world case studies from industry leaders, such as Insilico Medicine, DeepMind, Pfizer, Novartis, and Roche.

Result: Case studies show that AI/ML applications reduce discovery timelines, cut costs, increase the accuracy of predictions, and improve drug safety through early detection of risks and enhanced data analysis.

Conclusion: Integrating AI and ML into pharmaceutical research represents a transformative trend, supporting a future with more effective, efficient, and personalized therapeutic solutions for patients worldwide.

Key words: Artificial intelligence(AI), Machine learning(ML), Drug discovery, case studies,innovation,deep learning,clinical trials

PCU-OP-025

Fast Dissolving Oral Films

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Fast Dissolving Oral Films (FDOFs) are an innovative oral drug delivery system designed to provide rapid disintegration, improved patient convenience, and enhanced therapeutic effectiveness. These thin, flexible polymeric films dissolve within a few seconds when placed on the tongue, releasing the drug instantly without the need for water. This feature makes FDOFs especially beneficial for pediatric, geriatric, bedridden, and dysphagic patients who experience difficulty swallowing conventional tablets and capsules. The films are typically formulated using film-forming polymers such as HPMC, Pullulan, PVA, and Sodium Alginate, which contribute to strength, uniformity, and fast disintegration. Plasticizers like glycerin or polyethylene glycol improve flexibility, while sweeteners, flavors, and saliva-stimulating agents increase palatability.FDOFs are commonly prepared by solvent casting, which offers uniform drug distribution and reproducible film thickness. They provide several advantages including rapid onset of action, improved bioavailability, avoidance of first-pass metabolism, accurate dosing, and enhanced patient compliance. Fast dissolving films are being widely explored for drugs used in pain management, allergies, nausea, and neurological disorders. Recent research focuses on nanotechnology-based FDOFs, taste-masking techniques, and multilayered films to increase drug loading and stability. Overall, FDOFs represent a promising advancement in pharmaceutical formulation technology.

Key words: FDOF,Pullulan, HPMC

PCU-OP-026

LIPID-BASED NANOPARTICLES: EMERGING PLATFORMS FOR PROTEIN AND PEPTIDE DELIVERY

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Lipidic nanoparticles (LNPs) have emerged as a promising delivery system for proteins and peptides, addressing the challenges associated with their therapeutic application. These biomolecules, while offering high specificity and efficacy, are often limited by poor stability, rapid degradation, and low bioavailability. LNPs provide a protective environment, enhancing the stability of proteins and peptides during storage and transit within the body. Composed of biocompatible lipids, LNPs encapsulate therapeutic molecules, enabling controlled and targeted release. They offer advantages such as improved solubility, reduced immunogenicity, and the ability to cross biological barriers, including the blood-brain barrier. Advances in LNP design, including ionizable lipids and surface modifications, have further optimized their performance for intracellular delivery. Applications of LNPs in protein and peptide delivery span diverse therapeutic areas, including cancer immunotherapy, metabolic disorders, and infectious diseases. The recent success of LNPs in mRNA vaccines underscores their versatility and potential in modern drug delivery systems. Despite their advantages, challenges such as large-scale production, stability during formulation, and regulatory considerations remain areas of active research.Lipidic nanoparticles hold immense potential in revolutionizing the delivery of proteins and peptides, paving the way for next-generation therapeutics with enhanced efficacy and patient outcomes.

Key words: Nanocarriers, Lipidic nanoparticles (LNPs), Protein delivery, Peptide delivery, Controlled release

PCU-OP-027

PECTIN MICROSPHERES OF NSAID: FORMULATION AND EVALUATION

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Aim: The present study aimed to develop NSAID-loaded pectin microspheres for controlled drug delivery, specifically targeting the ileo-colonic region, which may be beneficial for the treatment and prevention of colon cancer. Celecoxib, a BCS Class II drug commonly used for rheumatoid arthritis and colonic cancers, suffers from poor solubility and extensive first-pass metabolism.

Methods: To overcome these limitations, pectin-based microspheres were prepared by the external gelation method using varying drug-to-polymer ratios. The objective was to investigate the influence of formulation and process variables on the physicochemical

characteristics of the microspheres. The prepared microspheres were evaluated for production yield, particle size, drug entrapment efficiency, SEM, DSC, in vitro drug release.

Results: The developed formulations exhibited production yields of 72–97% and entrapment efficiencies of 79–98%. Particle sizes ranged from 35.9 µm to 78.2 µm, with entrapment efficiency between 79% and 90%. The final formulation (PMS4) was further coated with Eudragit S100, resulting in an increased particle size of 94.5 µm. Drug release studies revealed that uncoated PMS4 showed prolonged release with approximately 90% cumulative drug release at 24 hours. In contrast, Eudragit S100–coated PMS4 released only 28% of the drug within the first 6 hours, followed by a significantly enhanced and targeted release of approximately 98% at 24 hours.

Conclusion: These findings indicate that Eudragit S100–coated pectin microspheres were successfully developed, effectively protecting the drug in acidic conditions and enabling targeted delivery to the colonic region.

Keywords: Pectin microspheres, NASID, Colon-targeted drug delivery, Eudragit S100, External gelation Controlled release

PCU-OP-028

SMART NANOCARRIER SYSTEMS: AI-DRIVEN INNOVATION IN NEXT- GENERATION DRUG DELIVERY

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Nanocarriers have emerged as highly efficient alternatives to conventional drug-deliverysystems due to their nanoscale dimensions, large surface area, and inherent capacity fortargeted delivery, resulting in enhanced efficacy and improved stability of therapeutics. Awide spectrum of nanocarriers—including dendrimers, liposomes, polymeric nanoparticles,solid lipid nanoparticles, micelles, nanoemulsions, nanocapsules, and carbon-basedsystems—are employed across biomedical research. Their behaviour is extensivelycharacterized through in vitro, ex vivo, in situ, and in vivo methods. Despite significantprogress, many nanocarriers face challenges in translation from laboratory research to clinicalapplication owing to manufacturing limitations, safety concerns, and regulatory barriers.The integration of artificial intelligence (AI) is transforming the landscape ofnanotechnology. AI-driven tools enhance nanocarrier design, optimization, and performanceprediction, revolutionizing drug discovery and enabling highly accurate and targetedtherapeutic delivery. Machine learning algorithms optimize critical parameters such asnanocarrier size, drug-release kinetics, and encapsulation efficiency while predictingdrug–polymer interactions with high precision. This leads to improved bioavailability,minimized adverse effects, and more effective targeting of diseased tissues.Furthermore, AI accelerates the development of precision and personalized medicine byenabling the design of nanocarriers tailored to individual patient needs, based on predictedinteractions with biocompatible and disease-specific polymers. By boosting innovation,therapeutic selectivity, and functional customization, AI-integrated nanotechnologyrepresents a transformative step toward next-generation drug delivery and precisionmedicine.

Keywords: Nanotechnology, Artificial intelligence (AI), Drug delivery systems, Targeted therapy, Personalized medicine, Nano–AI integration

PCU-OP-029

ARTIFICIAL ORGANS AND ORGAN ON A CHIP FOR DRUG TESTING

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In recent years, the search for alternatives to animal testing has significant advancements in artificial organs and organ-on-a-chip (OOC) technologies. These innovative platforms offer a more accurate, ethical, and efficient to test drugs before they reach clinical trials. Artificial organs are bioengineered versions of human organs, and made from biomaterials and stem cells, designed to replicate the natural functions of organs like heart, liver, kidneys. These organs provide more human-like environment for drug testing, improving our ability to predict how drugs will behave in human body. organ-on-a-chip systems are miniature, lab-grown models use microfluidic technology to create small-scale, functioning versions of human organs. These chips mimic the physiological conditions of body, including fluid flow, cellular interactions etc, allowing highly controlled testing of drug responses. Both technologies are transforming drug development process by allowing researchers to observe the effects of drugs in real time, without relying on animal models. They are particularly valuable for testing drug toxicity, efficacy, and bioavailability at an early stage, potentially reducing costly failures in clinical trials.

Keywords: Artificial Organs, Organ-on-a-Chip (OOC), Microfluids , Biomaterials

PCU-OP-030

TRANSFORMING PARKINSONISM THERAPY: FAST-DISSOLVING PRAMIPEXOLE FILMS FOR RAPID ONSET AND ENHANCED COMPLIANCE

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Parkinsonism is a progressive neurodegenerative disorder characterized by degeneration ofdopaminergic neurons in the substantia nigra, resulting in dopamine deficiency. The condition ismost prevalent among elderly individuals and affects males more frequently than females.Pramipexole, a dopamine agonist, is routinely used in Parkinsonism management; however,conventional dosage forms may cause swallowing difficulty and delayed onset of action. Thepresent study aimed to develop oral fast disintegrating films (OFDFs) of Pramipexole to enhancepatient compliance, provide rapid disintegration in the oral cavity, and improve drugbioavailability by bypassing first-pass metabolism. Films were prepared using the solvent castingmethod with different grades of Hydroxypropyl methylcellulose (HPMC) as film-formingpolymer. The formulations were evaluated for physico mechanical

properties, disintegration time,drug content, and in-vitro dissolution. FT-IR analysis confirmed compatibility betweenPramipexole and excipients. Among all formulations, F1 demonstrated optimal characteristics,including satisfactory flexibility, acceptable drug content, a rapid disintegration time of 24seconds, and enhanced drug release of 97% within 30 minutes. The study concludes thatPramipexole fast disintegrating films offer a promising alternative to conventional dosage forms,providing ease of administration, rapid onset of action, and improved therapeutic performancefor Parkinsonism patients.

Key words: Pramipexole, oral fast disintegrating films, Parkinsonism, Hydroxypropyl methylcellulose

PHARMACEUTICAL CHEMISTRY

PCH - OP – 01

A.I AS A MEDICINAL CHEMIST MYTH OR REALITY

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Artificial Intelligence (AI) is rapidly transforming the landscape of drug discovery and medicinal chemistry. Advances in generative models, machine learning, protein structure prediction, and automated laboratory have enabled AI to perform task such as design novel molecules, prediction ADMET properties. Optimizing leads, and assisting in the retro synthetic planning.These capability is suggest that AI is beginning to function like a “digital medicinal chemist” However despite its remarkable speed and data-driven accuracy, AI lacks the intuitive reasoning, creativity, mechanistic understanding, and contextual decision-making that human chemists process.Therefore, AI cannot fully replace the medicinal chemist but instead acts as a powerful collaborator that enhances efficiency and innovation. In reality, the future of drug drug discovery lies in the synergy between human expertise and artificial intelligence. AI can function like a medicinal chemist, but it can only act as a supportive tool rather than a replacement . AI serves as an intelligent partner rather than a substitute.

Key words: Artificial intelligence, drug discovery, medicinal chemistry

PCH - OP – 02

XR-ENABLED INNOVATIONS IN DRUG DISCOVERY, PRECLINICAL MODELLING AND MANUFACTURING WORKFLOWS

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Extended Reality (XR), Augmented Reality (AR) and Virtual Reality (VR), is increasingly recognized as a disruptive technological paradigm within pharmaceutical research and development. XR facilitates immersive, high-resolution three-dimensional molecular visualization, enabling researchers to interrogate chemical structures, ligand–receptor interactions, and spatial conformations with enhanced precision. This elevated level of molecular interactivity supports more accurate target validation and rational drug-design strategies. Within training and simulation domains, XR provides hyper-realistic, risk-free virtual environments for laboratory procedures, clinical trial workflow modelling, and pharmaceutical manufacturing operations, thereby improving procedural competency, reducing variability, and minimizing human error. Despite its transformative potential, XR adoption remains constrained by challenges such as high capital expenditure, limited computational and technical expertise, ergonomic limitations, and the absence of standardized, industry-wide XR frameworks. Nonetheless, emerging evidence indicates substantial return on investment (ROI) attributable to accelerated training timelines, enhanced operational safety, and improved process optimization. XR represents a promising innovation with the capacity to significantly advance pharmaceutical R&D through enhanced visualization, simulation fidelity, and data-driven decision-making.

Key words: Extended Reality (XR); Augmented Reality (AR); Virtual Reality (VR); Pharmaceutical Research and Development

PHARMACEUTICAL ANALYSIS

PA - OP - 01

VISIBLE SPECTROPHOTOMETRIC METHOD FOR THE DETERMINATION OF FAVIPIRAVIR IN BULK AND PHARMACEUTICAL FORMULATION USING MBTH REAGENT

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Favipiravir, a pyrazine carboxamide derivative with broad activity against RNA viruses, is widely employed in the treatment of SARS-CoV-2 infection. A simple and reliable visible spectrophotometric method was developed for the quantitative estimation of favipiravir in bulk and tablet dosage forms using 3-methyl-2-benzothiazolinone hydrazone (MBTH) as a chromogenic reagent. The method involves oxidation followed by coupling of MBTH with the drug in the presence of ferric chloride, producing a yellowish-red chromogen with maximum absorbance at 609 nm. The assay obeys Beer's law within the concentration range of 10–50 µg/mL, with a correlation coefficient (r^2) of 0.998, indicating excellent linearity. The limits of detection (LOD) and quantification (LOQ) were determined to be 1.29 µg/mL and 3.93 µg/mL, respectively. Validation studies performed in accordance with ICH Q2 (R2) guidelines confirmed the precision, accuracy, and reproducibility of the method. The proposed technique was successfully applied to the analysis of favipiravir tablets, demonstrating good recovery and robustness, and thus offers a practical approach for routine quality control.

Key words: Favipiravir, MBTH reagent, Limit of detection, Limit of Quantification

PA - OP – 02

SPECTROPHOTOMETRIC DETERMINATION OF IRBESARTAN BY NQS REAGENT IN BULK AND TABLET DOSAGE FORM

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A unique, simple, sensitive, and efficient approach has been developed for the measurement of Irbesartan in bulk and pharmaceutical formulations using the 1,2-naphthoquinone-4-sulphonic acid (NQS) reagent. The aim of this analytical validation method is to verify its effectiveness by laboratory testing, proving that the technique meets the necessary minimum standards for laboratory use. This approach was created using the chromogenic reagent NQS in a basic buffer at pH 12, producing a reddish-brown chromogen with an absorption maximum at 467 nm. This method can be efficiently employed to quantify drug content in pharmaceutical formulations. The analysis results have been statistically validated. A coefficient of determination (r^2) of 0.998 demonstrated compliance with Beer-Lambert's law within the concentration range of 100 to 150 µg/mL. The limit of quantification and limit of detection were established at 21.16 µg/mL and 64.14 µg/mL, respectively.

Key words: Irbesartan, NQS reagent, Pharmaceutical formulation, Chromogenic reagent

PA - OP – 03

AL-DRIVEN QUALITY ASSURANCE IN PHARMACEUTICAL MANUFACTURING

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Artificial intelligence is emerging as a powerful means for transforming quality assurance within pharmaceutical manufacturing. Traditional QA methods rely heavily on manual inspection, retrospective analysis, and labour-intensive documentation, which can introduce setbacks and hindrances. Recent advancements in machine learning, computer vision, and predictive analytics enable real-time, data-driven monitoring of critical manufacturing processes. AI-based visual inspection systems can detect many tablet defects such as cracks, chips, colour variations, and coating inconsistencies with greater accuracy and consistency than human observers. By utilizing AI algorithms it is much easier to analyze extensive biological data, including genomics and proteomics, researchers can identify disease-associated targets and anticipate in their interactions with potential drug candidates. Predictive models are increasingly used to identify early signs of equipment failure, process deviations, or out-of-trend results, helping manufacturers prevent batch failures and reduce wastage. These innovations support stronger GMP compliance by improving traceability, ensuring data integrity, and automating routine documentation tasks. However, integrating AI into pharmaceutical QA requires rigorous validation, careful data management, and alignment with evolving regulatory expectations. Regardless of these challenges, AI-driven QA systems offer significant potential for improving product quality, speeding batch release, and reducing operational costs. As the industry moves toward digital manufacturing and advanced automation, AI-enabled QA represents a key innovation shaping the future of pharmaceutical production.

Key words: Artificial Intelligence, Quality Assurance, Pharmaceutical Quality Control, Machine Learning, Computer Vision,Predictive Analytics.

PA - OP – 04

RISK-BASED APPROACH IN GOOD MANUFACTURING PRACTICES (GMP)

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A risk-based approach in Good Manufacturing Practices (GMP) has become an essential method for maintaining consistent product quality and ensuring patient safety. It focuses on identifying, analysing, and controlling potential risks that may affect the manufacturing process. Instead of treating all steps equally, this approach allows pharmaceutical companies to concentrate more on areas that carry higher chances of failure or impact on product quality. This makes the overall system more efficient, reliable, and scientific. Important risk-assessment tools such as Failure Mode and Effects Analysis (FMEA), Hazard Analysis and Critical Control Points (HACCP), and risk-ranking methods are widely used to support decision-making. These tools help detect weaknesses in equipment, materials, processes, and documentation. As the pharmaceutical industry grows more complex, the shift from traditional, compliance-based methods to preventive and risk-focused systems has become necessary.A risk-based GMP approach improves manufacturing control,

reduces deviations, strengthens documentation, and enhances regulatory compliance. It also supports continuous improvement and helps companies manage resources effectively. By implementing this approach, industries ensure that medicines are produced safely and consistently. Overall, the risk-based approach in GMP helps build a stronger quality culture and promotes greater trust by ensuring that patients receive safe and effective pharmaceutical products.

Key words: Good Manufacturing Practices, Risk-Based Approach, Quality Assurance, Risk Assessment, FMEA, Pharmaceutical Quality.

PA - OP – 05

PROCESS ANALYTICAL TECHNOLOGY (PAT) TOOLS: A NEW WEAPON FOR PHARMACEUTICAL INDUSTRY

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Process analytical technologies (PAT) have been mostly applied for designing, analyzing and controlling various processes functional during product manufacturing. These technologies are utilized for providing necessary informations about various parameters that could significantly affect different critical quality attributes (CQA). PAT is efficiently used to examine the raw material and final product quality, both physically and chemically, leading to reduction in engineering costs and thus improves the manufacturing sector of the pharmaceutical or chemical industries. PAT have provided effective tools which have improved the operative control and amenability, so resulted in continuous and instantaneous quality improvement of products. PAT includes a transferal from analyzing the quality of product development to the quality of final products by examining at various intermediate (in- or out-line processing)stages. As considered for industrial sector, this technique has emerged as a novel tool and numerous work is going on at academic and industrial level. Herein, we have explored the various aspects of PAT, including significant role of QbD (Quality-by-Design), in various industrial processes and manufacturing aspects.

Key words: Process analytic technology , quality control , innovation, quality by design, process optimization

PA - OP – 06

METHOD AND DEVELOPMENT AND VALIDATION OF SAXAGLIPTIN BY UV - VISIBLE SPECTROSCOPY IN BULK AND TABLET DOSAGE FORM

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A simple, accurate, precise and cost-effective UV-visible spectrophotometric method was developed and validated for the quantitative estimation of Saxagliptin in pharmaceutical dosage forms. Methanol was selected as the optimal solvent based on solubility and stability studies. The

maximum absorbance (λmax) of Saxagliptin was found to be 280 nm. Linearity was observed in the concentration range of 2.5–20 µg/ml, with a correlation coefficient (R^2) of 0.9994, indicating strong linearity.The method exhibited good precision with intra-day and inter-day %RSD values below 2%. Accuracy was confirmed through recovery studies at 50%, 100%, and 150% spike levels, with recovery results ranging from 99.59% to 99.17%. The method was proven to be robust and reproducible under minor variations in experimental conditions.The limit of detection (LOD) and limit of quantification (LOQ) were determined to be 0.34 µg/ml and 1.05 µg/ml, respectively. Assay results of marketed formulations showed 99.98% Saxagliptin content.This method, adhering to ICH guidelines, is suitable for routine quality control and analysis of Saxagliptin in bulk and tablet dosage forms.

Key words: Saxagliptin, UV-Visible spectrophotometric method, Method Validation, Assay, Precision, Accuracy, Linearity, Robustness, ICH Guidelines

PCOL-OP-01

A PRACTICAL GUIDE TO NETWORK PHARMACOLOGY: TOOLS, TECHNIQUES, AND WORKFLOW FOR MULTI-TARGET DRUG DISCOVERY

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Network pharmacology represents a novel paradigm for drug discovery and mechanistic studies by integrating systems biology, computational analysis, and pharmacology to examine multi-target interactions and holistic therapeutic effects. Unlike traditional single-target approaches, it focuses on the interconnected network of bioactive compounds, targets, and disease pathways empowering researchers to uncover drug repurposing opportunities and synergies, especially in plant-based and polyherbal formulations. This presentation, drawing on practical demonstrations from the referenced tutorial, will provide a step-by-step guide to the entire network pharmacology workflow. Participants will learn how to collect and curate relevant bioactive compound data using public databases; screen compounds for drug-likeness; predict biological targets via SwissTargetPrediction, SuperPred, or similar servers; and collect disease-related targets using platforms like Gene Cards. Further, visualization and intersection analysis will be performed using Venny for target overlap, and STRING and Cytoscape for constructing and analysing protein–protein interaction (PPI) networks. Finally, key network modules and drug-target-disease relationships will be examined to generate biological hypotheses and support evidence-based drug design. This tutorial-based session aims to empower attendees with hands-on familiarity with the software tools and logical workflow essential for contemporary network pharmacology studies.

Key Words: Network pharmacology, multitarget interaction, disease pathway.

PCOL-OP-02

SPACE A NEW FRONTIER FOR PHARMACISTS

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The field of space exploration is rapidly advancing with increasing number of astronauts embarking on missions to space. As space travel becomes more prevalent, ensuring the health and safety of astronauts becomes necessary. Space pharmacology is the study of how medications behave in space, including their effects on human body in microgravity environment to ensure safe and effective use during space missions. Microgravity exerts significant effects on pharmacokinetics and pharmacodynamics through alterations in gastrointestinal absorption, body fluid distribution, hepatic metabolism, renal excretion, and gut microbiota composition. Early human missions revealed significant physiological changes induced by microgravity including fluid redistribution, vestibular disturbances, musculoskeletal deconditioning, immune dysregulation haematologic alterations, sleep disturbances and increased radiation exposure risk. Pharmacology in Space remains insufficiently understood despite decades of drug use aboard human missions.

A deeper understanding of space pharmacology is essential to ensure drug safety and efficacy on future long duration missions.

Key Words: Space pharmacology, Microgravity.

PCOL-OP-03

LIQUID BIOPSY: THE FUTURE OF NON -INVASIVE CANCER DIAGNOSIS.

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Liquid biopsy has emerged as a transformative and minimally invasive approach for cancer detection, monitoring and management unlike conventional tissue biopsy, which is invasive, painful, and limited by sampling location, liquid biopsy analyses tumor derived components circulating in body fluids- primarily blood to provide a comprehensive and real time overview of tumour dynamics. The key analysis assessed include circulating tumour DNA (CtDNA), circulating tumor cells (CTCS), cell free RNA, micro RNA's, exosomes and tumor associated proteins. Those biomarkers reflect the genetic and molecular characteristics of the tumor, enabling early detection, treatment selection and personalized therapeutic decision making. Advances in analytical technologies, such as next-generation sequencing (NGS), digital droplet PCR and high sensitivity molecular assays have significantly improved the accuracy and reliability of liquid biopsy as research progresses liquid biopsy is poised to become an essential tool in precision oncology, offering a faster, safer and more comprehensive approach to cancer diagnosis and management.

Key words: Liquid biopsy, Cancer detection, DNA.

PCOL-OP-04

EVALUATION OF ANTI UROLITHIATIC POTENTIAL OF PTEROSPERMUM ACERIFOLIUM (L.) WILLD. IN ETHYLENE GLYCOL AND AMMONIUM CHLORIDE INDUCED UROLITHIASIS IN RAT MODEL

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Urolithiasis, the formation of urinary calculi, is a recurrent disorder associated with significant morbidity. Current therapeutic options are limited by adverse effects and high recurrence rates. Pterospermumacerifolium (L.) Willd., traditionally used in folk remedies, possesses antioxidant, anti-inflammatory, and diuretic properties, suggesting it potential in preventing stone formation. The study intended to assess anti-urolithiatic potential of ethanolic extract of P. acerifolium (EEPA) in ethylene glycol and ammonium chloride induced urolithiasis in rats. EEPA was extracted using Soxhlet apparatus. Male Wistar Albino rats were divided into five groups and were exposed to ethylene glycol and ammonium chloride for first seven days for disease induction and then, switching to only ethylene glycol along with their respective treatments orally for 21 days.

Biochemical parameters including urinary calcium, uric acid, total proteins were estimated. Serum parameters like blood urea nitrogen, uric acid, creatinine were also assessed. Histopathological examination at 200X of kidney tissues was performed to evaluate crystal deposition and tissue damage. Induction with ethylene glycol and ammonium chloride caused a substantial raise in urinary and serum stone-forming constituents compared to control. Treatment with EEPA, particularly at 400 mg/kg, significantly reduced calcium, uric acid levels, comparable to the standard drug Cystone. EEPA exhibits significant anti-urolithiatic activity, likely due to its diuretic effects. These findings authenticate its traditional use and suggest that P. acerifolium may serve as a potential natural therapeutic agent for management of urolithiasis.

Key words: Urolithiasis, Ethylene glycol, Ammonium chloride, Pterospermumacerifolium (L.) Willd.Calcium chloride.

PCOL-OP-05

LYCHEE'S AS HYPOGLYCEMIC AGENT

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Young, severely malnourished children in Bihar, India, have been reported to develop recurring outbreaks of acute encephalopathy syndrome (AES), and this coincides with the annual lychee harvest time, first reported in 2011, with another outbreak in 2014. This syndrome poses a challenging diagnosis, and possible causes of the syndrome are infections, environmental factors, or toxins. This trend is quite comparable to the Jamaican Vomiting Sickness which is brought about by the ackee fruit. The lychee fruit has the naturally occurring toxin Methylene Cyclopropyl Glycine (MCPG) which has been closely linked to be the causative agent. Nonetheless, as the consumption of lychee is safe in all parts of the world, the outbreaks can be attributed to the interactions between MCPG and a predisposing factor that is critical .In depth research was done in order to establish the main cause of AES. These included:The urine samples of affected children were collected. Toxicological testing using Thin-layer Chromatography (TLC) and Liquid Chromatography as a confirmation to the presence and concentration of MCPG. Specific isolation and determination of MCPG. Pesticide residues screening and other possible environmental toxins screening of the urine samples Although a range of factors were examined, the close association with consumption of lychees in children with malnutrition, along with the established toxicity of the MCPG due to interruption of fatty acid 8-oxidation and the appearance of extensive hypoglycaemia, indicates that this particular outbreak of AES is chiefly a toxic encephalopathy which is the result of MCPG toxin and nutritional susceptibility interaction. Through the factors that were examination the cause of these deaths is found to because of toxins in lychee, viral infections and the pesticides used. The pesticides were not expired when the fruits were picked hence they found pesticides in the samples.

Key words: Acute Encephalopathy Syndrome (AES), Lychee toxicity, Methylene, Cyclopropyl Glycine (MCPG), hypoglycemic encephalopathy Malnutrition Bihar outbreak, Fatty acid β-oxidation inhibition.

PCOL-OP-06

GLP-1 AGONISTS: REVOLUTIONIZING OBESITY AND DIABETES TREATMENT.

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Glucagon like peptide-1 (GLP-1) agonists represents a major breakthrough in the management of type-2 diabetes mellitus (T2DM) and obesity. GLP-1 is an incretin hormone that enhances glucose dependent insulin secretion delays gastric emptying reduces appetite and promotes weight loss. However, the natural GLP-1 hormone is rapidly degraded in the body. Modern GLP-1 receptor agonists such as semaglutide, liraglutide, dulaglutide and tirzepatide have been engineered to resist enzymatic breakdown providing prolonged action and superior therapeutic benefits. These agents significantly reduce hemoglobin A1c levels improve β-cell function, lower post- prandial glucose levels and facilitate sustained weight reduction in obese individuals. Beyond glycemic control, GLP-1 receptor agonists also offer cardio protective benefits, including reduced risk of major adverse cardiovascular events. Their dual advantage on metabolic and cardiovascular health has positioned them at the forefront of modern pharmacotherapy. Recent clinical trials demonstrate remarkable outcomes, semaglutide produces an average 15-20% body weight reduction, while tirzepatide shows even greater efficacy due to its dual GIP/GLP-1 receptors action. These results make a paradigm shift in obesity management previously limited to lifestyle modification and surgery. Overall GLP-1 Agonists are transforming treatment strategies for metabolic diseases by offering improved efficacy, safety and patient quality of life. They are considered as the future obesity and diabetes pharmacotherapy.

Keywords: GLP-1 receptor agonists, Type-2 diabetes mellitus (T2DM), Incretin hormone, Obesity, cardiovascular effects

PCOL-OP-07

INFLUENCE OF GLP-1 AGONISTS (OZEMPIC) IN COSMETIC PHARMACOLOGY AND PUBLIC HEALTH

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Modern obesity management strategies have been completely transformed by the introduction of glucagon-like peptide-1 (GLP-1) receptor agonists, such as Semaglutide (Ozempic). While initially developed to control Type-2 Diabetes, the profound efficacy of Semaglutide in inducing weight loss has led to widespread and controversial off-label application in the cosmetic domain. This examines the potent biological mechanism of action, demonstrating the dual efficacy of Ozempic: (1) signalling to the brain to promote rapid and intense satiety and curb cravings, and (2) significantly delaying gastric emptying, which sustains the feeling of fullness and dramatically lowers caloric intake. The drug's pharmacological impact, the associated side effects like sudden facial fat loss

("Ozempic Face"), and the substantial financial commitment required for maintenance. Crucially, we address the resulting public health crisis and regulatory oversight, citing recent judicial directives (e.g., Delhi High Court) urging the Central Drugs Standard Control Organisation (CDSCO) to curtail the misuse of a critical therapeutic agent for purely aesthetic purposes. The analysis concludes that while Semaglutide is a powerful tool against obesity, its unmonitored use poses serious ethical dilemmas and risks of diverting vital medical resources, necessitating immediate regulatory and public awareness interventions.

Keywords: Semaglutide, Ozempic, GLP-1 Agonist, Weight Loss, Obesity Management, Off-label Use, Drug Misuse, Public Health.

PCOL-OP-08

DRUG-INDUCED LIVER INJURY: CASCADE OF EVENTS LEADING TO CELL DEATH, APOPTOSIS OR NECROSIS

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Drug-induced liver injury can broadly be divided into predictable and dose dependent such as acetaminophen. And unpredictable or idiosyncratic DILI. Liver injury from drug hepatotoxicity (whether idiosyncratic or predictable) results in hepatocyte cell death and inflammation. The cascade of events leading to DILI and the cell death subroutine (apoptosis or necrosis) of the cell depend largely on the culprit drug. Direct toxins to hepatocytes likely induce oxidative organelle stress (such as endoplasmic reticulum and mitochondrial stress) leading to necrosis or apoptosis, while cell death in idiosyncratic DILI is usually the result of engagement of the innate and adaptive immune system (likely apoptotic), involving death receptors (DR). Here, we review the hepatocyte cell death pathways both in direct hepatotoxicity such as in APAP DILI as well as in IDILI. We examine the known signalling pathways in APAP toxicity, a model of necrotic liver cell death. We also explore what is known about the genetic basis of IDILI and the molecular pathways leading to immune activation and how these events can trigger hepatotoxicity and cell death.

Key Words: Hepatotoxicity, acetaminophen, DILI, necrosis, apoptosis

PCOL-OP-09

LASER VISION CORRECTION-LASIK SURGERY

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LASIK (Laser-Assisted in Situ Keratomileusis) eye surgery is the best known and most commonly performed laser refractive surgery to correct vision problems. Laser-assisted in situ Keratomileusis (LASIK) can be an alternative to glasses or contact lenses. Laser Vision Correction refers to a group of surgical procedures designed to correct refractive errors such as myopia (Near sightedness), hyperopia (Farsightedness) and astigmatism. LASIK eye surgery involves three main steps: creating a thin corneal flap, using an excimer laser to reshape the underlying corneal tissue and then

repositioning the flap to heal naturally. This process changes the cornea's shape, which corrects how light focuses on the retina and improves vision by treating refractive errors like near sightedness, farsightedness and astigmatism. Long-term results from LASIK tend to be best in people who are carefully checked before surgery to see if they are good candidates for the procedure. LASIK often offers improved vision without the hassle of glasses or contact lenses. In general, you have a very good chance of achieving 20/40 vision or better after refractive surgery. More than 8 out of 10 people who've undergone LASIK refractive surgery no longer need to use their glasses or contact lenses for most of their activities.

Key words: Situ, Keratomileusis, Myopia, Hyperopia, Astigmatism, cornea, Excimer laser.

PCOL-OP-10

AI IN DISCOVERED DRUGS AND MACHINE GENERATED MOLECULES

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Artificial Intelligence (AI) is transforming modern drug discovery by enabling the rapid design, evaluation, and optimization of novel therapeutic molecules. Traditional drug development is a lengthy and costly process, often taking more than a decade. AI-driven methods—such as deep learning, reinforcement learning, and generative models significantly accelerate this timeline by predicting molecular properties, generating new chemical structures, and identifying promising drug candidates with high accuracy. Machine-generated molecules created by generative algorithms (e.g., GANs, VAEs, and transformer-based models) can explore vast chemical spaces that are inaccessible through conventional medicinal chemistry. These models design molecules with desired pharmacological profiles, predict ADMET properties, and reduce experimental failures. AI-discovered drugs have already advanced into clinical trials, demonstrating real-world impact. Examples include AI-designed kinase inhibitors, CNS-targeting molecules, and antibiotics against resistant pathogens. By integrating computational predictions with automated laboratory platforms, AI establishes a closed-loop drug discovery system that dramatically improves efficiency. As technology advances, AI is expected to deliver increasingly precise, personalized, and innovative therapeutics.

Key Words: Artificial Intelligence, Drug Discovery, Machine-Generated Molecules, Deep Learning, Generative Models, Reinforcement Learning, Computational Chemistry, ADMET Prediction.

PCOL-OP-11

BIOSIMILERS

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Biosimilar, which are copies of biologics that are highly similar, were introduced in the market with an aim to offer efficacy that is not clinically different from the originator or reference product, at lower prices. We aim to clarify the concept of biosimilar, from the definitions, manufacturing, history, market entry, challenges faced, and future evolution. They have become part of the standard of care in the treatment of a large variety of diseases, such as growth disorders, autoimmune diseases, cancer, cardiovascular illnesses, haemophilia, and rare genetic conditions. For approvals of new biosimilars, the sponsors of premarket applications must present analytical and biological characterization to demonstrate that a proposed biosimilar drug is highly similar to the licensed reference product. The premarket application protocol requires a sponsor to describe the biosimilar product's PK/PD clinical data comparing its safety, efficacy, and immunogenicity to that of the licensed reference product.

Key Words: Biosimilars, Biologicals, licensed reference product, Immunogenicity.

PCOL-OP-12

LURBINECTEDIN: GIVING NEW HOPE FOR SCLC TREATMENT

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Lurbinectedin (Zepzelca) is an FDA-approved therapy for adults with metastatic small cell lung cancer (SCLC) who progress after platinum-based chemotherapy. It acts by inhibiting oncogenic transcription through RNA polymerase II, inducing DNA damage, modifying the tumor microenvironment, and activating anticancer immunity. Preclinical studies show that Lurbinectedin reduces tumor-associated macrophages and enhances immune activity, supporting its use in combination therapy with complementary mechanisms. Clinically, Lurbinectedin has demonstrated meaningful activity as a secondline therapy, with manageable toxicity and a favourable response rate in relapsed SCLC.Its role is now being further explored in combination with agents such as doxorubicin and immunotherapies, aiming to improve outcomes for patients who have limited options after relapse.

Key Words: Lurbinectidine, zepzelca, small cell lung (SCLC), doxorubicin, immunotherapies, RNA polymerase 2, oncogenic transcription

PCOL-OP-13

NANOPARTICLES BASED VACCINES DELIVERY SYSTEM LNPS VLPS AND NANOCARRIES

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Nanotechnology has revolutionized vaccine development by overcoming limitations of traditional vaccines. Various nanocarriers including LNPs, Polymeric nanoparticles, VLPs, enhance antigen stability, targeted delivery and immune modulation. LNPs are crucial in efficient intracellular delivery and controlled antigen release. VLPs mimic viral structures triggering robust immune responses, while ensuring safety due to their lack of genetic material. On the other hand ,cationic lipid assisted nanoparticles(CLAPs/CLANs) further optimize delivery by combining cationic lipids with polymers, as a result improving cellular uptake and controlled antigen release. The Polymer-based nanoparticles, which are made from materials such as poly lactic co-glycolic acid (PLGA), hyaluronic acid, polycaprolactone (PCL) and chitosan, deliver antigens with improved stability, sustained release, and controllable biodegradability, allowing for adaptive immune responses. Multifunctional nanocarriers that combine properties of various systems, and handle ongoing challenges in vaccine stability, targeted delivery, and potent immune activation, with several formulations advancing through clinical evaluation. M-RNA vaccines are the latest and most widely used method for the new vaccines preparation. A blend of physicochemical, immunological and toxicological experiments can be used to accurately characterize nano-vaccines. This narrative review will provide an overview of the current scenario of nano-vaccine.

Key Words: Nanoparticles, Nano vaccine, Nanocarriers, Vaccine delivery system, LNPs VLPs, mRNA vaccine delivery, PLGA

PCOL-OP-14

RELUGOLIX: A NEXT-GENERATION ORAL GNRH ANTAGONIST—MECHANISM, PHARMACOKINETICS AND CLINICAL IMPACT

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Relugolix is an oral GnRH antagonist that rapidly and reversibly suppresses gonadotropins by competitively blocking pituitary GnRH receptors, leading to reduced estradiol in women and testosterone in men. It has predictable pharmacokinetics, with peak levels in 1–2 hours, a half-life of ~25 hours, and mainly CYP3A-mediated metabolism. Its therapeutic impact is illustrated through two cases. A 68-year-old man with recurrent prostate cancer and high cardiovascular risk achieved fast castration-level testosterone and significant PSA reduction without cardiovascular events, supporting Relugolix as a safer alternative to injectable androgen-deprivation therapy. A 40-year-old woman with symptomatic uterine fibroids experienced marked improvement in bleeding and anemia on Relugolix combination therapy, enabling minimally invasive surgical management.

These cases highlight Relugolix as a versatile, clinically effective option with strong pharmacologic and oncologic value for hormone-dependent disorders in both men and women.

Key Words: Oral GnRH antagonist, Prostate cancer, uterine fibroids, Hormone-dependent disorders

PCOL-OP-15

POLYCYSTIC OVARIAN DISORDER (PCOD)

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Polycystic means many cysts. Polycystic ovarian disorder is a complex disorder of chronic oligoanovulation or oligomenorrhoea and clinical or biochemical hyperandrogenism.It is also known as Stein-Leventhal Syndrome. PCOD often causes clusters of small, pearl-sized cysts in the ovaries. The cysts are fluid-filled and contain immature eggs. Genetic and environment factors may contribute to this disorder. PCOD causes changes in physical appearance, irregularity in menstrual cycle and if not treated in time, leads to diabetes and heart strokes, obesity, mood disorder, endometrial cancer and sleep apnea. Women affected by PCOD are generally in the age group of 14 to 44 .There is no cure for this disease but studies have found that hormones, medicines, healthy food and exercise can control the disease .Number of women having this problem, especially in young ones have increased alarmingly. This needs attention to address urgently to stop ill effects later in life.

Key Words: PCOD, oligo anovulation, hyperandrogenism, Stein-Leventhal

PCOL-OP-16

TARGET DRUG THERAPY

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Targeted drug therapy represents a major advancement in modern pharmacology and oncology, offering selective action on specific molecular targets involved in disease progression. Unlike conventional therapies that affect both healthy and diseased cells, targeted therapies are designed to interact with unique cellular receptors, signaling proteins, or genetic mutations, thereby improving therapeutic precision. These agents may inhibit key pathways such as tyrosine kinase signaling, angiogenesis, or cell-cycle regulation. By focusing on specific biomarkers, targeted therapies enhance efficacy, reduce systemic toxicity, and allow for personalized treatment approaches. Despite their advantages, challenges include drug resistance, high cost, and the need for accurate biomarker identification. Ongoing research continues to optimize target selection and combination strategies, making targeted drug therapy a cornerstone of precision medicine.

Key Words: Molecular targets, oncogenic signaling pathways, receptor tyrosine kinases, gene mutations

PCOL-OP-17

MICRONEEDLE-BASED INSULIN DELIVERY A PROMISING ALTERNATIVE TO CONVENTIONAL INJECTIONS

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Subcutaneous insulin injections, though effective, often cause pain, fear, and poor patient compliance in diabetes patients. This has led to interest in non-invasive delivery methods such as microneedle-based transdermal systems. This presentation reviews the potential of microneedles to deliver insulin across the skin by creating microscopic channels, enabling painless and targeted drug absorption. Pre-clinical studies show promising glucose-lowering effects comparable to conventional injections, with minimal skin irritation and better patient acceptability. However, challenges like delivering higher insulin doses, maintaining insulin stability, ensuring cost-effective production, and lack of large-scale human trials still limit clinical use. Up on conclusion, microneedle technology shows strong potential to optimize insulin therapy, but further research is needed before it can replace routine subcutaneous injections.

Key Words: Insulin, Diabetes, Microneedle, Transdermal systems, Non-invasive, Painless, Pre-clinical studies.

PCOL-OP-18

PHARMACOGENOMIC TESTING IN ANTI-DEPRESSANTS

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This case report illustrates the application of pharmacogenomic testing.The group concluded that to inform medication selection and dosing of several commonly-used antidepressant and antipsychotic medications, current published evidence, prescribing guidelines, and product labels support the use of PGx testing for 2 cytochrome P450 genes (CYP2D6, CYP2C19) .Here is a case study that , a young male in his mid-20s with medication-resistant depression (MRD), who had failed to respond to multiple antidepressant trials over 18 months and experienced significant side effects. Genetic analysis revealed he was an ultrarapid metabolizer for the CYP2C19 enzyme, which is responsible for the metabolism of several selective serotonin reuptake inhibitors (SSRIs), including escitalopram and sertraline. This genetic variant led to subtherapeutic drug levels and a lack of efficacy at standard dosages. Based on these pharmacogenomic insights, clinicians tailored his medication plan to avoid drugs predominantly metabolized by CYP2C19 and chose alternatives better suited to his metabolic profile. This personalized approach resulted in marked clinical improvement and symptom stabilization. The case highlights the critical role of pharmacogenomics in clarifying reasons for antidepressant treatment failures and optimizing medication selection, dosing, and monitoring in complex psychiatric cases. Integration of genetic data with clinical judgment can significantly improve outcomes, particularly for patients with treatment-resistant presentations.

Key Words: Cytochrome p450 genes, Ultra rapid metabolizer, Genetic analysis, Sub therapeutic drug levels, Treatment Failure, Medication selection, Clinical Improvement

PCOL-OP-19

Enhancing ADR detection: deep learning and NLP advancements in pharmacovigilance

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Artificial Intelligence's (AI) application in pharmacovigilance (PV) has expanded significantly, promising to improve the speed and accuracy of adverse event detection. This review critically examines AI's potential to revolutionize drug safety monitoring, practical implementation challenges such as ensuring AI's consistent and transparent performance, reducing multiple source of bias and addressing interpretability issues .AI is capable of analysing large data sets, including genetic data, electronic health records and medication interaction data in order to find trends and forecast a person's vulnerability to ADRs. AI Uses techniques like machine learning, natural language processing (NLP), deep learning, signal detection and robotic process automation (RPA) and enables early detection of potential ADRs and supports proactive risk management via predictive analytics for study and detection. Practical application of AI such as, IBM Watson health's AI system demonstrates major improvement in signal detection and accuracy. This allows pharmacovigilance professionals to focus more on strategic activities rather than routine tasks. Automation ensures timely and accurate regulatory reporting compliant with agencies like the FDA and EMA. AI uses natural language processing (NLP) to monitor social media for ADR mentions, then uses machine learning to identify, filter and prioritize potential signals from vast amounts of text data. It can analyse real time posts from various forums, social media sites and patient support networks to identify patterns and potential safety issues.

Key Words: AI, pharmacovigilance, ADRs, NLP, machine learning, signal detection, data processing, IBM Watson health's system

PCOL-OP-20

THE FUTURE OF BREAST CANCER TREATMENT: COMBINING TRADITIONAL AND ADVANCED THERAPEUTIC APPROACHES

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Breast cancer represents a diverse condition influenced by intricate biological processes, including genetic alterations, disrupted hormonal signaling, and changes in the tumor microenvironment. Important biomarkers like estrogen receptor (ER), progesterone receptor (PR), HER2, Ki 67, and

PD LI play a crucial role in diagnosis, prognosis, and guiding treatment choices. Traditional treatment approaches typically merge breast-conserving surgery with radiotherapy and systemic therapies. Chemotherapy, especially anthracycline-based regimens such as doxorubicin, remains a fundamental component, while endocrine therapy has progressed with the introduction of selective estrogen receptor degraders (SERDs), which offer enhanced effectiveness in ER-positive cases. Immunotherapy, particularly through checkpoint inhibitors, has shown potential in triple-negative breast cancer, emphasizing the importance of immune system modulation. Innovations in gene editing, notably CRISPR/Cas9, are facilitating functional investigations of oncogenes and resistance mechanisms, although translating these advances into clinical practice necessitates overcoming challenges related to delivery and safety. The application of artificial intelligence (Al) is growing in breast cancer management, extending from detection through imaging and risk assessment to predictive modeling that aids in personalized treatment choices. The combination of these approaches marks a significant shift toward precision oncology. Integrating surgeries, radiotherapy, chemotherapy, immunotherapy, and targeted treatments, along with emerging technologies like CRISPR and Al, provides a comprehensive strategy aimed at enhancing survival and improving patients' quality of life. Future approaches will depend on treatments driven by biomarkers, well-planned combinations of drugs, and digital innovations to tackle tumor diversity and resistance, ultimately advancing personalized management of breast cancer.

Key Words: Biomarkers, Radiotherapy, CRISPR, Gene editing

PCOL-OP-21

TARGETED PROTEIN DEGRADATION MODALITIES: MECHANISMS, CHALLENGES AND FUTURE DIRECTIONS

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Targeted Protein Degradation (TPD) is an innovative therapeutic strategy that harnesses the cell’s natural protein disposal systems to selectively eliminate disease-causing proteins. Unlike traditional small-molecule inhibitors that block protein function temporarily, TPD removes the entire protein, resulting in deeper, more durable, and often catalytic pharmacological effects. This approach is particularly valuable for “undruggable” proteins such as transcription factors, scaffold proteins, and mutant forms that lack accessible active sites. The most widely developed TPD modalities are PROTACs (Proteolysis-Targeting Chimeras) and molecular glues. PROTACs are heterobifunctional molecules composed of a target-binding ligand, an E3 ligase-binding ligand, and a linker. Upon binding, they bring the target protein and E3 ubiquitin ligase into proximity, enabling ubiquitination and subsequent proteasomal degradation. Molecular glues, in contrast, are monovalent small molecules that enhance protein–ligase interactions by promoting neo-substrate formation, leading to selective degradation through a simpler structural design. Current challenges include ensuring selectivity, optimizing pharmacokinetics, achieving oral bioavailability, addressing tissue-specific ligase expression, and managing potential off-target effects.

Ongoing advances such as LYTACs, AUTACs, and antibody-PROTAC conjugates continue to expand the scope of degradation technologies.

Key Words: Transcription factors, chimeras, scaffolds, E3 Ubiquitin

PCOL-OP-22

REVOLUTIONIZING GENE EDITING: CRISPR-CAS9 TECHNOLOGY IN PRECISION MEDICINE AND BEYOND

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CRISPR technology has revolutionized gene editing over the past decade. It holds significant potential for treating various genetic disorders by correcting the mutated genes responsible for these conditions. The CRISPR-Cas9 system was originally discovered in bacteria and archaea, where it serves as an acquired immune defense mechanism against viruses. By adapting the type 2 CRISPR-Cas9 systems and employing guide RNA, precise cuts can be made at specific sites to alter nucleotide patterns. Owing to its gene-editing capabilities, it is extensively used at both the molecular and therapeutic levels to achieve the desired outcomes. This seminar highlighted the efficient use of the CRISPR-Cas9 system in the treatment of genetic disorders and the advancement of precision medicine. Beyond addressing genetic disorders, it has broad applications in customizing treatments to individual genetic profiles and expediting drug discovery. The CRSIPRcas9 system represents a ground breaking advancement in genetic engineering, with significant implications for treating genetic disorders and personalized medicine. Its continued development promises to revolutionize therapeutic strategies and accelerate drug discovery.

Key Words: CRISPR- Cas9, gene editing, genetic disorders, precision medicine, gene therapy.

PCOL-OP-23

UNDERSTANDING THE FOETAL HEART ORGANOIDS: A REVOLUTION IN UPCOMING DISCOVERIES

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Human Fetal Organoids is an Emerging and most interesting topic In - Vitro studies. Organoids are the 3D self-organizing structures recapitulate chamber-specific cardiomyocytes, pacemaker-like cells, epicardium, endocardium, cardiac fibroblasts, and in advanced vascularized models, a primitive coronary-like network. Human Fetal Heart is the first functional organ to fully develop in the embryo. This allows the research to study its organization in the body. It emphasizes on the Foetal Cardiac Phenotype and Genotype. It detects the Foetal anomalies like cardiovascular diseases and its Impact on the other organs like Brain, Lungs, Liver etc. This can be studied by Assembloids (Fused Organoids like combining Heart – Brain, Heart – Lungs, Heart – Kidneys). Although, the Organoids of tissues like those of intestines and Brain were developed many years

ago but it is for the first time that Heart Organoids were not reported recently. This Organoids are prepared from the Fetal Progenitor cells [e.g.: from Amniotic Fluid or Tracheal Fluid procedures during Fetoscopic Endotracheal Occlusion (FETO)]. These organoids are used to detect the Mutations specific defects, Drug Induced Anomalies like Aspirin induced Intra uterine bleeding, and Thalidomide induced Terato toxicity. By this model we can predict the complications that might be faced by the fetus in future from the parent who have Diabetes, Hypertension etc. [Impact of parent's disease state in fetal health].
Through these findings we can overcome the disease in the future by targeting specific targets [E.g.: Enzymes, Genes] in body and making new strategies to overcome the happening. Human Fetal Organoids can aid the medical field in Post – Diagnosis Prognosis but not in the initial defects or abnormalities.

Key Words: Organoids, Cardiovascular disease, Congenital Diaphragmatic Hernia

PCOL-OP-24

TARGETED PROTEIN DEGRADATION AS A NEXT-GENERATION THERAPEUTIC STRATEGY

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Targeted protein degradation has emerged as a transformative strategy in pharmaceutical research, offering an event-driven approach that can eliminate pathogenic proteins rather than merely inhibit their function. It enables irreversible removal of disease-relevant proteins through endogenous proteolytic pathways. This approach utilises bifunctional PROTACs and non-functional molecular glues to induce proximity between a target protein and an E3 ubiquitin ligase, promoting ubiquitination and subsequent proteasome degradation. Unlike conventional occupancy-based inhibitors, degraders exert event-driven pharmacology, allowing sustained suppression of signalling pathways and expanding druggability to proteins lacking classical ligand-binding pockets, including transcription factors and scaffolding proteins. This is gaining prominence in oncology, neurodegeneration, and immune disorders due to its potential for durable target modulation and improved therapeutic specificity. To systematically outline the mechanism, therapeutic relevance, and current developmental constraints associated with targeted protein degradation as an emerging innovation in drug discovery.

Key Words: Targeted protein degradation, PROTACs, Molecular glues, E3 ligase recruitment, Ubiquitin–proteasome system, Ternary complex.

PCOL-OP-25

DUAL-ACTION TRIUMPH: WHY TIRZEPATIDE SURPASSES SEMAGLUTIDE IN WEIGHT LOSS & GLYCEMIC CONTROL

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Semaglutide (a GLP-1 agonist) and tirzepatide (a dual GLP-1/GIP agonist) are important therapies for managing type 2 diabetes and obesity. Both improve glycaemic control and reduce appetite, but tirzepatide's dual mechanism provides enhanced metabolic benefits. This summary compares their efficacy and safety based on key clinical trials, including STEP for Semaglutide and SURPASS/SURMOUNT for tripeptide. Semaglutide 2.4 mg produces around 15% weight reduction over 68 weeks. In comparison, tirzepatide 15 mg achieves approximately 22.5% weight loss over 72 weeks, with lower doses also showing substantial reductions (16–20%). Glycemic Control: Tirzepatide shows superior A1C lowering. The 15 mg dose reduces A1C by about 2.3%, compared to 1.86% with semaglutide 1 mg. A higher proportion of tirzepatide-treated patients achieve target A1C < 7% (92% vs. 81%). Mechanism: Tirzepatide's combined GLP-1 and GIP agonism enhances insulin secretion, reduces glucagon, slows gastric emptying, and improves appetite and visceral fat reduction more effectively than GLP-1 agonism alone. Safety: Both drugs are well tolerated. Gastrointestinal effects such as nausea and diarrhoea occur slightly more often with tirzepatide, but discontinuation rates remain low and comparable between the two agents. Tirzepatide demonstrates greater weight-loss efficacy and superior glycaemic improvements compared to semaglutide, with a similar safety profile. Its dual-hormone action makes it a strong therapeutic option for individuals with type 2 diabetes and obesity.

Key Words: Semaglutide GLP-1 agonist Tirzepatide, Dual GLP-1/GIP agonist, Type 2 diabetes Obesity, management Weight loss efficacy STEP trial SURMOUNT trial SURPASS trial A1C reduction

PCOL-OP-26

ARTIFICIAL INTELLIGENCE–ENABLED DRUG REPURPOSING AND TOXICITY PREDICTION: A CLINICAL PERSPECTIVE ON ACCELERATING SAFER DRUG DEVELOPMENT

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Drug discovery till today had come a long way right from traditional remedies to modern science, it has opened new doors in the field of medicine and cure of many disease conditions, this advancement also lead to the discovery of diverse tools, with that the concern regarding the adverse effects and toxicity has also increased. Artificial intelligence (AI) have also help by identifying the new or novel approaches for previously approved drugs for treatment of new diseases saving the time by avoiding the early stages of

drug development, cost of research and also reducing the risk. Drug repurposing aims to speed-up the treatment development through known safety and effectiveness or comparing, and discovering recent findings related to biomarkers of drug response. Thus the integration of big data with AI, particularly machine learning, is driving significant advancements in toxicology research. It has also proven that the AI algorithms are well-suited for large-scale high dimensional data analysis and predicting the potential drug repurposing. AI had always given the proven benefits in all the ways, including its affordability, analytical strength, and better at spotting hidden patterns than traditional methods. It also rapidly scans vast chemical and biological datasets to uncover unexpected therapeutic potentials of existing drugs. Future development of AI in drug discovery requires better data integration, faster computation, and personalized treatment approaches, and transforming side effects into therapeutic opportunities.

Key Words: Drug discovery, Artificial intelligence, Novel approaches, Toxicology, Machine learning, Drug repurposing.

PCOL-OP-27

ANTIDIABETIC DRUG TIRZEPATIDE

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Tirzepatide is a new and unique medicine used to manage type 2 diabetes. It works by activating two natural hormones—GIP and GLP-1—that help the body control blood sugar. Because it targets both hormones at the same time, it is known as a “twincretin.” This dual action increases insulin release, reduces glucagon levels, slows stomach emptying, and improves the feeling of fullness. Together, these effects help lower blood sugar and support significant weight loss. Results from the SURPASS clinical trials show that tirzepatide reduces HbA1c and body weight more effectively than commonly used GLP-1 drugs and basal insulin. It may also offer added benefits for heart health and overall metabolism, making it suitable for people with diabetes who also struggle with obesity or metabolic syndrome. Tirzepatide is given once a week as a small injection under the skin, which makes it easy and convenient to use. The most common side effects are mild stomach-related issues such as nausea, vomiting, and discomfort, which usually decrease over time and depend on the dose. Overall, tirzepatide represents a major advancement in diabetes care by addressing both high blood sugar and obesity—two key challenges in managing type 2 diabetes.

Key Words: - Tirzepatide - Type 2 diabetes - GIP - GLP-1 - Twincretin - Insulin release - Glucagon levels - Stomach emptying - Weight loss - HbA1c - - Heart health - Metabolism - Obesity - Metabolic syndrome - Injection - Nausea - Vomiting - Diabetes care

PCOL-OP-28

INTEGRATING CELL-PENETRATING PEPTIDES WITH POLYMER–LIPID HYBRID NANOPARTICLES FOR PRECISION CANCER DRUG DELIVERY.

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Polymer lipid hybrid nanoparticles (PLHNs) are an emerging class of nanocarriers that combine the structural stability and drug loading capacity of polymers with the biocompatibility and membrane mimicking properties of lipids. Their surface modification with cell penetrating peptides (CPPs) which are short, positively charged amino acid sequences (such as TAT) has opened new possibilities in targeted anticancer therapy. CPP'S facilitate intracellular transport of diverse therapeutic molecules, including chemotherapeutics, siRNA, proteins, and macromolecules, through mechanisms ranging from direct membrane translocation to receptor-mediated endocytosis. Structural variations of PLHNs (polymer-core lipid shell, monolithic hybrids, polymer-caged liposomes, and erythrocyte membrane-coated systems) allow customization for sustained release, receptor targeting, and immune evasion. Recent studies demonstrate that CPP-functionalized PLHNs enhance tumor-specific uptake, overcome multidrug resistance, and enable dual-drug or gene delivery strategies, thereby improving therapeutic efficacy in cancers such as breast, lung, ovarian, glioblastoma, and hepatocellular carcinoma. Furthermore, their dual functional (therapy+ diagnosis) potential integrating drug delivery with imaging positions CPP-modified PLHNs as a next-generation platform for precision oncology, with ongoing clinical trials and translational research refining their safety, scalability, and receptor-specific targeting.

Key Words: polymer lipid hybrid nanoparticles, cell penetrating peptides, membrane translocation, receptor mediated endocytosis, polymer caged liposomes, etc.

PCOL-OP-29

THERAPEUTIC POTENTIAL OF OMEGA 3 FATTY ACID FOR NEUROLOGICAL DISORDERS

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A nutritional approach could be a promising strategy to prevent or slow the progression of neurodegenerative diseases such as Parkinson’s and Alzheimer’s disease, since there is no effective therapy for these diseases so far. The beneficial effects of omega-3 fatty acids are now well established by a plethora of studies through their involvement in multiple biochemical functions, including synthesis of anti-inflammatory mediators, cell membrane fluidity, intracellular signaling, and gene expression. This systematic review will consider epidemiological studies and clinical trials that assessed the impact of supplementation or dietary intake of omega-3 polyunsaturated fatty acids on neurodegenerative diseases such as Parkinson’s and Alzheimer’s diseases. Indeed,

treatment with omega-3 fatty acids, being safe and well tolerated, represents a valuable and biologically plausible tool in the management of neurodegenerative diseases in their early stages.

Key Words: Alzimherir disease, Parkinson's disease, clinical trials, omega 3 polyunsaturated fatty acids

PCOL-OP-30

BRAIN COMPUTER INTERFACE IN NEUROPHARMACOLOGY

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Brain-computer interfaces (BCIs) acquire brain signals, analyse them, and translate them into commands that are relayed to output devices that carry out desired actions. BCIs do not use normal neuromuscular output pathways. The main goal of BCI is to replace or restore useful function to people disabled by neuromuscular disorders such as amyotrophic lateral sclerosis, cerebral palsy, stroke, or spinal cord injury. From initial demonstrations of electroencephalography-based spelling and single-neuron-based device control, researchers have gone on to use electroencephalographic, intracortical, electrocorticographic, and other brain signals for increasingly complex control of cursors, robotic arms, prostheses, wheelchairs, and other devices. Brain-computer interfaces may also prove useful for rehabilitation after stroke and for other disorders. In the future, they might augment the performance of surgeons or other medical professionals. Brain-computer interface technology is the focus of a rapidly growing research and development enterprise that is greatly exciting scientists, engineers, clinicians, and the public in general. Its future achievements will depend on advances in 3 crucial areas. Brain-computer interfaces need signal-acquisition hardware that is convenient, portable, safe, and able to function in all environments. Brain-computer interface systems need to be validated in long-term studies of real-world use by people with severe disabilities, and effective and viable models for their widespread dissemination must be implemented. Finally, the day-to-day and moment-to-moment reliability of BCI performance must be improved so that it approaches the reliability of natural muscle-based function.

Key Word: Brain-Computer Interface (BCI), Neuropharmacology, Electroencephalography (EEG), Intracortical, Electrocorticographic, Neuroprosthetics, Rehabilitation, Assistive Technology, Neural Signals, Device Control

PCOL-OP-31

NEXT GENERATION CANCER TREATMENT-A NEW BEACON OF HOPE FOR PATIENTS

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Advances in biomedical research over the past decade have catalysed the development of next-generation cancer therapies capable of transforming patient outcomes. These innovative treatments—including immunotherapy, targeted molecular therapy; gene editing, personalized vaccines, and nanomedicine—aim to overcome the limitations of conventional chemotherapy and radiation by offering greater precision, reduced toxicity, and improved therapeutic efficacy. By harnessing the body's own immune system, exploiting tumor-specific genetic alterations, and enabling patient-tailored treatment strategies, next-generation modalities present a significant shift toward more individualized and effective cancer care. Early clinical results demonstrate promising improvements in survival rates, quality of life, and long-term disease control. Despite challenges related to cost, accessibility, and long-term safety, the rapid evolution of these therapies represents a powerful new ray of hope for cancer patients worldwide. Continued research, interdisciplinary collaboration, and equitable deployment are essential to fully realize the potential of this emerging era in oncology.

Key Words: Next-generation cancer therapies Immunotherapy Targeted molecular therapy Gene editing Personalized cancer vaccines Nanomedicine Precision oncology Reduced toxicity Improved therapeutic efficacy Tumor-specific genetic alterations

PCOL-OP-32

BREAST CANCER DIAGNOSIS REIMAGINED: THE RISE OF BIOPSY 2.0 AND ARTIFICIAL INTELLIGENCE

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Breast cancer continues to hold the title of most common cancer among females around the world as it remains a significant contributor to cancer-related deaths. The speed and exactness of diagnosis serve as critical determiners for improved results yet standard biopsy procedures such as Core Needle Biopsy (CNB) and Fine Needle Aspiration (FNA) need better specimen acquiring techniques because of their irregular interpretations and slow diagnostic processes. Biopsy 2.0 emerged through artificial intelligence technologies to provide better diagnostic accuracy by integrating AI systems during biopsy evaluation but also guarantees efficient personalized outcomes. AI applications in breast cancer diagnosis span multiple domains. CNN-based deep learning models achieve diagnosis performance like experienced pathologists when they analyze

WSIs to diagnose tumors and determine their staging and identify receptor activities. AI systems support current liquid biopsy techniques by analysing circulating tumor DNA (ctDNA) together with Circulating Tumor Cells (CTCs), which enables early disease detection and proper

Treatment monitoring as well as prognosis of recurrence. Healthcare providers obtain better risk assessments and create person-specific treatment plans through AI predictive models, which handle clinical information with molecular data. The adoption of new Biosystems for clinical practice encounters present barriers due to data prejudice and regulatory constraints, and interpretation barriers, which delay widespread implementation. This investigation explores current developments with clinical importance of AI-based breast cancer biopsy approaches alongside an assessment of Biopsy 2.0 as a potential system to revolutionize oncological testing and prediction.

Key Words: Biopsy 2.0, Breast cancer, Artificial Intelligence, Liquid Biopsy, Histopathology.

PCOL-OP-33

CLUSTERED REGULARLY INTERSPACED SHORT PALINDROMIC REPEATS

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A series of recent discoveries harnessing the adaptive immune system of prokaryotes to perform targeted genome editing is having a transformative influence across the biological sciences. The discovery of Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR) and CRISPR-associated (Cas) proteins has expanded the applications of genetic research in thousands of laboratories across the globe and is redefining our approach to gene therapy. Traditional gene therapy has raised some concerns, as its reliance on viral vector delivery of therapeutic transgenes can cause both insertional oncogenesis and immunogenic toxicity. While viral vectors remain a key delivery vehicle, CRISPR technology provides a relatively simple and efficient alternative for site-specific gene editing, obliviating some concerns raised by traditional gene therapy. Although it has apparent advantages, CRISPR/Cas9 brings its own set of limitations which must be addressed for safe and efficient clinical translation. This review focuses on the evolution of gene therapy and the role of CRISPR in shifting the gene therapy paradigm. We review the emerging data of recent gene therapy trials and consider the best strategy to move forward with this powerful but still relatively new technology.

Key Words: Gene therapy, CRISPR/Cas9, homology-directed repair (HDR), non-homologous end joining (NHEJ), clinical trial, ethics

PCOL-OP-34

AFTER COVID-19-THE NEW ERA

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The post-COVID-19 period marks the beginning of a transformative new era characterized by rapid innovation, redefined social norms, and evolving global priorities. The pandemic exposed critical vulnerabilities in health systems, supply chains, digital infrastructure, and governance, prompting nations and institutions to accelerate reforms and adopt more resilient models. In healthcare, the rise of telemedicine, genomic surveillance, and data-driven public health strategies signals a shift toward more proactive and integrated care. Economically, remote work, platform-based labor, and digital commerce have restructured workplaces and consumer behaviour, creating new opportunities while intensifying the need for digital literacy and equitable access. Socially, the crisis reshaped communities' values, elevating mental health, social well-being, and collective responsibility. Education systems embraced hybrid learning, encouraging pedagogical flexibility and technological investment. Environmentally, the pandemic reinforced the urgency of sustainable development, revealing both the fragility and adaptability of human activity. As societies adjust to long-term recovery, the new era is defined not merely by technological adoption but by an overarching emphasis on resilience, inclusivity, and preparedness. Understanding these shifts is essential for building systems capable of withstanding future global disruptions and fostering a more adaptive, interconnected world.

Key Words: Transformative, rapid innovation, pandemic, adaptability, public health strategy.

PHARMACOGNOSY

PCOG-OP-01

BIOCHEMICAL AND IN SILICO ASPECTS OF ACTIVE COMPOUNDS FROM NYCTANTHES ARBOR-TRISTIS FLOWER AS ANTIDIABETIC AGENTS: A COMPREHENSIVE REVIEW

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Nyctanthes arbor-tristis (Night Jasmine) is an Ayurvedic medicinal plant valued for multiple therapeutic properties, including antidiabetic activity. Its flowers contain rich phytochemicals such as flavonoids, glycosides, phenolics, and alkaloids. This review highlights the biochemical mechanisms and computational analyses (in silico studies) supporting the antidiabetic potential of its bioactive constituents. Experimental evidence demonstrates glucose-lowering activity through enzyme inhibition, antioxidant defense, and metabolic regulation. Molecular docking and ADMET assessments further validate drug-likeness and multi-target activity. Integrating biochemical and in silico evidence positions N. arbor-tristis flowers as promising candidates for developing novel antidiabetic therapeutics.

Keywords: Nyctanthes arbor-tristis, antidiabetic agents, phytochemicals, α-glucosidase inhibition, molecular docking, drug discovery

PCOG-OP-02

PHARMACOGNOSY IN PERSONALISED MEDICINE

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Personalised medicine represents a modern approach to healthcare in which therapeutic interventions are tailored to an individual’s genetic profile, lifestyle, environment, and disease conditions. Pharmacognosy, the scientific study of medicinal plants and natural products, plays a significant role in this emerging field due to the wide diversity and therapeutic richness of bioactive compounds derived from nature. Individual variations in genes, metabolic pathways, gut microbiota, and drug-metabolizing enzymes influence how different patients respond to the same herbal preparation. At the same time, natural products themselves exhibit variability based on plant chemotypes, environmental conditions, and

extraction processes, highlighting the need for proper standardization and quality control. Integrating pharmacognosy with pharmacogenomics, metabolomics, and biomarker analysis helps identify patient-specific responses to herbal medicines and reduces the risk of toxicity or herb–drug interactions. This combined approach enables the design of personalized herbal therapies, optimizes therapeutic outcomes, and strengthens the scientific basis of traditional medicine systems. Although challenges remain—such as variability in herbal preparations, limited clinical trials, and regulatory constraints—the fusion of pharmacognosy and personalised medicine offers promising future opportunities for safer, more effective, and individualized natural healthcare solutions.

Keywords: Pharmacogenomics,metabolomics,natural products, herbal drug interactions, phytochemicals

PCOG-OP-03

BEE VENOM(MELITTIN) : NATURE'S FAST ACTING HOPE FOR BREAST CANCER CELL

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Melittin , a major component of bee venom , demonstrates potent and rapid cytotoxic effects on breast cancer cells , including those resistant to conventional chemotherapy . Its mechanism of action involves physically disrupting the cell membrane through pore formation , leading to immediate cell lysis and death , contrasting with the slower , programmed cell death (apoptosis) induced by many traditional treatments . Traditional breast cancer often face challenges such a systemic effects and drug resistance .Crucially ,melittin exhibits a high degree of selectivity ,effectively targeting malignant cells while causing minimal harm to surrounding healthy tissue .This raid,non apoptotic killing mechanism positions melittin and its synthetic derivatives as promising candidates for novel targeted breast cancer therapies . This abstract outlines the mechanism of action and challenges and strategies associated with therapeutic application.

Keywords: Melittin, chemotherapy,apoptosis,novel,therapeutic application

PCOG-OP-04

"NATURE TO NEW": SPONDIAS PINNATA BIOENGINEERED AGNP'S AS POTENTIAL ANTI-CANCER AGENTS AGAINST MCF 7 CELLS

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Biosynthesis of silver nanoparticles was done by hot plate method and synthesized silver nanoparticles are characterized by SEM, TEM, XRD, Nanoparticle analyzer, FTIR and UV (Size

and morphology, crystalline nature & size , zeta potential & charge, Functional groups and confirmation of synthesis of silver nanoparticles) respectively. Extraction by soxhelt apparatus and column chromatography for isolation of compounds. Structure elucidation was confirmed by IR, NMR, MASS spectra's. Anticancer activity was performed on MCF7 cells by In-vitro (MTT Assay).β-sitosterol was isolated from n-hexane. Preliminary confirmation from UV-Visible peak around 424 nm , SEM(50nm), TEM(Spherical), XRD(22.5nm), zeta potential(-21.2mV & -ve charge) and FTIR(C-H,O-H,C=C stretching and bending of alkane, alkene and aromatic groups of lipds proteins,etc) Anticancer activity IC50 value was 58.41±0.864 more than standard drug (IC50 is 6.36±0.317.An eco-friendly, rapid & convenient method was reported for synthesis of silver nanoparticles. β-sitosterol was isolated and Anticancer activity was determined.

Keywords: Sliver Nanoparticles, TEM, Anticancer

PCOG-OP-05

GREEN EXTRACTION TECHNOLOGIES: A MODERN EXTRACTION TECHNIQUE

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Extraction of phytochemicals from plant material is a crucial step in the utilization of plants for pharmaceuticals, nutraceuticals, food, cosmetics, and related industries. Traditional extraction methods such as maceration, Soxhlet extraction, steam distillation etc. are well established, but often suffer from drawbacks including long extraction times, high solvent consumption, thermal degradation of active compounds, and environmental toxicity. In recent years, green extraction techniques have been developed or adapted to address these issues, improving yield, reducing solvent usage, energy input, and enhancing sustainability. Key techniques covered include solvent extraction (traditional), Soxhlet, maceration, steam
distillation; and more modern green variants such as ultrasoundassisted extraction (UAE), microwaveassisted extraction (MAE), supercritical fluid extraction (SFE), pressurized liquid extraction (PLE/ASE), enzymeassisted extraction (EAE), pulsed electric field (PEF), subcritical water extraction (SWE), and hybrids of these.

Keywords: Phytochemicals, green extraction, ultrasoundassisted extraction, microwave assisted extraction, supercritical fluid extraction

PCOG-OP-06

MARINE PHARMACOLOGY

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Marine pharmacognosy is an emerging and highly innovative field that focuses on the exploration, identification, and utilization of bioactive compounds derived from marine organisms.Oceans cover more than 70% of the Earth's surface and host an enormous diversity of life forms, including algae,sponges, tunicates, corals, sea cucumbers, and marine microorganisms. These organisms are continuously exposed to extreme environments such as high pressure, low light, and intense competition, which drives them to produce unique secondary metabolites with remarkable structural diversity and potential biological activities.

Several clinically important drugs have originated from marine sources , such as Cytarabine, Trabectedin, Ziconotide, and Eribulin. These compounds exhibit significant therapeutic potential in anticancer, antiviral, anti-inflammatory, analgesic, and neuroprotectiveapplications.Moderntechniques including, supercritical fluid extraction, chromatography, spectroscopy, marine metagenomics, and bioreactor - based cultivation have expanded the ability to isolate and characterize novel marine compounds more efficiently.Despite its tremendous promise, marine drug discovery faces challenges such as sustainable harvesting, difficulty in culturing deep- sea organisms, and the high cost of exploration. However, rapid advancements in marine biotechnology, synthetic biology, and AI- driven compound prediction are opening new avenues for future pharmaceutical research.

Keywords: Marine pharmacognosy, Marine natural products, Bioactive compounds

PCOG-OP-07

FORMULATION, DEVELOPMENT, OPTIMIZATION BY APPLYING QBD OF GALLIC ACID ETHOSOMES INCORPORATED IN SUPPOSITORY FOR ANTI- INFLAMMATORY EFFECT IN-VIVO AND IN-VITRO

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Aim of the present studies is formulation, development and optimization of gallic acid ethosomes by applying QBD 3^2 factor applying, ethosomes are incorporated in suppository as cocoa butter base. Gallic acid is a polyphenolic compound found in many plants, such as tea leaves, sumac and oak bark. It is a white solid with strong antioxidant, anti-inflammatory, antimicrobial, and anticancer properties, although it can appear brown due to oxidation. Gallic acid has a variety of uses in industries like food, ink, dye, and pharmaceuticals. Ethosomes are prepared by cold

methods. Ethosomes characterization are IR, SEM, ZETA Potential and particle size index. By applying QBD formulation-4 is optimized. Zeta potential -38.8 mV and PDI- 796.2 nm. The evaluation parameters of suppositories such as visual characterization. Length and width, weight variation, friability, melting point, hardness test, liquefaction, disintegration test, in-vitro dissolution study. In-vitro protein denaturation methods carried out for anti-inflammatory effect comparing with
diclofenac sodium suppositories, gallic acid suppository has shown significant activity.
Keywords: Gallic acid, QBD, Cocoa butter

PHARMACY PRACTICE

PP-OP-01

DRUG REACTION WITH EOSINOPHILIA AND SYSTEMIC SYMPTOMS (DRESS) SYNDROME DUE TO ISONIAZID AND ETHAMBUTOL- A CASE STUDY

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Drug reaction with eosinophilia and systemic symptoms (DRESS) syndrome is a severe, potentially life-threatening condition precipitated by the reaction of therapeutic drugs. It is a severe idiosyncratic drug reaction with a long latency period that occurs primarily after exposure to antibiotics, anti-inflammatory, anti-tubercular, and anti-convulsant drugs. The prevalence of potential antitubercular therapy (ATT)-induced DRESS is 1.2%.

A 71-year-old female patient after 5 weeks of starting ATT complained of fever, vomiting, dizziness, and generalized itchy maculopapular rash over the body. It was associated with marked eosinophilia (absolute eosinophil count 3094 cell/mm3, 36% in peripheral blood smear) Fever, rash, lymphadenopathy, and internal organ involvement with marked eosinophilia constitutes the major clinical manifestations of DRESS. RegiSCAR scoring system is usually used to diagnose DRESS. Identification of the culprit drug is based on the temporal correlation of symptoms with drug exposure and rechallenge test, patch test and lymphocytic transformation tests may be valuable adjunctive tools. Treatment includes withdrawal of offending agent and use of topical or systemic corticosteroids, antihistamines, cyclosporine or JAK inhibitor with clinical judgement.

The reported case emphasizes the importance of thorough medical history and including drug reactions in differential diagnosis.

Keywords: Hypersensitivity reaction, Anti-tubercular drugs, drug reaction, maculopapular rash, Eosinophilia.

PP-OP-02

PERSONALISED MEDICINE APPROACHES IN CERVICAL CANCER TREATMENT AND PREVENTION

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Cervical cancer remains a major cause of morbidity and mortality among women worldwide, with the heaviest burden seen in low- and middle-income countries such as South Africa. In these settings, the prevalence of high-risk human papillomavirus (HPV) infection and co-existing immunosuppressive conditions, particularly HIV, significantly increases vulnerability to cervical carcinogenesis. HPV, the most common sexually transmitted infection, alters the vaginal microbiome by increasing anaerobic bacterial diversity, which correlates with progressive cervical dysplasia. Additionally, widespread resistance to standard chemotherapeutic agents such as cisplatin and carboplatin further complicates treatment outcomes. Growing evidence highlights the need for precision approaches across the prevention–treatment continuum. Personalized risk-based screening (PRBS), which incorporates individual factors such as genetics, environmental exposures,

immunological status, and sexual health risk, offers a more efficient framework for early detection. As false-positive rates in population-wide screening remain high, PRBS provides a targeted strategy to optimize cervical cancer prevention and clinical use.

Keywords: cervical cancer; human papillomavirus (HPV); HIV co-infection; vaginal microbiome; chemo resistance; cisplatin; precision medicine; personalized risk-based screening

PP-OP-03

NANOROBOTICS: The future of healthcare

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Nanotechnology, particularly nanorobotics, has emerged as a transformative force in modern medicine. Nanorobots, designed at the molecular scale, hold promise for a range of medical applications, including targeted drug delivery, early disease diagnostics, minimally invasive surgeries, and precise infection control. Their unique ability to interact with biological systems at the cellular level opens avenues for significant advancements in treatment protocols, potentially overcoming current limitations in traditional therapies. This review delves into the development, mechanisms, and diverse medical applications of Nanorobots, highlighting their structural components, energy sources, and propulsion methods. Additionally, we explore specific case studies in cancer treatment, infection control, and surgical innovations, assessing both the advancements and challenges associated with nanorobotics technologies. The goal is to present a comprehensive overview that underscores the potential of Nanorobots to revolutionize patient care and set the stage for future research in this burgeoning field.

Keywords: Nanorobotics, drug delivery, diagnostics, surgery, propulsion.

PP-OP-04

MICROBIOME-BASE THERAPEUTICS

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Microbiome-base therapies are treatments that modulate the microorganisms living in or on body to restore microbial balance and treat diseases. The Gastrointestinal microbiome is known to play an integral role in overall homeostasis; however, alterations can lead to the development & progression of disease. Symbiotic microorganisms inhabiting the gastrointestinal tract promote health by decreasing susceptibility to infection and enhancing resistance to a range of diseases. These complex communities contain between 100 to 1000 bacterial species all of which have the ability to interact with the host in different ways. The concept of altering the gastrointestinal microbiome to improve health outcomes is now established in modern medicine. Increasing understanding of the impact of the microbiome on the mammalian host and recent efforts to culture and characterize intestinal symbiotic microorganisms that produce or modify metabolites that impact disease pathology. Manipulation of the intestinal microbiome has the great potential to reduce the incidence and/or severity of a wide range of human conditions and diseases. Variety of approaches is used to

treat diseases by manipulating the body's microbial communities, including using prebiotics, probiotics, and symbiotic to add beneficial bacteria, fecal microbiota transplantation (FMT) to restore a healthy microbial balance and phage therapy to target specific harmful bacteria. This therapy is applicable in treating diseases like gastrointestinal disorders, metabolic disorders, immune-mediated diseases, cancer, neurological disorders and others.

Keywords: Microbiome-base therapies, gastrointestinal microbiome, symbiotic, bacteria's, probiotics, post biotics, probiotics, fecal microbiota transplantation, microbial balance, gastrointestinal disorders, immune mediated disorders, cancer, neurological disorders.

PP-OP-05

ASSESSMENT OF EFFECTIVENESS OF DECONGESTIVE STRATEGIES IN PATIENTS WITH ACUTE DECOMPENSATED HEART FAILURE AND ITS IMPACT ON QUALITY OF LIFE

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Acute decompensated heart failure (ADHF) is a leading cause of hospitalization and is frequently marked by significant systemic and pulmonary congestion. Suboptimal response to loop diuretics limits effective decongestion in many patients. Acetazolamide has emerged as a simple, low-cost adjunct that may enhance diuretic efficiency.

This prospective interventional study was conducted at two tertiary care hospitals in Hyderabad. Adults hospitalized with clinically confirmed ADHF were enrolled and assigned to either an acetazolamide-treated group or a standard-therapy control group. Baseline demographics, clinical parameters, congestion scores, body weight, and Minnesota Living with Heart Failure Questionnaire (MLHFQ) scores were assessed at admission, discharge, and three months.

All 140 enrolled patients completed follow-up. The acetazolamide-treated group showed a more pronounced reduction in congestion scores from Day 1 to discharge and at three months compared with the control group. Greater improvements in functional status and quality of life were observed in the acetazolamide group, reflected by consistently lower MLHFQ scores at subsequent time points. Patients receiving acetazolamide demonstrated larger reductions in body weight, consistent with enhanced decongestion, and had a shorter duration of hospital stay. Overall, clinical improvement occurred earlier and was sustained over three months in the acetazolamide group.

Adjunctive acetazolamide therapy resulted in faster, more effective, and longer-lasting decongestion in ADHF, with parallel improvements in weight reduction, functional status, and quality-of-life measures. These findings support acetazolamide as a beneficial and safe addition to standard diuretic therapy in the management of ADHF.

Keywords: Acute Decompensated Heart Failure; Acetazolamide; Decongestion; Diuretic Therapy; Quality of Life; MLHFQ; Congestion Scores; Heart Failure Management.

PP-OP-06

EVALUATION OF PREOPERATIVE ANXIETY AND ITS MANAGEMENT STRATEGIES AND THEIR EFFECTS ON ELECTIVE ORTHOPEDIC SURGERY OUTCOMES.

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Preoperative anxiety is a common emotional response among patients undergoing elective orthopedic surgeries and has been linked to adverse perioperative and postoperative outcomes. Despite its relevance, routine screening and targeted management remain limited. This study aimed to evaluate preoperative anxiety levels, assess management strategies, and determine their effect on surgical outcomes.

A prospective non interventional study was conducted among 50 adult patients scheduled for elective orthopedic procedures. Preoperative anxiety was assessed using STAI (State trait anxiety scale). Patients with elevated anxiety received pharmacological anxiolytics or non-pharmacological interventions, including counseling, breathing exercises, and music therapy. Outcomes assessed included anesthesia requirement, hemodynamic variations, postoperative VAS pain scores, analgesic consumption, complications, length of hospital stay, and patient satisfaction.

Among 50 patients, 20% (n = 10) exhibited moderate–severe preoperative anxiety. Anxious patients required approximately 18% higher anesthetic doses and demonstrated greater intraoperative hemodynamic fluctuations. Their mean postoperative VAS pain score was higher compared to non-anxious patients. Analgesic requirements were also increased, with anxious patients requiring 30% more opioid equivalents within 24 hours postoperatively. Length of hospital stay was extended by an average of 1.2 days in the anxious group. No major complications occurred, but minor issues such as delayed mobilization were more frequent. Patient satisfaction scores were significantly higher in those who received structured anxiety management.

Preoperative anxiety negatively affects anesthetic needs, pain perception, recovery duration, and patient satisfaction. Routine anxiety screening and implementation of structured management strategies can improve perioperative stability and enhance postoperative outcomes in elective orthopedic surgeries

Preoperative anxiety, pain, STAI, VAS Scale, patient satisfaction

Keywords: Preoperative anxiety, pain, STAI, VAS Scale, patient satisfaction.

PP-OP-07

SUBACUTE SCLEROSING PANENCEPHALITIS (SSPE): A DEVASTATING MEASLES COMPLICATION

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Subacute sclerosing pan encephalitis (SSPE) is a rare, progressive, and fatal complication of measles that appears 7–10 years after infection, mainly in children from low-vaccination areas. It is caused by a persistently mutated measles virus in the CNS, leading to chronic inflammation and progressive neuronal damage.SSPE presents with cognitive decline, behavioral changes, myoclonus, seizures, visual problems, and later severe neurological deterioration. Diagnosis is based on symptoms, high anti-measles antibodies in CSF, periodic EEG complexes, and imaging showing white matter changes. There is no cure; treatment is mostly supportive with limited benefit from antivirals. SSPE emphasizes the need for strong measles vaccination and early clinical recognition.

Keywords: Subacute sclerosing pan encephalitis, Measles virus, progressive Neurodegeneration, Persistent mutated virus, Measles vaccination.

PP-OP-08

SOFTWARE AS A MEDICAL DEVICE (SAMD)

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Software as a Medical Device, SaMD, refers to software developed for medical purposes but is standalone, independent of hardware. Its core principle involves advanced algorithms and data processing to deliver medical utility-such as diagnosis or treatment-on general-purpose computing platforms, decoupling the medical function from the hardware. This independence enables benefits in screening, disease management, and predictive analysis. Key examples include AI analyzing MRI images for cancer detection, mobile apps tracking glucose for treatment adjustments, and software detecting arrhythmia via heart rate signals. Primarily used by clinicians for decision support and patients for self-management, SaMD transforms data into actionable insights. However, it faces strict regulation by bodies like the FDA and HSA to ensure safety, requiring compliance with standards like ISO 13485 and IEC 62304. In conclusion, SaMD is a vital healthcare tool, but its deployment demands rigorous adherence to global regulatory frameworks.

Keywords: Software as a Medical, Patient Safety, Device Digital Health, Artificial Intelligence (AI), Mobile Health (mHealth), Patient Self-Management, FDA (Food and Drug Administration), HSA (Health Sciences Authority), Medical Device Regulation (MDR).

PP-OP-09

VANZACAFTOR-TEZACAFTOR-DEUTIVACAFTOR: ADVANCEMENTS IN NEXT-GENERATION TRIPLE COMBINATION THERAPY FOR PEDIATRIC CYSTIC FIBROSIS MANAGEMENT

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A next-generation triple-combination therapy—vanzacaftor-tezacaftor-deutivacaftor—was evaluated in children aged 6–11 years with cystic fibrosis in the RIDGELINE (VX21-121-105) phase 3, single-arm trial. The study enrolled pediatric patients with at least one responsive CFTR variant, assessing safety, tolerability, and efficacy over 24 weeks. Results demonstrated the regimen was generally well tolerated, with most adverse events being mild or moderate and related to underlying cystic fibrosis. Improvements were observed in lung function and sweat chloride concentrations, with a majority achieving levels below the diagnostic threshold, and over half reaching normal sweat chloride values. The promising clinical and biomarker results suggest restoration of near-normal CFTR function and support ongoing regulatory review, highlighting the regimen's potential as an important new therapeutic option in pediatric cystic fibrosis management.

Keywords: Vanzacaftor-tezacaftor-deutivacaftor, Triple-combination therapy, Cystic fibrosis, Children 6–11 years, RIDGELINE trial (VX21-121-105), Phase 3 Single-arm study, CFTR variant, Safety, Tolerability, Efficacy, Adverse events, Lung function improvement, Sweat chloride reduction, Diagnostic threshold, Normal sweat chloride, CFTR function restoration, Biomarker response, Regulatory review, Pediatric cystic fibrosis management.

PP-OP-10

L-ARGININE SUPPLEMENTATION IN INTRAUTERINE GROWTH RESTRICTION AND ITS CORRELATION WITH FETAL OUTCOME

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IUGR; a syndrome wherein the fetal development is pathologically limited in utero; continues to be a significant public health risk; as it impacts not only the new born phase; but also the adult phenotype and quality of life.

This study is aimed to decide the efficacy of L-Arginine in fetal development and also adult phenotype and quality of life.

To deliver that L- Arginine places crucial function in fetal nourishment oxygenation; resulting in an improvement of intra-uterine growth restriction; an increase in birth weight, and a decrease in neonatal morbidity and death.

A prospective observational study was conducted, with a sample size of 124 patients suffering IUGR and prescribed with L-Arginine; The SPSS statistical tool, version 16.0 was used for statistical analysis.

There was an increase in baby weight after supplementation of L-Arginine; with a good APGAR score and there was a decrease in intra-uterine deaths and cesarean section.

There was an increase in the body weight and also improved perinatal outcomes following administration of L-Arginine to IUGR – a complicated pregnancy.
Discussion: IUGR leads to increased risk of perinatal problems including hypoxemia, low APGAR scores and cord blood acculturation, which may have severe implications on neonatal health.
Key words: IUGR; L-Arginine: neonatal outcome; oligohydramnios.

PP-OP-11

AN OBSERVATIONAL STUDY TO EVALUATE THE EFFICACY AND QUALITY OF LIFE PROVIDED BY NETUPITANT AND PALONOSETRON REGIMEN AGAINST ONDANSETRON IN MANAGEMENT

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This study is aimed towards stopping and managing chemotherapy-induced nausea and vomiting is an important part of a cancer patient's treatment plan.
In this study, we evaluated the efficacy and quality of life provided by two commonly used antiemetic regimens in the management and prevention of chemotherapy-induced nausea and vomiting (CINV) in cancer patients. We assessed patient-reported nausea, vomiting, use of rescue medication, and Functional Living Index Emesis (FLIE) questionnaire results, and used them as parameters to make comparisons. We also examined the percentage of patients showing complete response (CR; no emesis and non-use of rescue antiemetic's), and the impact of CINV on patient's daily life during the acute and delayed phases.
The results show that the complete response is achieved by 26 patients in group-B and 18 patients in group-A, from the total 60 patients, while the FLIE scores indicated better quality of life is maintained in group-B (76.6%).
Treatment with Netupitant and Palonsetron offers a greater cure for chemotherapy -induced nausea and vomiting in managing a cancer patient's treatment plan than Ondansetron. Patients treated with Netupitant and Palonsetron have reported higher quality of life while receiving chemotherapy, with increased fewer frequency and severity of episodes of nausea and vomiting.
In the study, the predominance of Netupitant and Palonosetron regimen to Ondansetron was demonstrated.

Keywords: Netupitant; Palonosetron; Ondansetron; Chemotherapy induced nausea and vomiting.

PP-OP-12

FROM CODE TO CURE: HOW GENERATIVE AI DESIGNED A DRUG IN 46 DAYS

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Traditional pharmaceutical research is currently facing a productivity crisis, characterized by spiraling costs (>$2.6 billion per drug) and decade-long development timelines with a 90% failure rate in clinical trials. We will explore a paradigm shift in drug discovery: the transition from serendipitous discovery to Generative AI-driven engineering.
Leveraging the foundational breakthroughs of Alpha Fold (awarded the 2024 Nobel Prize in Chemistry), Generative AI has evolved from simple data analysis to de novo molecular design. This

presentation examines how AI models, similar to Large Language Models (LLMs), are now capable of "writing" chemical structures with specific biological properties.
The core of the presentation focuses on the landmark case study of Insilco Medicine, which utilized generative adversarial networks (GANs) to discover a novel target and design a drug candidate for Idiopathic Pulmonary Fibrosis (ISM001-055). This process, which typically requires nearly five years, was achieved in just 46 days, marking the first time a fully AI-generated drug has reached Phase II clinical trials. By visualizing the massive reduction in time and resources, this presentation demonstrates how AI acts not merely as a tool, but as a "New Chemist" that promises to deliver safer, more effective medicines at a fraction of the traditional cost.

Keywords: Generative AI, Drug Discovery, Alpha Fold, Insilco Medicine, De Novo Design, Idiopathic Pulmonary Fibrosis, Artificial Intelligence in Pharma.

PP-OP-13

ORGAN-ON-A-CHIP TECHNOLOGY

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Current methods for testing new drugs and understanding human disease are often limited by the use of animal models and 2D cell cultures, which fail to accurately replicate human physiology. Organ-on-a-Chip (OoC) technology addresses this limitation by replicating the complex structures and functions of human organs on microfluidic devices.
The purpose of this presentation is to provide an overview of OoC technology, its applications, and its potential to revolutionize the way we approach human disease modeling and drug testing.
OoC devices are engineered to mimic the mechanical and biochemical cues of human organs, such as the lung, liver, and kidney. These microfluidic devices are lined with living human cells, which recreate the complex interactions between cells, tissues, and organs.
OoC models have shown promising results in predicting drug toxicity, modeling human diseases, and accelerating personalized medicine approaches. For example, OoC models have been used to study cancer progression, predict drug-induced liver injury, and develop novel treatments for cardiovascular diseases.
By providing a more accurate and human-relevant platform for disease modeling and drug testing, Organ-on-a-Chip technology has the potential to revolutionize biomedical research and drug development, ultimately leading to safer and more effective treatments for human diseases.
Keywords: Organ on a chip, Microfluidics, Biomedical research, drug development, disease modeling, in vitro models, human organs.

PP-OP-14

DRESS/DIHS SYNDROME INDUCED BY PROPYLTHIOURACIL: A CASE REPORT

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Drug reaction with eosinophilia and systemic symptoms (DRESS), also known as Drug-induced hypersensitivity syndrome (DiHS), is a severe adverse drug reaction. Propylthiouracil, a member of thiouracil group, is widely used in medical treatment of hyperthyroidism.

A 38-year-old female was treated with methimazole for hyperthyroidism at first. 4weeks later, the patient developed elevated liver transaminase so methimazole was stopped. After liver function improved in 2 weeks, medication was switched to propylthiouracil therapy. Propylthiouracil is a rare cause of the DRESS/DiHS syndrome, which typically consists of severe dermatitis and various degrees of internal organ involvement.

Keywords: Propylthiouracil, Drug reaction with eosinophilia and systemic symptoms (DRESS), Drug-induced hypersensitivity syndrome (DiHS).

PP-OP-15

UNDERSTANDING THE FOETAL HEART ORGANOIDS: A REVOLUTION IN UPCOMING DISCOVERIES

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Human Fetal Organoids is an Emerging and most interesting topic In - Vitro studies. Organoids are the 3D self-organizing structures that recapitulate chamber-specific cardiomyocytes, pacemaker-like cells, epicardium, endocardium, cardiac fibroblasts, and in advanced vascularized models, a primitive coronary-like network. The Human Fetal Heart is the first functional organ to fully develop in the embryo. This allows the research to study its organization in the body. It emphasizes on the Foetal Cardiac Phenotype and Genotype. It detects the Foetal anomalies like cardiovascular diseases and its impact on the other organs like Brain, Lungs, and Liver etc. This can be studied by Assembloids (Fused Organoids like combining Heart – Brain, Heart – Lungs, Heart – Kidneys). Although the Organoids of tissues like those of intestines and Brain were developed many years ago, it is for the first time that Heart Organoids were not reported recently. This Organoids are prepared from the Fetal Progenitor cells [e.g.: from Amniotic Fluid or Tracheal Fluid procedures during Fetoscopic Endotracheal Occlusion (FETO)] these organoids are used to detect the Mutations specific defects, Drug Induced Anomalies like Aspirin induced Intra uterine bleeding, Thalidomide induced Terato toxicity.

By this model we can predict the complications that might be faced by the fetus in future from the parents who have Diabetes, Hypertension etc. [Impact of parent's disease state in fetal health]. Through these findings we can overcome the disease in the future by targeting specific targets [E.g.: Enzymes, Genes] in the body and making new strategies to overcome the happening. Human Fetal Organoids can aid the medical field in Post – Diagnosis Prognosis but not in the initial defects or abnormalities.

Keywords: Organoids, Congenital Heart Disease, Congenital Diaphragmatic Hernia, Mulkerian Duct Anomalies.

PP-OP-16

GENETIC VARIABILITY IN DRUG-METABOLIZING ENZYMES AMONG INDIAN SUBGROUPS AND ITS IMPLICATION IN PRECISION MEDICINE USING PHARMACOGENOMICS

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The Indian population represents one of the most genetically diverse populations in the world, with multiple ethnic, linguistic, and regional subgroups. This diversity contributes to significant inter-individual and inter-subgroup variability in drug metabolism. Pharmacogenomics—particularly the study of genetic polymorphism in drug-metabolizing enzymes such as CYP450 isoenzymes—plays a critical role in understanding differential drug responses, adverse drug reactions (ADRs), and therapeutic failures. It focuses on the prevalence of key Pharmacogenomic variants in CYP2C19, CYP2D6, CYP3A5, CYP2C9, and NAT2 among major Indian subgroups and explores their clinical implikbhargavik1@gmail.comcations in precision medicine. The findings highlight the urgent need to integrate pharmacogenomics testing into clinical decision pathways in India to optimize treatment outcomes and reduce medication-related risks .Testing is done once in a lifetime nowadays AI driven pharmacogenomics test is done which promises precise medication with better therapeutic outcome. It can play a key role in chronic disease and its management, treatment as ADRs can be prevented and corrected at genetic level. It is still an emerging topic in the modern era which is mostly practiced in the western countries such as the USA and in recent times, India has also started using it in hospitals such as AIG. etc.

Keywords: pharmacogenomics, precise medicines, drug metabolism, ADRs prevention, pharmacogenomics testing**.**

PP-OP-17

HEMGENIX: ONE TIMEGENE THERAPY FOR HAEMOPHILIA B

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Hemophilia B is a rare X-linked recessive hereditary disease of the hemostasis system resulting from abnormalities in the F9 gene, which codes for blood coagulation factor IX and is located on the long arm of the X chromosome, resulting in recurrent bleeding and lifelong prophylaxis. HEMGENIX (etranacogene dezaparvovec drlb) is a single-dose AAV5 (Adeno-Associated Virus serotype 5) -mediated gene therapy delivering the high-activity FIX-Padua gene to hepatocytes, enabling sustained endogenous FIX production. In the phase III HOPE-B trial, 54 adult males with moderate-to-severe Hemophilia B received a single intravenous infusion of HEMGENIX (2×10^{13} genome copies/kg). At four years, mean FIX activity remained stable at 37 IU/dL, annualized bleeding rate decreased by ~90% (4.16 → 0.40/year), and 94% of participants were free from continuous prophylactic therapy. Treatment was well

tolerated; transient liver enzyme elevations were managed with corticosteroids, and no FIX inhibitors or serious treatment-related adverse events were reported.

HEMGENIX provides durable FIX expression, significant reduction in bleeding, and long-term independence from prophylactic therapy, representing a transformative advance in Hemophilia B management.

Keywords: Hemophilia B, Hemostasis, Hemgenix, Gene Therapy, Aav5.

PP-OP-18

AI-BASED VACCINE DESIGN

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The COVID-19 pandemic has underscored the critical importance of effective vaccines, yet their development is a challenging and demanding process. It requires identifying antigens that elicit protective immunity, selecting adjuvants that enhance immunogenicity, and designing delivery systems that ensure optimal efficacy. Artificial intelligence (AI) can facilitate this process by using machine learning methods to analyze large and diverse datasets, suggest novel vaccine candidates, and refine their design while predicting their performance with high accuracy.AI-driven tools enable rapid epitope prediction, antigen mapping, and structural modeling of viral proteins, significantly reducing the time required to identify promising immunogenic targets. Deep learning models can analyze mutation patterns, helping scientists anticipate emerging variants and design broader, more adaptable vaccines. Additionally, AI contributes to adjuvant discovery by screening vast chemical libraries, optimizing vaccine formulations, and determining ideal dose–response relationships. Beyond biological design, AI also plays a vital role in modeling vaccine distribution systems, forecasting demand, and improving supply chain resilience in real-world settings. Its applications extend to predicting immune responses across different populations, supporting personalized vaccination strategies, and enhancing global preparedness against future outbreaks. However, the integration of AI into vaccine development raises challenges and ethical concerns, including data privacy, algorithmic bias, and the sensitivity of biomedical information. Ensuring high-quality training data, transparent models, and responsible implementation is essential. Overall, AI has immense potential to accelerate vaccine development, improve precision, and strengthen public health responses, provided it is applied thoughtfully and ethically.

Keywords: AI;Adjuvant discovery; COVID-19 vaccine; Epitope prediction; Immunogenicity; Machine learning models; Molecular design and synthesis prediction.

PP-OP-19

DIGITAL THERAPEUTICS AND EVOLVING ROLE OF PHARMACISTS

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Digital therapeutics (DTx) represents a rapidly emerging class of evidence-based medical interventions delivered through software platforms to prevent, manage, or treat a broad range of diseases. Unlike conventional health applications, DTx are clinically validated, regulated, and often prescribed as stand-alone or adjunct therapies. Their integration into healthcare is reshaping the management of chronic conditions such as diabetes, asthma, hypertension, mental health disorders, and substance use disorders. As the adoption of DTx expands, pharmacists occupy a critical position in ensuring their safe, effective, and ethical use. The pharmacist's role now extends beyond traditional medication dispensing to include recommending appropriate digital therapeutics, providing patient education, monitoring treatment outcomes through digital dashboards, ensuring adherence, and protecting patient data privacy. Real-world applications—such as smart inhalers, connected glucose monitors, and digital cognitive behavioral therapy platforms—demonstrate the potential of DTx to improve patient engagement, optimize therapy, and reduce healthcare burden. However, challenges such as accessibility, digital literacy, regulatory variability, and cyber security must be addressed to support widespread implementation. This presentation explores the foundations of digital therapeutics, highlights pharmacist-led opportunities in digital health delivery, and emphasizes the need for skill development to prepare future pharmacists for technology driven clinical practice.

Keywords: Therapeutics, digital technology.

PP-OP-20

PHARMACOGENOMICS

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Pharmacogenomics is the study of how genetic variations influence an individual's response to drugs. By combining principles of pharmacology and genomics, it aims to optimize drug therapy, improve therapeutic outcomes, and minimize adverse drug reactions. Genetic differences in drug metabolizing enzymes, transporters, and drug targets can significantly alter pharmacokinetics and pharmacodynamics. Pharmacogenomic testing helps identify patient-specific genotypes that guide personalized medication selection and dosing strategies. This approach is particularly valuable in treating cancer, cardiovascular diseases, neurological disorders, and conditions requiring narrow therapeutic index drugs. As precision medicine advances, pharmacogenomics plays an important role in developing safer, more effective therapies and supports evidence-based, individualized patient care.

Keywords: Pharmacogenomics ,personalized medication,evidence-based, individualized patient care.

PP-OP-21

CLINICAL AND DIAGNOSTIC SIGNIFICANCE OF VHH ANTIBODIES

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A VHH antibody is the antigen binding fragment of heavy chain only antibodies. Discovered nearly 25 years ago, they have been investigated for their Use in clinical therapeutics and Immunodiagnostics, and more recently for environmental Monitoring Applications.
Heavy chain Only antibodies are naturally Produced by camelids and shark .The most notable advantage is the VHH antibodies can be produced economically in unlimited amounts, are more Stable when exposed to heat & solvent and with altered specific Aminoacids.VHH are 1/10 th the size of Conventional antibodies.
In comparison to Poly & monoclonal antibodies VHH antibodies have a number of advantages and its usage specific to TTP along with its site of action.

Keywords: VHH antibodies, usage in TTP, HcAbs

PP-OP-22

PHARMACIST-LED DIGITAL CLINICS: TRANSFORMING CHRONIC DISEASE MANAGEMENT

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The rapid rise in chronic diseases such as diabetes, hypertension, dyslipidemia, asthma, and depression has intensified the global need for accessible, continuous, and cost-effective care models. In 2025, pharmacist-led digital clinics have emerged as a transformative innovation, integrating telehealth, artificial intelligence (AI), and remote patient monitoring to deliver comprehensive chronic disease management. These digital clinics are operated by clinical pharmacists who utilize real-time patient data from connected devices—including continuous glucose monitors, smart blood pressure cuffs, ECG wearables, and medication adherence sensors—to provide personalized therapy adjustments, intensive counseling, and early identification of clinical deterioration.
Unlike traditional episodic care, digital clinics enable continuous monitoring and proactive intervention, leading to significant improvements in medication adherence, therapeutic outcomes, and patient satisfaction. AI-driven clinical decision support tools assist pharmacists in risk stratification, medication titration, lifestyle assessment, and automated alerts for abnormal parameters. This model not only reduces the burden on physicians and healthcare institutions but also minimizes preventable hospitalizations and emergency visits.
Early studies from 2024–2025 demonstrate clinically meaningful outcomes: improved HbA1c levels, better blood pressure control, reduced asthma exacerbations, and enhanced mental health screening accuracy. Digital clinics offer a scalable, cost-efficient solution for countries with limited healthcare access, particularly in rural and underserved areas.
Pharmacist-led digital clinics represent a major shift in chronic care delivery—redefining the pharmacist's role from medication dispenser to frontline digital healthcare provider. This model holds strong potential for nationwide implementation in the coming decade.

Keywords: Digital clinics, Pharmacist-led care, Telehealth, Chronic disease management, Remote patient monitoring, Artificial intelligence, Diabetes, Hypertension

PP-OP-23

HUMAN DIGITAL TWIN TECHNOLOGY FOR PERSONALIZED PHARMACOTHERAPY: A PARADIGM SHIFT IN PRECISION DOSING

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Conventional pharmacotherapy often relies on standardized dosing frameworks that overlook patient-specific variability, leading to suboptimal outcomes and adverse drug reactions. Human Digital Twin (HDT) technology offers a transformative solution by creating a dynamic, computational replica of an individual using genomic data, physiological parameters, clinical records, biosensor inputs, and pharmacokinetic-pharmacodynamics (PK-PD) models. This virtual model allows drug responses to be simulated before therapy is initiated, enabling precise dose prediction, toxicity assessment, and real-time therapy adjustment. Emerging evidence from applications in oncology, metabolic disorders, cardiovascular care, and rare diseases indicates that HDT-guided decisions can enhance safety, improve therapeutic efficacy, and reduce trial-and-error prescribing. With integration of artificial intelligence and machine learning, HDTs can continuously evolve alongside patient health, supporting proactive and lifelong personalized therapy.

Despite its promise, implementation faces challenges including data standardization, ethical considerations, cybersecurity, regulatory approval pathways, and the need for robust clinical validation. Pharmacists—positioned at the interface of therapeutics, patient care, and digital health—will be central to HDT adoption, ensuring accuracy, safety, and responsible deployment.

Human Digital Twin technology signals a paradigm shift in pharmacotherapy: transitioning from generalized treatment models to a predictive, adaptive, and highly individualized approach. As research and regulatory frameworks advance, HDTs hold the potential to redefine precision dosing and shape the future of personalized medicine.

Keywords: Human Digital Twin, Personalized Pharmacotherapy, Precision Dosing, Predictive Modeling, PK-PD Simulation, Artificial Intelligence, Digital Health.

PP-OP-24

PHARMACOGENOMICS IN DRUG-RESISTANT EPILEPSY: A PROSPECTIVE CLINICAL STUDY

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Epilepsy is a chronic neurological disorder characterized by recurrent unprovoked seizures, and nearly one-third of patients continue to experience seizures despite adequate anti-seizure medication (ASM) therapy, leading to Drug-Resistant Epilepsy (DRE). Pharmacogenomics offers a promising approach to understanding interindividual variability in treatment response by identifying genetic variants that influence drug metabolism, transport, and therapeutic efficacy. This prospective observational study was conducted at AIG Hospital, Hyderabad, over a six-month period to

investigate the genetic mutations and Pharmacogenomic patterns associated with drug-resistant focal and generalized epilepsy in adult patients.
A total of 74 subjects were evaluated through clinical profiling, laboratory investigations, seizure characteristics, treatment history, and whole-exome sequencing. Generalized epilepsy was more prevalent (60.8%) than focal epilepsy (39.2%), with the highest incidence in the 21–30 years age group. Key biomarkers identified included RELN and NPRL2 in focal epilepsy, and SETD1A-POL and GRIN2A in generalized epilepsy, suggesting a significant genetic contribution to treatment resistance. Lacosamide was the most frequently prescribed ASM in focal epilepsy, whereas lamotrigine and sodium valproate were commonly used in generalized epilepsy.
This study highlights the importance of integrating Pharmacogenomic testing into routine epilepsy management for personalized therapy selection. Despite limitations such as small sample size, patient recall bias, and pending genetic reports, the findings emphasize the potential of precision medicine in improving outcomes for drug-resistant epilepsy patients.

Keywords: Drug-Resistant Epilepsy, anti-seizure medication

PP-OP-25

EVALUATION OF EFFICACY OF SGLT-2 IN DIABETIC NEPHROPATHY

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Diabetes is a worldwide epidemic inflicting severe problems around the sector. It is one of the main causes to Diabetic Nephropathy which is likewise called Diabetic kidney sickness. It is precipitated due to increased degrees of blood glucose because of Improper insulin secretion in beta cells. Here, SGLT-2 is the brand-new class of medicine and superior remedy for diabetic nephropathy. They have less side consequences and are powerful in treating diabetic nephropathy. Thus, this study is aimed to decide the efficacy of SGLT-2 inhibitors in treating sufferers with diabetic nephropathy when in comparison with different anti-diabetic treatments.
A prospective interventional examination with a pattern size of 450 patients in a period of six months in which 71 participants were filtered according to inclusion criteria and exclusion standards. Clinical information of sufferers (>30 years) of tertiary care health Facility, who had received anti diabetic treatment for DM and other comorbidities turned into accrued.
The outcomes were observed to be statically extensive with SGLT2 Inhibitors having more therapy fee (forty-four.60%) when compared with other anti- diabetic tablets having remedy fee (25. Sixty-six %). There isn't any good-sized distinction across men and Women and empagliflozin has a greater increase in eGFR.
Our results show that, Patients handled with SGLT-2 Inhibitors have extra boom in eGFR cost than with other anti- diabetic drugs and treatment with SGLT2 Inhibitors is greater useful with much less facet outcomes whilst compared to other anti- diabetic remedy.

Keywords: eGFR, SGLT-2 inhibitors, CKD, DKD, ESRD, hyperglycemia.

PP-OP-26

ASSESSMENT OF DEPRESSION ANXIETY AND STRESS IN PATIENTS HAVING TYPE 2 DM ATTENDING SECONDARY CARE HOSPITAL

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Depression, anxiety, and stress are prevalent psychological comorbidities among patients with type 2 diabetes mellitus (T2DM), often worsening the disease burden and impairing quality of life. The psychological impact may influence glycemic control and increase the risk of diabetic complications. Early identification and effective management are essential to improve clinical outcomes in this population.

A prospective observational study was conducted in the general medicine department at Hospital, over six months. A total of 150 patients with T2DM, both inpatients and outpatients, were included based on defined inclusion and exclusion criteria. The Depression, Anxiety, and Stress Scale-21 (DASS-21) was used to assess psychological states, and data were analyzed with GraphPad Prism software for statistical significance.

Among the 150 participants, females were affected more than males. The age group 41–50 showed the highest prevalence of psychological disorders. Comorbidities such as hypertension were common. The study found a high proportion of moderate depression (32.67%), severe and extremely severe anxiety (47.33%), and varied levels of stress, with most subjects in the normal or mild range. The presence of depression, anxiety, and stress was associated with poorer glycemic control and greater diabetic complications.

There is a statistically significant association between psychological factors (depression, anxiety, and stress) and glycemic levels in patients with type 2 diabetes mellitus. Psychological distress negatively impacts quality of life and contributes to diabetic morbidity. Early psychological evaluation and integrated care are recommended for optimal patient management.

Keyword: Depression, Anxiety, Stress, T2DM, Psychological comorbidities Glycemic control, DASS-21 (Depression, Anxiety, and Stress Scale-21) , Integrated care

PP-OP-27

HIGHLY ACTIVE ANTI-RETROVIRAL THERAPY INDUCED ANEMIA

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Anemia is a prevalent hematological issue in patients infected with HIV and is frequently exacerbated by specific antiretroviral medications. Zidovudine and ribavirin, commonly utilized in HAART therapies, are recognized for causing bone marrow suppression which results in drug-induced anemia. Timely identification and control are crucial to avoiding illness.

This case report details the clinical symptoms, laboratory results, and treatment approach of a 60-year-old female with HIV who is on HAART that includes zidovudine and ribavirin. Clinical evaluation, complete blood count, physical examination, and treatment response were assessed to determine the cause of severe anemia and direct therapeutic adjustment. Patient arrived with shortness of breath, coughing, slight sputum production, stomach pain, and decreased appetite.

Laboratory examinations indicated severe anemia (Hb 5.5 g/dL), diminished RBC count, low PCV, and leukopenia. She had been taking zidovudine and ribavirin, both recognized for causing bone marrow suppression. Supportive treatment consisting of antibiotics, antihypertensive, hematinic, nebulization, and management of symptoms was administered, yet erythropoiesis continued to be significantly compromised. Anemia caused by drugs was recognized as the main factor.
HAART greatly enhances the survival rates of HIV patients, but it can lead to severe side effects like anemia, particularly with medications such as zidovudine and ribavirin. Prompt identification, regular assessment of hemoglobin and CD4 levels, and timely replacement with safer options (e.g., didanosine, abacavir, and indinavir) can avert complications and enhance patient results. Consistent follow-ups and supportive therapy are essential for optimal management.

Keywords: HTN (hypertension), NNRTIS (non-nucleoside reverse transcriptase inhibitors), Anemia, HAART (highly active anti-retroviral therapy).

PP-OP-28

BACTERIOPHAGE THERAPY: THE FUTURE BEYOND ANTIBIOTICS

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Due to the increasing inefficiency of antibiotics, the emergence of superbugs, and the overuse and misuse of antibiotics, antibiotic resistance has emerged as one of the greatest threats to global health. It is critical to have new therapeutic tools because the evolution of multidrug resistance poses a threat to the global control of infectious disease. One of the most promising substitutes for antibiotics in clinical settings is Bacteriophages. The viruses known as Bacteriophages only infect and destroy bacteria without endangering human cells .In contrast to antibiotic therapy, phage therapy exhibits high specificity , the capacity to self- amplify at the site of infection and efficacy against the biofilm - forming bacteria and multidrug - resistant organisms like pseudomonas aeruginosa , staphylococcus aureus and klebsiella pneumoniae. While antibiotics have more detrimental effects, Bacteriophages are frequently advantageous for the microflora of the gastrointestinal tract. Bacteriophage therapy has great promise as a novel and long-lasting way to fight antibiotic-resistant infections, despite obstacles with regards to regulatory approval, standardization, and possible immune reactions. Phage therapy's clinical potential has been further enhanced by recent developments such as phage cocktail, genetically modified phage, phage - derived enzymes, Nano- encapsulated phage and AI - assisted phage matching .
Keywords: antibiotic resistance, Bacteriophage, high specificity, self-amplification, detrimental effects ,phage cocktail, genetically modified phage , nano- encapsulated phage ,AI - assisted phage matching.

PP-OP-29

DIGITAL THERAPEUTICS DTX AND SMART HEALTH APPS

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Digital Therapeutics (DTx) and smart health applications are emerging as transformative technologies in modern healthcare, offering evidence-based, software-driven interventions for prevention, management, and treatment of diseases. Unlike general wellness apps, DTx solutions undergo clinical validation and regulatory evaluation to ensure safety, efficacy, and measurable health outcomes. These platforms deliver personalized therapy using structured algorithms, behavior-modification strategies, continuous monitoring, and real-time feedback. Smart health apps complement DTx by enabling patients to track symptoms, medication adherence, lifestyle patterns, and physiological parameters through integrated sensors and wearable devices. Together, they support remote care, early detection of complications, and improved patient engagement, especially for chronic conditions such as diabetes, hypertension, mental health disorders, and cardiovascular diseases.

For healthcare providers and pharmacists, DTx offers new opportunities in patient counselling, therapy optimization, and pharmacovigilance by integrating clinical data with digital endpoints. The combination of DTx and smart health apps enhances treatment precision, reduces healthcare burden, and improves accessibility in underserved populations. As regulatory bodies increasingly recognize DTx as legitimate therapeutic tools, their adoption is expected to expand significantly. Overall, these digital innovations represent a shift toward personalized, data-driven, and patient-centric healthcare delivery.

Keywords: Digital therapeutics (DTx) Smart health apps Software-based interventions Remote patient monitoring Personalized healthcare Chronic disease management Clinical validation Patient engagement ,Digital health technologies .

PP-OP-30

NITROSAMINE CONTAMINATION IN PHARMACEUTICALS: A GROWING CARCINOGENIC THREAT TO PUBLIC HEALTH

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Nitrosamines are a group of highly potent carcinogenic compounds capable of inducing DNA damage, genetic mutations, and multi-organ tumor development. Their detection in several widely used pharmaceuticals—including antihypertensive, antidiabetics, and heartburn medications—has raised major global health concerns. Contamination incidents involving compounds such as NDMA and NDEA have led to numerous international drug recalls, highlighting serious gaps in manufacturing oversight, regulatory control, and quality assurance.

This review evaluates published scientific literature, regulatory reports, FDA recall data, and toxicological assessments to understand the sources, mechanisms, and potential health risks associated with nitrosamine contamination in pharmaceuticals. Mechanistic evidence on

genotoxicity, manufacturing pathways, and risk estimation models have been examined to provide an integrated assessment.
Findings indicate that nitrosamine contamination primarily arises from chemical reactions during synthesis, degradation of active ingredients, use of contaminated raw materials, or inadequate purification processes. Mechanistic studies confirm that nitrosamines produce DNA adducts, strand breaks, and oxidative stress, contributing to carcinogenesis. Risk assessments based on contaminated drugs like valsartan suggest a measurable increase in lifetime cancer risk. Despite strict regulatory limits, widespread detection reflects insufficient GMP compliance and the need for advanced analytical monitoring.
Nitrosamine contamination in pharmaceuticals represents a significant carcinogenic threat to public health. Strengthening Good Manufacturing Practices (GMP), improving analytical detection methods, enforcing continuous regulatory surveillance, and reformulating high-risk drug products are essential to reducing exposure. A coordinated global response is required to enhance medication safety and prevent future contamination events.

Keyword: Nitrosamines, Pharmaceutical contamination NDMA & NDEA, Carcinogenicity Genotoxicity, Risk assessment, Regulatory oversight.

PP-OP-31

CAR T CELL THERAPY: THE FUTURE OF PRECISION IMMUNOTHERAPY

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The treatment of hematological malignancies has been transformed by chimeric antigen receptor T-cell (CAR-T) therapy, which provides targeted and long-lasting responses in situations where traditional therapies frequently fail. CAR-T therapy is becoming a safer, more efficient, and more broadly applicable modality thanks to recent advancements. By simultaneously identifying several tumor antigens, next-generation CAR designs, such as dual-target and tri-target CARs, seek to prevent antigen escape. In the immunosuppressive tumor microenvironment, armored CAR-T cells that are designed to secrete cytokines like IL-12 or IL-18 increase T-cell persistence and efficacy. Allogeneic "off-the-shelf" CAR-T products, which were created using gene-editing techniques like CRISPR to remove graft-versus-host risks and enable quicker access and shorter manufacturing delays, are also making significant strides. Long-standing obstacles of poor infiltration and hostile tumor biology are being caused by innovations targeting solid tumors, such as chemokine receptor engineering, hypoxia-responsive CARs, and local delivery methods. Suicide switches, tunable CARs, and logic-gated circuits are examples of safety-enhancing technologies that give physicians more control to reduce neurotoxicity and cytokine release syndrome. Fibrosis and autoimmune diseases are examples of emerging applications outside of oncology that represent a growing frontier.
Keywords: CAR-T therapy, Hematological malignancies, Targeted immunotherapy, Armored CAR-T cells, IL-12 / IL-18 secretion ,Tumor microenvironment, Allogeneic CAR-T (“off-the-shelf”).

PP-OP-32

BIRSA- 101

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BIRSA 101 represents India's first fully indigenous CRISPR-based gene therapy, marking a historic milestone in the country's genomic medicine and rare disease innovation. Designed for the treatment of Sickle Cell Disease (SCD)—a debilitating, inherited blood disorder caused by a mutation in the β-globin (HBB) gene—this therapy directly targets the root cause of the disease. SCD affects millions worldwide and disproportionately impacts India's tribal populations, where healthcare accessibility and disease burden remain major challenges. Developed by the CSIR–Institute of Genomics and Integrative Biology (CSIR-IGIB), BIRSA 101 employs an optimized and highly precise CRISPR–Cas9 genome-editing system to correct the genetic mutation responsible for sickle hemoglobin formation. By restoring normal hemoglobin production, the therapy holds the potential to serve as a one-time curative intervention, eliminating the need for lifelong symptom-management treatments.

A key achievement of BIRSA 101 lies in its emphasis on affordability and accessibility. Existing global gene therapies for SCD are extremely expensive—often costing crores of rupees—making them out of reach for most patients in low- and middle-income countries. In contrast, BIRSA 101 has been developed with cost-effective manufacturing in mind, supported by technology-transfer agreements with industry partners such as the Serum Institute of India to ensure scalable, low-cost production. This collaborative ecosystem positions India as a global leader in delivering equitable gene therapy solutions.

The development of BIRSA 101 demonstrates India's growing capability in precision medicine, genome engineering, and next-generation therapeutics. Beyond offering a transformative treatment for SCD, it sets a new benchmark for indigenous innovation, encouraging the development of similar advanced therapies for other inherited and rare diseases. Ultimately, BIRSA 101 embodies a significant step toward democratizing cutting-edge biomedical technology, improving public health outcomes, and empowering communities historically affected by genetic disorders.

Keywords: India's first indigenous gene therapy, SCA Inherited blood disorder, Gene Therapy.

PP-OP-33

THE ROLE OF NEUROPLASTICITY IN THE IMMUNE SYSTEM

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Neuroplasticity, traditionally described as activity-dependent changes in neuronal circuits, also extends to the immune system where neural signals reshape immune cell behavior and organ-level responses. Sensory and autonomic neurons release neurotransmitters (e.g., acetylcholine, norepinephrine, substanceP) that bind to receptors on macrophages, Tcells, and dendritic cells, modulating cytokine production, migratory patterns, and antigen presentation. Conversely, immune-derived cytokines (IL-1, TNF-α) act on the hypothalamus and brainstem, altering neuronal firing and synaptic strength, thereby creating a bidirectional feedback loop. Studies using ontogenetic stimulation of the vagus nerve and single-cell transcriptomics have identified specific

neuronal-immune synapses that can either dampen inflammation (the "inflammatory reflex") or enhance immune surveillance, depending on the context. Understanding this neuro-immune plasticity opens avenues for neuromodulation therapies—such as vagal nerve stimulation, deep-brain stimulation, or targeted pharmacology—to treat chronic inflammatory diseases, autoimmune disorders, and even neuropsychiatric conditions linked to immune dysregulation.

Keyword: neuroplasticity, immune system, neuro-immune interaction, vagus nerve, cytokine signaling, neuronal immune synapses, immune surveillance, neuro immune plasticity, neuromodulation therapies.

PP-OP-34

CLINICAL TRIAL PROCESS: DESIGN, PHASES AND REAL TIME DRUG APPROVALS

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Clinical trials are systematic research studies conducted on human participants to evaluate the safety, effectiveness and overall impact of new drugs, vaccines or medical treatment. As defined by WHO, Clinical trials assign interventions to participants to measure their health outcomes, making them the gold standard in evidence-based medicine.

Trials progress through phase 0 to 4, each designed to test specific aspects such as initial safety, dosage, therapeutic efficiency and long-term effects after market approval.

The major examples include Pfizer-Biotech mRNA COVID -19 which used innovative mRNA technology. This case marked a scientific milestone and proved the potential of mRNA technology for future vaccines and treatments; India's first indigenously developed CAR -T Therapy, NexCAR19 uses a patient's own genetically modified T-cell to target and destroy cancer cells, making a breakthrough in personalized cancer therapy. Developed by IIT BOMBAY &TATA Memorial hospital showcases the nation's capability in advanced oncology innovation.

Keywords: Systematic research, Human participants, Safety evaluation, Effectiveness assessment, Health outcomes, advanced biomedical research, Global and national innovation, Market approval.

PP-OP-35

THE VITAL ROLE OF PHARMACISTS IN THE MODERN HEALTHCARE SYSTEM

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The role of pharmacists in the modern healthcare system has expanded dramatically over recent decades, driven by the increasing complexity of medical therapies, the rise of chronic diseases, growing patient expectations, and the global emphasis on patient safety and cost-effective care. Pharmacists are no longer limited to dispensing medications; they now serve as essential clinical decision-makers, public health advocates, medication safety experts, researchers and frontline healthcare providers. In research and development, pharmacists participate in drug discovery, formulation development, clinical trials, pharmacokinetics and pharmacodynamics studies, pharmacovigilance, and post-marketing safety surveillance.

This section outlines the typical approach used to evaluate or describe the role of pharmacists within a healthcare system. Study Design A descriptive and analytical approach based on published literature, healthcare guidelines, clinical studies, and global health reports. Methodology: Review of literature on pharmacist roles in clinical, community, and

public health settings. Analysis of case studies highlighting pharmacist-led interventions. Evaluation of outcomes such as medication error reduction, patient satisfaction, adherence improvements, and cost-effectiveness. Comparative study of healthcare systems
with and without structured pharmacy services.
Improved Clinical Outcomes Hospitals with active clinical pharmacy services showed reduced medication errors, better therapeutic drug monitoring outcomes, higher rate of adverse drug reaction reporting improved treatment success rates in chronic diseases.
Key Words: Therapeutic drug monitoring, Study Design, Pharmacodynamics studies.

PP-OP-36

NOVEL ALZHEIMER'S THERAPIES: ANTI-AMYLOID MONOCLONAL ANTIBODIES

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Anti-amyloid monoclonal antibodies (mAbs) represent a major therapeutic advancement in Alzheimer's disease (AD).Aducanumab, Lecanemab, and Donanemab are designed to target and reduce fibrillary amyloid-β (Aβ) aggregates on (AD).Lecanemab and aducanumab has full FDA approval where as Donanemab is on progress. The three of them have a common mechanism: microglial-mediated clearance of fibrillary amyloid-β (Aβ), resulting in substantial plaque reduction observable on amyloid PET (positron emission Tomography) imaging. Amyloid species binds to pharmacokinetics such as half-life, dosing schedule and using clinical trials. These trials contain the pt. early AD(mild cognitive impairment due to AD or dementia).Clinical trial has shown that 15–25 centiloid reduction in amyloid burden are associated with the meaningful slowing of cognitive and functional decline, averaging 25–35% improvement versus placebo on measures such as CDR-SB, ADAS-Cog, and ADCS-ADL. Where donanemab has more efficacy in phase 3 trials. The safety concern is about amyloid-related imaging abnormalities (ARIA), which occur more frequently in APOE ε4 carriers and it requires MRI monitoring. This mainly focused on AD management such as Safety and long - term efficacy.

Keywords: Alzheimer's disease, Aducanumab, Lecanemab, Donanemab

PP-OP-37

IMPACT OF CLINICAL PHARMACIST INTERVENTIONS IN ICU (Intensive care unit)

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A critically ill patient is treated and reviewed by physicians from different specialties; hence, polypharmacy is very common. This study was conducted to assess the impact and effectiveness of having a clinical pharmacist in an Indian Intensive Care Unit (ICU). It also evaluates the clinical pharmacist interventions with a focus on optimizing the quality of pharmacotherapy and patient safety.
The prospective, observational study was carried out in medical and surgical/trauma ICU over a period of 1 year. All detected drug-related problems and interventions were categorized based on the Pharmaceutical Care Network Europe system.

During the study period, an average monthly census of 1032 patients got treated in the ICUs. A total of 986 pharmaceutical interventions due to drug-related problems were documented, whereof medication errors accounted for 42.6% (n = 420), drug of choice problem 15.4% (n = 152), drug-drug interactions were 15.1% (n = 149), Y-site drug incompatibility was 13.7% (n = 135), drug dosing problems were 4.8% (n = 47), drug duplications reported were 4.6% (n = 45), and adverse drug reactions documented were 3.8% (n = 38). Drug dosing adjustment done by the clinical pharmacist included 140 (11.9%) renal dose, 62 (5.2%) hepatic dose, 17 (1.4%) pediatric dose, and 104 (8.8%) insulin dosing modifications. A total of 577 drug and poison information queries were answered by the clinical pharmacist.
Clinical pharmacists as part of the multidisciplinary team in our study were associated with a substantially lower rate of adverse drug events caused by medication errors, drug interactions, and drug incompatibilities.

Keywords: Adverse drug reactions, critical care pharmacist, drug interactions, medication error.

PP-OP-38

RECENT THERAPEUTIC ADVANCEMENTS IN THE MANAGEMENT OF HYPERTENSION

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Hypertension remains a major global health burden, and achieving adequate blood pressure control is still challenging, especially in resistant cases. Recent developments in antihypertensive pharmacotherapy aim to improve treatment efficacy, adherence, and outcomes. This abstract summarizes key advancements, including the triple-drug combination Widaplik, the newly approved aprocitentan, and investigational aldosterone synthase inhibitors, with the objective of highlighting their potential clinical impact.
A narrative review of recent approvals and emerging clinical trial data was conducted, focusing on novel mechanisms, fixed-dose combinations, and investigational agents demonstrating improved blood pressure control in patients with uncontrolled or resistant hypertension.
Widaplik, a single-pill triple combination of telmisartan, amlodipine, and indapamide, showed enhanced blood pressure reduction and improved adherence compared to conventional stepwise therapy. Aprocitentan, an endothelin receptor antagonist approved for resistant hypertension, demonstrated significant additional reductions in systolic blood pressure when added to optimize background therapy. Emerging agents such as lorundrostat, an aldosterone synthase inhibitor, displayed promising results in early clinical trials by effectively lowering aldosterone levels and improving blood pressure in uncontrolled hypertension.
Recent advancements in hypertension management provide more potent, targeted, and convenient therapeutic options. Combination therapy with Widaplik, the novel mechanism of aprocitentan, and the potential of aldosterone synthase inhibitors collectively represent an important step forward in treating patients with uncontrolled or resistant hypertension. These therapies have the potential to improve patient adherence, enhance BP control, and reduce long-term cardiovascular risk.
Keywords: Hypertension; Resistant hypertension; Widaplik; Triple combination therapy; Telmisartan; Amlodipine; Indapamide; Aprocitentan; Endothelin receptor antagonist; Aldosterone synthase inhibitors; Lorundrostat; Blood pressure control; Novel antihypertensive; Fixed-dose combination.

RA-0P-01

ARTIFICIAL INTELLIGENCE AND ROBOTICS IN PHARMACEUTICAL INDUSTRY

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Artificial Intelligence (AI), a branch of computer science, is transforming the pharmaceutical industry by enabling smarter, more efficient processes. By using advanced algorithms, AI helps improve decision-making, optimize workflows, and reduce costs, while enhancing safety, accuracy, and productivity. In areas like drug discovery, formulation development, and hospital pharmacy, AI has proven to be a game-changer. Techniques such as Artificial Neural Networks (ANNs), including Deep Neural Networks (DNNs) and Recurrent Neural Networks (RNNs), are widely used to predict and design new drug molecules, analyse structure-activity relationships (QSAR), and optimize drug delivery systems. AI also accelerates drug development through de novo design, which creates novel molecules with specific desired properties. Furthermore, AI is making significant contributions to managing and organizing vast amounts of healthcare data, improving both research outcomes and clinical practices. This poster highlights the diverse applications of AI in the pharmaceutical sector and its potential to revolutionize drug development, treatment strategies, and patient care.

Keywords: Artificial intelligence,Artificial neural network(ANN), Recurrent neural network(RNN),Structure activity relationship (SAR),Revolutioni

RA-OP-02

REGULATORY COMPLIANCE AND GLP TESTING FOR DERMAL FILLERS-NAVIGATING EU AND USA STANDARDS

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The cosmetic medical devices industry has experienced significant global growth driven by technological innovation and rising demand for aesthetic procedures. This study presents a comparative analysis of the regulatory frameworks governing cosmetic medical devices in two major markets: Europe and the United States. As dermal fillers represent one of the most widely used cosmetic treatments, the paper highlights their regulatory oversight, emphasizing safety, quality, and efficacy requirements. The study reviews the U.S. Food and Drug Administration (FDA) classification system and pre-market approval pathways, followed by an examination of Europe's regulatory structure. Additionally, the research discusses emerging trends, including international harmonization efforts and initiatives to enhance regulatory clarity and transparency. The findings offer valuable insights for regulators, industry professionals, and policymakers, supporting a deeper understanding of current frameworks and encouraging global cooperation. Ultimately, this work contributes to discussions on regulatory convergence and the ongoing improvement of standards in the cosmetic medical devices sector.

Keywords: Cosmetic medical devices, FDA, Medical device, dermal fillers, MDR, ISO.

RA-0P-03

LAPROSCOPY

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Laparoscopy represents a cornerstone of minimally invasive surgery, revolutionizing operative techniques for a wide spectrum of abdominal and pelvic disorders. This procedure utilizes small incisions and specialized instruments—primarily the laparoscope, a fiber-optic camera—enabling direct visualization and manipulation of internal organs with reduced trauma compared to open surgery. Over recent decades, laparoscopy has demonstrated significant advantages, including decreased postoperative pain, expedited recovery, and minimized risk of wound infections and haemorrhaging, and improved cosmetic outcomes. Its application spans diagnostic interventions, biopsies, tumor removal, and procedures such as cholecystectomy, appendectomy, and gynaecological operations, now considered gold standards in surgical practice.Advancements in instrumentation, imaging, and surgical techniques have extended laparoscopy's reach to complex oncological and bariatric procedures, supported by evidence of safety and efficacy from numerous randomized controlled trials. Furthermore, improved diagnostic accuracy and reduced complication rates favour laparoscopy for both elective and emergency cases, though some challenges persist, such as increased operating time and technical demands. Overall, the impact of laparoscopy on patient outcomes and healthcare systems is profound, signifying a paradigm shift toward less invasive treatments and enhanced postoperative recovery.

POSTER PRESENTATIONS

PHARMACEUTICS

PCU-PP-001

ORAL DISINTEGRATING TABLETS

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The demand for Mouth Dissolving Tablet has been increasing for the last decade particularly in geriatric, pediatric and patient with some sort of disabilities in swallowing. Mouth dissolving tablets are those tablets which when placed in mouth get dissolved rapidly in saliva without the need of liquid and can be swallowed. European pharmacopeia adopted the term Oro-dispersible tablet for MDTs. Mouth dissolving tablets are also known as Fast melting tablets. Oro-dispersible tablets, fast dissolving tablets or melt in mouth tablets. This article reviews the potential benefits offered by MDTs as an oral drug delivery system for various kinds of patients suffering from different diseases and disabilities. Desired characteristics and challenges for developing fast disintegrating drug delivery systems, quality control tests, various techniques used in the preparation of fast disintegrating drug delivery systems like lyophilization technologies, tablet molding method, sublimation techniques, spray drying techniques, direct compression method. It also reviews the patented technologies for fast dissolving tablets, advantages and disadvantages of different technologies for preparing fast disintegrating dosage form, future prospective for MDTs. The growing importance for MDTs is due to the potential advantages offered by this technology. MDT is a New Drug Delivery System with least disintegration time.

Keywords: Oral Disintegrating Tablets, Ideal Characteristics, Taste Masking Excipients

PCU-PP-002

PHARMACY STRENGTHENING HEALTH SYSTEM

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Pharmacy plays a vital and increasingly multidimensional role in strengthening health systems by ensuring the safe, effective, and rational use of medicines. As healthcare demands grow, pharmacists contribute significantly to improving service delivery, enhancing access to essential medicines, and promoting public health. A strong pharmaceutical sector supports the core building blocks of a health system, including governance, financing, human resources, information systems, and service accessibility. Pharmacists assist in the formulation and implementation of evidence-based policies, standard treatment guidelines, and quality assurance frameworks that help maintain the safety and efficacy of medications. Clinical pharmacy services further strengthen health systems by reducing medication errors, improving therapeutic outcomes, and promoting patient-centered care through counseling, pharmacovigilance, and medication therapy management. Community pharmacies enhance primary healthcare by providing vaccination services, chronic disease screening, and health education, thereby improving early detection and treatment of common diseases. Additionally, pharmacists contribute to efficient supply chain management, ensuring an uninterrupted availability of essential medicines, reducing wastage, and optimizing healthcare expenditures. The integration of digital technologies, such as e-prescriptions, telepharmacy, and electronic health records, has expanded the pharmacist's capacity to deliver high-quality care across diverse settings. In low- and

middle-income countries, pharmacists play a crucial role in addressing healthcare disparities by improving access to essential medicines and supporting national health programs such as immunization, tuberculosis control, and diabetes management.

Keywords: Health Systems, Universal Health Coverage, Essential Medicines

PCU-PP-003

SPACE PHARMACY & DRUG STABILITY IN MICROGRAVITY

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Extended human space missions bring critical challenges to pharmaceutical therapy, as microgravity and ionizing space radiation compromise both drug efficacy and stability. In low Earth orbit, long-term exposure has been shown to accelerate the degradation of active pharmaceutical ingredients (API), with some space exposed medications exhibiting up to ~1.5× increased degradation rate compared to terrestrial controls. The primary risk factors include radiation-induced breakdown of chemical bonds and non protective repackaging of medications, which together contribute to potency loss. Pharmacokinetics in microgravity further add complexity: fluid redistribution, altered renal clearance, and changes in hepatic metabolism may significantly affect absorption, distribution, metabolism, and excretion (ADME) of drugs. Microgravity also influences the crystallization behavior of small-molecule drugs: experiments have shown novel polymorphic forms emerging under space conditions, which could alter solubility and bioavailability. To mitigate these challenges, innovative solutions are being explored: radiation resistant formulations, space optimized packaging, and on-demand drug manufacturing (e.g., 3D printing) may preserve drug potency for long-duration missions. These integrated strategies are essential to ensure safe, effective pharmacotherapy for astronauts, paving the way for reliable medical support in deep-space exploration.

Keywords: Microgravity, Space Pharmacy, Drug Stability, Ionizing Radiation

PCU-PP-004

SMART INHALERS: REDEFINING RESPIRATORY CARE WITH TECHNOLOGY AND DATA

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Smart inhalers represent a transformative advancement in respiratory care by integrating digital technology, sensors, and data analytics into routine inhalation therapy. these innovative devices monitor inhaler usage in real time, track medication adherence and record inhalation technique, enabling both patients and healthcare providers to disease optimize management by connecting to mobile applications and cloud platforms.Smart inhalers generate actionable data that supports personalized treatment plans, early identification of exacerbations and enhanced clinical decisions - making the combination of Bluetooth- enabled sensors, reminders, dose counters, and environmental exposure tracking empowers patients with asthma and COPD to achieve better symptom control and reduce hospitalizations. as digital health continues to evolve. Smart inhalers stand at forefront of patient- centred, data - driven respiratory therapy, their integration into

healthcare systems promises improved adherence, reduced disease burden and a shift toward proactive and predictive care.

Keywords: Integrating digital technology, personalized treatment, proactive and predictive care.

PCU-PP-005

FORMULATION AND EVALUATION OF CONTROLLED RELEASE MATRIX TABLETS OF LOVASTATIN

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In the present study an attempt was made to overcome the bioavailability problems & to reduce dose dependent side effects, so lovastatin loaded buccal tablets was designed by using Karayagum,tamarindgum,sodiumCMC& Carbopol bydirectcompressionfurther subjected to pre-compression and post compression parameters. From the drug excipient compatibility studies, it revealed that there is no interactions in between the drug and excipients used in the formulation. From the invitro drug release studies it revealed that formulation (F12) containing Carbopol 30mg showed sustained drug release up to 8 hours and shown good bio- adhesive strength of 18grams.

Keywords: Lovastatin,Carbopol,Karaya gum,SodiumCMC.

PCU-PP-006

mRNA VACCINES CHANGING HOW WE PREVENT DISEASES

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Messenger RNA (mRNA) vaccines have introduced a new direction in the disease prevention by using a simple but powerful idea, deliberate genetic instruction that allow the body to produce its own antigen and build immunity from within. Because mRNA is fragile, it is packed inside lipid nanoparticles which protect it from degradation and guide it into cells where antigen production begins. This technology has transformed vaccine development, allowing rapid design, easier updates, and ability to respond quickly to emerging infectious diseases. The same platform is now being used to explore personalized vaccines, where the mRNA sequence can be tailored to a patient's unique biological profile. This approach is especially promising in cancer immunotherapy, where targeting individual tumor markers may offer more precise treatment. As mRNA vaccine platforms continue to evolve, they are shaping a flexible and forward-looking strategy for preventing and managing a wide range of diseases.

Keywords:mRNA vaccines, nanoparticles, disease prevention, personalized vaccines.

PCU-PP-007

NEXT-GENERATION BIOLOGICS AND BIOSIMILARS: CLINICAL AND REGULATORY PERSPECTIVES

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The biopharmaceutical industry has witnessed significant growth in the development and approval of biosimilars. These products have similar safety, quality, and effectiveness as the original reference products. Biosimilars, although similar to reference products, are not identical copies and should not be considered generic substitutes for the original. Their development and evaluation involve a rigorous step-by-step process that includes analytical, functional, and nonclinical evaluations and clinical trials. Clinical studies conducted for biosimilars aim to establish similar efficacy, safety, and immunogenicity, rather than demonstrating a clinical benefit, as with the reference product. Recognizing the inherent complexities of comprehending biosimilars fully, it is essential to focus on communication between healthcare providers and patients, encouraging informed decision-making, and minimizing risks. Developing biosimilars increases competition in the market, helps reduce healthcare costs, for example, a recent analysis indicates a 20–30% cost reduction in the U.S. due to biosimilar adoption, and makes important medicines available to more patients. With the growth of the biosimilar market, coordinated efforts among regulatory authorities, pharmaceutical manufacturers, and healthcare professionals are crucial to improve access to biologic therapies. Such collaboration can enhance clinical outcomes and support major improvements in global healthcare systems.

Keywords: Biosimilars, Biopharmaceutical industry, Immunogenicity, Patient- provider communication, Global healthcare system.

PCU-PP-008

FOLDING DNA INTO MEDICINE:DNA NANOBOTS DESIGNED TO OUTSMART CANCER

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Tumour-targeting DNA nanorobots are an emerging innovation in precision cancer therapy, engineered through DNA origami to create intelligent, programmable nanoscale carriers. These nanorobots fold into tiny “DNA boxes” capable of encapsulating therapeutic agents while remaining inactive during systemic circulation. They selectively unlock only upon sensing tumour-specific markers, ensuring that the drug is released exclusively inside cancer cells. This highly targeted mechanism directs medicine exactly where it is needed, protecting healthy tissues, dramatically reducing toxicity, and significantly enhancing therapeutic efficiency. As fully biodegradable structures, DNA nanobots naturally break down into harmless DNA fragments that are safely cleared through metabolic pathways. By combining extreme selectivity, inherent safety, and futuristic programmability, tumour-targeting DNA nanorobots represent a powerful next-generation

platform for smarter, safer, and more effective cancer treatment. Truly, it is medicine that walks to the tumour, not the patient.

Keywords:DNA nanorobots, targeted drug delivery, biodegradable nanocarriers.

PCU-PP-009

ORGAN-ON-A-CHIP: A SMART MICROFLUIDIC MODEL FOR REALISTIC DRUG TESTING

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Organ-on-a-Chip (OoC) is an emerging microfluidic technology designed to address the major limitations of traditional preclinical models such as 2D/3D cell cultures and animal testing. These older methods often fail to recreate the complexity of real human physiology, leading to poor prediction of drug safety and effectiveness. OoC platforms integrate living human cells, extracellular matrix components, and precisely controlled fluid flow within microscale channels to simulate organ-level functions in a highly realistic manner. From a biological viewpoint, OoC systems recreate tissue-specific structures and responses. From an engineering perspective, they utilize advanced microfluidics, concentration gradients, mechanical forces, and built-in sensors to mimic physiological conditions such as shear stress, nutrient flow, and barrier integrity. Recent advances have enabled successful development of blood–brain, ocular, nasal, pulmonary, and gastrointestinal barrier models, making OoCs highly valuable for studying drug absorption, toxicity, disease mechanisms, and therapeutic responses. Multi-organ interconnected chips further support personalized medicine by allowing patient-specific drug testing. Although challenges remain such as material limitations and standardization—OoC technology represents a highly predictive, ethical, and cost-effective alternative to animal models. It holds immense promise for improving drug discovery, toxicity assessment, and precision medicine.

Keywords: Organ-on-a-Chip (OoC), Microfluidic technology, Human physiology simulation.

PCU-PP-010

4D PRINTING: THE FUTURE OF SMART DRUG DELIVERY IN PHARMACY

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4D printing is an emerging technology that extends the capabilities of 3D printing by creating pharmaceutical products that can change their shape, structure, or functionality over time in response to external stimuli. These stimuli include pH, temperature, moisture, magnetic fields, or light, enabling the development of “smart” drug delivery systems that adapt to the patient’s physiological environment. This poster explores the principles, materials, mechanisms, and applications of 4D printing within the pharmaceutical field. The objective of this work is to provide a concise overview of how 4D printing can transform conventional drug delivery into a dynamic

and personalized model. Smart materials such as shape-memory polymers, hydrogels, and bioresponsive polymers play a central role in enabling these transformations. Literature was reviewed to summarize current advancements, compare 3D and 4D printing approaches, and evaluate the practical advantages of 4D-printed dosage forms. Research indicates that 4D printing can enable controlled and targeted drug delivery, chronotherapy-based dosing, and patient-specific formulations. Tablets or implants printed with stimuli-responsive materials can unfold, swell, or release drugs only under specific physiological conditions, enhancing treatment precision and patient compliance. Additionally, 4D printing holds promise for pediatric and geriatric populations by enabling flexible, adaptive dosage forms. Despite its potential, challenges such as regulatory considerations, material safety, scalability, and clinical validation remain. Overall, 4D printing represents a transformative innovation in pharmacy, offering new avenues for personalized medicine and advanced drug delivery systems. Continued research is essential to translate these technologies into routine clinical practice.

Keywords: 4D Printing, Smart Drug Delivery, Stimuli-Responsive Materials.

PCU-PP-011

3D PRINTING IN PHARMACEUTICALS:REVOLUTIONIZING PERSONALIZED MEDICINE

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Introduction: Three-dimensional (3D) printing, also known as additive manufacturing, is transforming pharmaceutical research by enabling the production of personalized dosage forms. Unlike conventional tablets, 3D printed drugs allow customization of dose, shape, release profile, offering significant advantages in patient centric therapy.

Objectives: To explore the recent advances in 3D printing of pharmaceutical dosage forms, evaluate, their potential in personalized medicine, and assess challenges in clinical transformation.

Methodology: A comprehensive literature survey was conducted on studies published from 2019 to 2025. Various 3D printing technologies including Fused Deposition Modelling (FDM), Stereo lithography (SLA), and ink jet printing, were analyzed for their suitability in fabricating oral dosage forms. Key parameters such as material selection, printer type, pill geometry and drug release characteristics were reviewed.

Results and Discussion: FDM and extrusion-based techniques dominate current 3D pharmaceutical printing due to versatility and ease of customization. Customized geometries enable controlled release profiles, including rapid, delayed, and sustained drug release. 3D printing allows production of poly pills and age-appropriate doses for paediatrics and geriatrics. Real world examples like FDA approved Spritam(levetiracetam) demonstrates clinical feasibility. Challenges include material stability, reproducibility, regulatory compliance and large-scale manufacturing.

Conclusion: 3D printing is a promising tool for personalized medicine, enabling precise dosing, complex release patterns and innovative drug formulations. Continued research in material science, process optimization, and regulatory frameworks is essential to integrate 3D printed pharmaceuticals into routine clinical practice.

Keywords:3D printing,Additive manufacturing,Personalized medicine, Pharmaco-technology

PCU-PP-012

ADVANCEMENTS IN NEEDLE-FREE INJECTION SYSTEM

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Needle-free injection systems (NFIS) are innovative drug-delivery devices designed to administer medications without the use of traditional hypodermic needles. These systems use high-pressure gas, spring mechanisms, or electromagnetic forces to propel liquid formulations through the skin, creating a fine stream that penetrates tissues effectively. Needle-free technology reduces the risk of needlestick injuries, cross-contamination, and needle-related anxiety, improving patient compliance and safety. NFIS are increasingly used for vaccines, insulin delivery, and biologics, and are gaining importance in mass immunization programs due to faster administration and minimal training requirements. Advances in device design and drug formulation continue to improve precision, dosage accuracy, and user convenience, positioning needle-free injection as a promising alternative to conventional needle-based delivery systems.

Keywords: Insulin Delivery, High pressure drug delivery,Jet Injectors,Needle phobia.

PCU-PP-013

STOPPING INFECTION BEFORE IT STARTS: THE ANTI- INFECTION CATHETER

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Catheter-associated infections remain a major clinical challenge, accounting for a significant proportion of hospital-acquired infections worldwide. Traditional catheters provide an essential function in patient care, yet their prolonged use increases the risk of microbial adherence, biofilm formation, and subsequent bloodstream or urinary tract infections. To address these concerns, anti-infection catheter design has emerged as a promising innovation integrating principles of pharmaceutics, biomedical engineering, and microbiology. Anti-infection catheters incorporate specialized materials and surface modifications to prevent bacterial colonization. Common strategies include antimicrobial coatings such as silver ions, chlorhexidine, rifampicin–minocycline combinations, or hydrophilic hydrogel layers that reduce friction and bacterial attachment. Some designs use drug-eluting technologies to provide sustained localized release of antimicrobial agents, while others employ surface engineering techniques like polymer modification or nanopatterning to make the catheter surface less favorable for biofilm development. These technologies aim to reduce infection risk without altering catheter function or compromising patient safety. Clinical studies have shown that antimicrobial catheters significantly lower rates of catheter-related bloodstream infections (CRBSIs) and catheter-associated urinary tract infections (CAUTIs), especially in high-risk or long-term catheterized patients. Anti-infection catheter design thus represents an important advancement in modern healthcare, offering safer and more efficient catheter systems for clinical use.

Keywords: Anti-infection Catheter, CAUTIs, Hospital acquired infections, Traditional catheters

PCU-PP-014

FROM TABLETS TO TECH: THE RISE OF DIGITAL PILLS IN MODERN HEALTHCARE

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Digital pills embedded with ingestible sensors are reshaping the future of medication adherence by merging traditional pharmacotherapy with advanced digital monitoring. Once swallowed, these sensors activate and transmit signals to external devices, enabling real-time tracking of ingestion events and patient response. This innovation addresses long-standing challenges of non-adherence, particularly in chronic diseases where missed doses compromise treatment outcomes and increase healthcare costs. A review of global patent trends reveals a rapid rise in technologies related to smart pills, mobile clinical monitoring, intelligent drug delivery, and digital diagnostics. Leading contributors include the United States, European Patent Office, China, Canada, and Australia. Therapeutic domains such as mental health, cardiovascular care, diabetes, oncology, infectious diseases, and gastroenterology show significant patent activity. While digital pills promise improved compliance, enhanced safety, and personalised therapy, they also raise concerns regarding privacy, ethical data use, and patient autonomy. This analysis highlights both the opportunities and challenges associated with ingestible sensors, underscoring their potential to build a connected, transparent, and patient-centred healthcare ecosystem.

Key words: Digital pills, personalised therapy, digital monitoring

PCU-PP-015

ENHANCING PREFORMULATION STUDIES WITH DE-INTERACT: AN AI-BASED PREDICTION SYSTEM

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Artificial intelligence (AI) is playing an increasingly important role in pharmaceutical preformulation, especially in assessing drug–excipient compatibility. In this study, the DE-Interact system flagged incompatibilities in paracetamol–vanillin, paracetamol–methylparaben, and brinzolamide–polyethylene glycol combinations, which were subsequently verified through DSC, FTIR, HPTLC, and HPLC analyses. A robustly trained Artificial Neural Network (ANN), refined for optimal validation accuracy and precision with minimal loss, showed strong predictive ability. Incorporating Mol2vec features, 2D molecular descriptors, and a stacked modeling approach further improved performance, yielding high metrics (accuracy 0.98; precision 0.87; recall 0.88; AUC 0.93; MCC 0.86). Overall, the study demonstrates how AI-driven tools can streamline excipient screening, anticipate stability concerns, and support formulation development. Despite ongoing challenges such as limited datasets and the complexity of chemical interactions, AI offers considerable potential to advance and expedite pharmaceutical research.

Keywords:AI,DE,DSC,FTIR,HPTLC,HPLC,ANN,Mol2vec,MCC

PCU-PP-016

POST-COVID REVOLUTION: MRNA AS THE FUTURE OF VACCINES & THERAPEUTICS

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The field of Ocular drug delivery is one of the interesting and challenging endeavours facing the pharmaceutical scientist. The most frequently used dosage forms i.e. ophthalmic solutions and suspensions are compromised in their effectiveness by several limitations, leading to poor ocular bioavailability. In ocular inserts the films are directly applied in the cul-de-sac,improving ocular bioavailability by increasing the duration of contact with corneal tissue, thereby reducing thefrequency of administration. Ocular inserts are defined as preparations with a solid or semisolid consistency, whose size and shape are especially designed for ophthalmic application (i.e., rods orshields). Ocular diseases require localized administration of drugs to the tissues around the ocular cavity. In the recent years, there has been explosion of interest in the polymer based delivery devices. Utilization of the principles of controlled release as embodied by ocular inserts offers an attractive approach to the problem of prolonging pre-corneal drug residence times. In the present update, the authors discuss the basic concept of ocular inserts as drug delivery system and examine the few inserts, which are available in the market or are being developed by pharmaceutical companies for drug delivery. The article discusses about the various structures of the eye, its anatomy with the various diagrams of it. This article further states the classification and the various mechanisms of drug diffusion into an eye with special attention to biological/clinical performances, and potential for future applications and developments.

Keywords: Eye, Ocuserts, Drug diffusion.

PCU-PP-017

REVOLUTIONIZING DRUG DISCOVERY AND DEVELOPMENT WITH ARTIFICIAL INTELLIGENCE

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Artificial Intelligence (AI) had transfigured different sectors in society, where the pharmaceutical sector is not an exceptional case. Pharmaceutical sectors have reached new heights with the emergence of these sophisticated technologies. The evolution of artificial intelligence in the pharmaceutical industry is in a growth phase opening the possibilities of discovering many new drugs. The diseases affecting humans are increasing tremendously whereas the drugs which are available to treat or cure are very much minimal. But this kind of scenario will not be present in the future because of the combination of artificial intelligence and the pharmaceutical industry which results in faster discovery of drugs with increased clinical outcomes. There was a shift in the paradigm of various stages in drug discovery because of the utilization of artificial intelligence. Each stage of drug discovery involves a certain timeline that can be cut down with the help of artificial intelligence. Many pharma companies are engaged with AI-based drug discovery

approaches for treating various diseases like Parkinson's disease diabetes, Alzheimer's, Obsessive Compulsive Disorder, etc., AI is also being employed in product development for the fabrication of nanomedicines and nanorobots. Few AI-based drugs are already in the phase of clinical trials which indicates the growth of AI-driven drug discovery. In this review, we have highlighted the application of AI in drug discovery and product development of pharmaceuticals.

Key words: Drug discovery, Drug delivery, Machine learning, Era of machines, Algorithm.

PCU-PP-018

TINY PARTICLES, BIG IMPACT: NANOMEDICINE IN DRUG DELIVERY

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Nanoparticles have emerged as one of the most promising tools in modern drug delivery, offering precise, controlled, and targeted transport of therapeutic agents. Their nanoscale size allows them to bypass biological barriers, improve drug solubility, enhance stability, and deliver medicines directly to diseased tissues while minimizing side effects. Various nanoparticle systems—including polymeric nanoparticles, lipid-based nanocarriers, metallic nanoparticles, and dendrimers—enable controlled release and improved bioavailability, making treatments more effective and patient-friendly. With growing applications in cancer therapy, infectious diseases, gene delivery, and personalized medicine, nanoparticle-based drug carrier systems represent a major advancement in pharmaceutical technology. This poster highlights the mechanisms, types, advantages, and future potential of nanoparticles as smarter, safer, and more efficient drug delivery systems.

Key words: Technology, nanoparticles, advancements, drug delivery

PCU-PP-020

STABILITY OF DOSAGE FORMS

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Introduction: Stability of dosage forms is a critical quality attribute that ensures a pharmaceutical productmaintains its identity, potency, safety, and performance throughout its shelf life. Factors suchas temperature, humidity, light, oxidation, pH variations, and interactions with packagingmaterials can alter the chemical, physical, microbiological, and therapeutic properties of adrug. Understanding dosage form stability is essential for designing robust formulations andestablishing appropriate storage and handling conditions.

Objective: The primary objective of this study is to evaluate the stability of various pharmaceuticaldosage forms under different environmental conditions, identify factors contributing todegradation, and assess the impact of these changes on the quality, efficacy, and safety of theproducts.

Experimental: A selection of solid, liquid, and semisolid dosage forms was subjected to accelerated stabilitytesting following ICH guidelines (40°C ± 2°C / 75% RH ± 5% RH). Physical parameterssuch as color, odor, pH, viscosity, hardness, and dissolution profile were monitored at 0,

30,60, and 90 days. Chemical stability was analyzed using HPLC to quantify activepharmaceutical ingredient (API) content and identify degradation products. Microbialstability was evaluated using microbial limit tests. Data were compared with long-termstability conditions (25°C ± 2°C / 60% RH ± 5% RH).

Results and Discussion: Solid dosage forms generally remained stable with minimal changes in hardness anddissolution, though moisture-sensitive tablets showed reduced API content over time. Liquidformulations exhibited more rapid degradation, particularly those susceptible to hydrolysisand oxidation. Semisolid preparations displayed changes in viscosity and phase separationunder extreme humidity conditions.

Conclusion: The study confirms that dosage form stability is influenced by environmental stress,formulation composition, and packaging integrity. Stability testing provides essential data fordetermining shelf life, selecting appropriate storage conditions, and ensuring consistent therapeutic performance.

Key words: AI-Assisted Dispensing Systems, minimal changes, degradation products.

PCU-PP-021

AI DRIVEN TRANSFORMATION IN DRUG DISCOVERY AND CLINICAL CARE

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Artificial Intelligence (AI) is transforming the entire spectrum of drug discovery and clinical care by enabling faster, data-driven, and more precise decision-making. In drug discovery, AI accelerates target identification, molecule design, lead optimization, and drug repurposing while reducing research time and cost. AI-driven analytics also enhance clinical trial design, patient recruitment, and safety monitoring. In clinical practice, AI supports clinicians through medical imaging interpretation, predictive analytics, personalized therapy selection, and medication management, leading to improved diagnosis, treatment accuracy, and patient outcomes. Despite challenges such as data privacy, algorithm transparency, and ethical concerns, regulatory bodies including the FDA, WHO, and EMA emphasize the safe and responsible integration of AI in healthcare. Overall, AI is a powerful tool reshaping modern medicine, enabling more efficient drug development and smarter clinical care.

Key words: Artificial intelligence, drug discovery, machine learning, clinical care, personalized medicine, predictive analytics, FDA, WHO, medical imaging.

PHARMACEUTICAL CHEMISTRY

PCH - PP – 01

DESIGN AND MOLECULAR DOCKING OF PHENANTHRENE OXAZOLE HYBRIDS AS DNA BINDING ANTI-CANCER AGENTS

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DNA binding agents are very important in cancer treatment because they can block the growth of cancer cells by interfering with DNA functions. In this study, a series of phenanthrene-based oxazole hybrids were designed to explore their ability to bind with DNA. Molecular docking was used to test how these hybrid compounds interact with DNA–protein structures. Among all the hybrids, **7b** and **7c** displayed the lowest binding energy, which indicates they formed stronger and more stable interactions. Their docking positions were also compared with well-known DNA intercalating agents like **doxorubicin** and **ethidium bromide**. The results showed that 7b and 7c were placed very close to the same regions where these standard drugs bind in DNA. This suggests that these new hybrids might also act as intercalating agents and could have potential use in future cancer treatment.

Key words: DNA binding agents , oxazole hybrids, molecular docking , intercalating agents

PCH - PP – 02

PEPTIDE-BASED THERAPEUTICS FOR MULTIPLE SCLEROSIS: A NOVEL APPROACH

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Current treatments for autoimmune diseases such as Multiple Sclerosis (MS) and Rheumatoid Arthritis (RA) often rely on general immune suppression, which leaves patients vulnerable to opportunistic infections. To overcome these limitations, recent research has focused on antigen-specific immunotherapies that selectively target autoreactive immune cells without compromising the systemic immune response. This review discusses the development and mechanisms of various therapeutic approaches, including soluble antigenic peptides, Altered Peptide Ligands (APLs), and Bifunctional Peptide Inhibitors (BPI).BPI molecules are designed to simultaneously bind to empty Major Histocompatibility Complex class II (MHC-II) molecules and Intercellular Adhesion Molecule-1 (ICAM-1) on the surface of Antigen Presenting Cells (APCs). This dual binding capability allows BPIs to disrupt the formation of the immunological synapse (IS) by blocking the interaction between LFA-1 and ICAM-1, which serves as a critical costimulatory signal (Signal-2). By inhibiting IS formation, these molecules suppress the proliferation of inflammatory Th1 and Th17 cells while promoting

the upregulation of Regulatory T cells (Tregs). The review further highlights advanced conjugate forms, such as I-Domain Antigen Conjugates (IDAC) and Fc-BPI molecules, which improve the delivery and stability of antigenic peptides. In Experimental Autoimmune Encephalomyelitis (EAE) mouse models, these conjugates demonstrated significant efficacy in suppressing disease symptoms, preventing blood-brainbarrier (BBB) leakiness, and reversing disease exacerbation. The findings suggest that antigen-specific peptide conjugates offer a promising therapeutic strategy for restoring immune balance and treating MS with reduced side effects compared to conventional therapies.

Key words: antigenic peptides, Bifunctional peptide inhibitor (BPI), peptide polymer conjugates,

PCH - PP – 03

ARTIFICIAL INTELLIGENCE EMPOWERING THE FULL SPECTRUM OF DRUG DISCOVERY

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Artificial Intelligence (AI) is revolutionizing the pharmaceutical industry by significantly enhancing various stages of drug development, from target identification and lead compound discovery to clinical trial optimization. Generative Adversarial Networks (GANs) have emerged as a particularly powerful AI technique, capable of rapidly generating novel molecular structures with high therapeutic potential. This paper discusses the integration ration of of AI into into drug development, highlighting the mathematical framework underlying GANs, where a generator produces candidate molecules and a discriminator evaluates their authenticity. Despite the transformative potential of AI, challenges such as data quality interpretability, and ethical concerns remain. High-quality datasets are crucial for training AI models, yet inconsistencies and biases present significant hurdles. The "black-box" nature of AI also complicates regulatory approval, necessitating the development of explainable AI (XAI) techniques. Furthermore, ethical considerations arou around Al's dual-use potential and data privacy must be addressed. This paper underscores the importance of cross-sector collaboration to overcome these challenges, citing initiatives like open-access databases and joint researchprojects as critical to advancing Al-enabled drug development. By By addressing these issues, AI has the potential to accelerate drug discovery, reduce costs, and pave the way for personalized medicine, ultimately transforming the pharmaceutical industry and improving global health.

Key words: Artificial Intelligence (AI), Generative Adversarial Networks(GANs),Drug Development, ExplainableAI(XAI), personalized Medicine

PCH - PP – 04

AI POWERED DIGITAL TWINS FOR DRUG DISCOVERY

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The integration of AI with digital twins and virtual human technology is transforming modern drug development by enabling predictive, personalized, and effective solutions. A digital twin is a virtual replica of a biological system, such as an organ, tissue, or even a whole human, created using real-time patient data, molecular profiles, and physiological parameters. Virtual humans are advanced AI-based models that simulate human biology, disease progression, and drug responses across diverse populations. In drug development, these technologies allow researchers to simulate drug behavior in silico before clinical trials, significantly reducing time, cost, and failure rates. AI-powered digital twins can model how a particular patient group may respond to a drug by analyzing genetic, metabolic, and lifestyle data. This supports precision medicine by enabling individualized dosing strategies and minimizing adverse drug reactions. Virtual humans further enhance this process by enabling large-scale efficacy testing, drug interaction, toxicity, and measuring across multiple virtual populations, including underrepresented groups who are often excluded from traditional trials.

Key words: AI-Powered Digital Twins, Virtual Humans, Drug Discovery, Predictive Modeling, Personalized Medicine, In Silico Simulation,Drug Efficacy & Safety

PCOL-PP-01

NAEGLERIA FOWLERI

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Naegleria fowleri also known as the brain-eating amoeba is a species of the genus naegleria. Naegleria fowleri, commonly known as the “brain-eating amoeba,” is a free-living, thermophilic protozoan found predominantly in warm freshwater environments such as lakes, ponds, hot springs, and inadequately chlorinated swimming pools. It is the causative agent of Primary Amoebic Meningoencephalitis (PAM). A rare but highly fatal infection of the central nervous system. The parasite typically enters the human body through the nasal passages during water-related activities. Once inside, it migrates along the olfactory nerves to the brain, where it induces extensive inflammation, tissue destruction, and necrosis. PAM progresses rapidly, with early symptoms resembling bacterial meningitis, including severe headache, fever, nausea, and vomiting, followed by neurological signs such as seizures, altered mental status, and coma. Diagnosis is challenging due to its rarity and non-specific early symptoms, often leading to delayed treatment. Laboratory identification involves microscopic examination of cerebrospinal fluid, antigen detection, or molecular methods such as PCR. Although treatment options remain limited, combinations of antifungal agents, particularly amphotericin B, along with miltefosine and supportive care, have shown occasional success. Preventive strategies are crucial and focus on minimizing exposure to contaminated warm freshwater, using nose clips during water activities, ensuring proper chlorination of recreational water facilities, and raising public awareness in high-risk regions.

Key words: Naegleria fowleri, brain-eating amoeba, Primary Amoebic Meningoencephalitis (PAM), thermophilic protozoan, freshwater contamination, central nervous system infection, olfactory nerve invasion, pathogenesis, diagnosis, PCR detection, amphotericin B, miltefosine

PCOL-PP-02

EMERGING THERAPY FOR CANCER CAUSED DUE TO K-RAS GENE MUTATION

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Cancer is a large group of diseases characterized by the uncontrolled division of abnormal cells that can invade and spread to other parts of the body. There are many types of cancer, often named after the organ or type of cell in which they start, such as carcinoma, sarcoma, and leukaemia. The KRAS gene is present in nearly all of our cells and provides the blueprint for a protein called K-Ras that helps signal to cells to divide and grow. Mutation in this gene can cause some dangerous cancers include lung, pancreatic, and colorectal. Earlier KRAS inhibitors were discovered but they are only limited to certain type of cancers. Additionally clinical research identified that they were having

large number of sever side effects. Therefore, new approaches have emerged focusing on the development of universal therapeutics capable of targeting a wider range of KRAS mutations, minimising toxicity and enhancing the therapeutic efficacy. Here in the treatment of KRAS GENE mutation mediated cancer we use gene therapy approaches, including siRNA, miRNA and CRISPR methodologies. Here we have different types of KRAS mutations and majorly occurring mutation is KRAS G12C mutation. To inhibit this, we have inhibitors and lipid based nanocarriers used in gene delivery. So far, several KRAS G12C inhibitors, including AMG510, MRTX849, LY3537982, GDC-6036 and D-1553, have gained approval for cancer treatment.

Key Words: K-RAS gene, Cancer, Mutation, K-RAS inhibitors, KRAS G12C inhibitors

PCOL-PP-03

DRUG COATED BALLON ANGIOPLASTY

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Drug-coated balloon (DCB) angioplasty is a modern technique used to treat blocked or narrowed blood vessels, especially in the heart. In this procedure, a small balloon coated with a special drug is placed inside the narrowed vessel. When the balloon is inflated, it opens the blockage and releases the drug directly into the vessel wall. This medicine helps stop the vessel from narrowing again by preventing abnormal tissue growth. Unlike stents, which stay inside the body permanently, DCBs do not leave any metal behind. This reduces long-term complications such as stent blockage, inflammation, or the need for long-term blood-thinning medicines. DCB angioplasty is especially helpful for patients with small vessels, in-stent restenosis, and peripheral artery disease. Studies show that DCBs improve blood flow, reduce symptoms, and lower the chance of repeat procedures. The technique is simple, quick, and causes minimal damage to the vessel. It also allows future treatment options if needed because no permanent device is left inside.Overall, drug-coated balloon angioplasty is an effective, safe, and patient-friendly approach for managing vascular blockages. It offers the benefits of immediate vessel opening, targeted drug delivery, and long-term prevention of restenosis, making it an important advancement in cardiovascular and peripheral vascular therapy.

Key Words: Drug-Coated Balloon Angioplasty ,Balloon angioplasty,Vascular stenosis, Restenosis prevention ,Endovascular therapy, Peripheral artery disease (PAD) ,Coronary artery disease (CAD).

PCOL-PP-04

EVALUATION OF NEUROPROTECTIVE EFFECT OF EMBLICA OFFICINALIS FRUIT EXTRACT ON ACRYLAMIDE INDUCED NEUROTOXICITY IN RATS

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The study investigates the neuroprotective effects of Embolic officinalis (Indian gooseberry) against acrylamide-induced neurotoxicity in Wistar rats. Acrylamide, a chemical formed during high-temperature cooking, poses significant health risks, particularly neurotoxicity. It leads to oxidative

stress, axonal damage, and behavioural deficits such as impaired grip strength, hyperalgesia, and locomotor dysfunction. Emblica officinalis, rich in bioactive compounds and antioxidants, is evaluated for its protective effects. Rats were divided into control, standard and experimental groups receiving acrylamide (50mg/kg) alone or combined with low/high (250mg/kg and 500mg/kg) doses of E. officinalis extract and standard Vitamin C (100mg/kg). Behavioural tests including locomotor activity, grip strength, narrow beam (hind limb impairment), and thermal hyperalgesia indicated that E. officinalis, especially at 500 mg/kg, significantly reversed acrylamide-induced deficits. The findings suggest that E. officinalis mitigates neurotoxicity by enhancing antioxidant defenses and possibly improving neuronal function. The study supports further exploration of E. officinalis as a therapeutic agent against chemically induced neurotoxicity and reinforces its traditional medicinal value.

Key Words: Emblica officinalis , Acrylamide , Neurotoxicity , Oxidative stress ,Antioxidants , Wistar rats , Grip strength , Hyperalgesia , Locomotor dysfunction , Vitamin C Neuronal function .

PCOL-PP-05

ROLE OF PREBIOTICS AND PROBIOTICS IN COLORECTAL CANCER PREVENTION AND TREATMENT

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Colorectal Cancer (CRC) is the third most common cancer worldwide in men and women. The second largest cause of death related to cancer, and the main cause of death in gastrointestinal cancer. The impact of probiotics and prebiotics on the management of Colorectal Cancer (CRC) is a developing field that could improve current treatments. Prebiotics, which nourish beneficial gut bacteria, and probiotics. Which introduce these bacteria directly into the gut, both play vital roles in restoring microbial balance and preventing dysbiosis associated with CRC? Prebiotics fermentation produces short chain fatty acids (SCFAs) such as butyrate. These SCFAs have anti-inflammatory effects and anti-carcinogenic properties. They inhibit tumour growth and induce cancer cell apoptosis. Probiotics improve gut barrier function, reduce permeability, and prevent the spread of pathogens and toxins, thereby reducing inflammation, a significant risk factor for CRC. Together, prebiotics and probiotics modulate immune responses, creating an environment that suppresses tumour growth and enhances the effectiveness of traditional treatments. They also help detoxify dietary carcinogens, reducing CRC risk. In conclusion, combining prebiotics and probiotics provides a comprehensive approach to CRC treatment by improving gut health, immune function, and cancer prevention.

Keywords: Prebiotics and probiotics, anti-inflammatory and anti-carcinogenic properties.

PCOL-PP-06

STRATEGIES TO REDUCE ANTIBIOTICS RESISTANCE IN URINARY TRACT INFECTIONS

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Antibiotic resistance in urinary tract infections (UTIs) is escalating globally, compromising therapeutic effectiveness and increasing morbidity, healthcare costs, and recurrence rates. This challenge demands innovative, multifaceted strategies that go beyond traditional antimicrobial use. This paper explores emerging and evidence-based approaches to reduce antibiotic resistance in UTI management, including rapid molecular diagnostics for targeted therapy, antimicrobial stewardship programs, and optimized prescribing practices that minimize unnecessary or prolonged antibiotic exposure. Non-antibiotic prophylactic interventions—such as immunoactive vaccines, bacteriophage therapy, probiotics, and anti-adhesion agents like D-mannose—are evaluated for their potential to decrease dependence on conventional antimicrobials. Furthermore, the use of novel drug-delivery systems, host-directed therapies, and biomarkers for personalized treatment decisions are discussed as promising tools to enhance therapeutic precision. Integrating these strategies within clinical workflows, supported by surveillance systems and patient-centered education, could significantly curb resistance rates and improve long-term UTI outcomes.

Key Words: Diabetes mellitus, Nyctanthes, arbor-tristis, Sequential extraction, Phytochemical Profiling, HPLC

PCOL-PP-07

AI FOR ALZHEIMER'S: PIONEERING PRECISION IN PREDICTION AND TREATMENT

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The landscape of Alzheimer's disease (AD) treatment is being reshaped through artificial intelligence (AI) that may enhance early diagnosis and indication of care and speed up development of therapies. AI-assisted neuroimaging and biomarker assessment may unearth subtle, pre-clinical changes in the brain that can provide opportunities to treat with improved clarity in prognosis and earlier in symptomatology. Further, machine learning can assist with the analysis of multi-modal data (e.g., genetic, protein, clinical, imaging) to predict the course of the disease; built projected risk profiles can also provide a rapid means to stratify patients for precision medicine.AI-based models may also inform designs of clinical trials, by identifying specific subgroups of individuals who are more likely to respond to new treatments, facilitating efficiencies and lowering costs associated with the study of, and eventual development of therapies for, the AD population. New tools are emerging that can support cognitive training and rehabilitation that, supported by AI, may slow cognitive decline and benefit individuals living with the effects of AD. All these types of advancements have the potential to ultimately change AD treatment; however, it is also critical and important that we continue to address issues related to ethical guidelines for use of AI models, data

quality, and cross discipline collaboration. Overall, the use of AI in treating Alzheimer's challenges can be an exciting step toward more efficient, personalized, effective care for individuals who are affected by AD.

Key Words: Artificial Intelligence (AI), Alzheimer's disease (AD), Early Diagnosis, Machine Learning, Neuroimaging, Biomarkers, Precision Medicine, Drug Discovery, Cognitive Rehabilitation

PCOL-PP-08

3D PRINTED ORGANS: THE FUTURE OF REGENERATIVE MEDICINE

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The increasing gap between organ demand and donor availability has positioned 3D bioprinting as a critical frontier in regenerative medicine. This review examines the principles of 3D bioprinting, a form of additive manufacturing that utilizes digital imaging (CT/MRI) to fabricate living tissue layer-by-layer. The article categorizes primary printing techniques including extrusion, inkjet, and laser-assisted printing— and evaluates the efficacy of natural and synthetic bio-inks, such as hydrogels, in maintaining cell viability. Significant clinical applications are highlighted, ranging from the creation of vascularized tissues essential for nutrient diffusion to the regeneration of cartilage, bone, and skin for wound healing. Specific advancements addressed include bio-printed liver models for fibrosis research and functional pancreatic constructs for treating Type 1 Diabetes. The review also surveys the emerging Indian bioprinting landscape, noting contributions from companies like Pandorum Technologies. While acknowledging current limitations regarding printing speed, resolution, and vascularization, the author concludes that 3D bioprinting holds transformative potential for personalized medicine, ultimately reducing healthcare costs and transplant rejection rates.

PCOL-PP-09

VIRTUAL CLINICAL TRIALS: REDUCING BARRIERS TO PARTICIPATION

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Through technology, virtual clinical trials are redefining the field of clinical research by removing long-standing obstacles to participant enrolment and retention. By enabling remote participation through digital telemedicine, mobile applications, and electronic data collecting, these trials have the potential to increase the scope and diversity of clinical research. This study compares virtual clinical trials with traditional trials to analyse the advantages and difficulties of the former. Essential characteristics and possible benefits of virtual trials like lessened travel expenses and burdens as

well as their drawbacks and methods for raising participant involvement are covered. Virtual trials aim to improve the accessibility and efficiency of clinical research by tackling these variables; nevertheless, they also encounter obstacles with participant involvement and technological uptake.Virtual clinical trials are changing how the clinical research community approaches participant enrollment and engagement. Virtual clinical trials hold promise for increasing study participation, retention, and comprehension. By employing tools of new technology and reducing the need for participants to travel to a central site, virtual clinical trials can alleviate some of the prominent challenges investigators face when enrolling and retaining demographics that are historically underrepresented in clinical research. However, these trials are not without risk and cannot replace traditional, purposeful outreach and educational efforts that are tailored to underserved populations. The aim is to see if virtual trials will make it easier for people to join studies as participants. It is intended to teach about the rewards and possible risks of volunteering for clinical research and hopefully motivate the viewer to consider becoming a participant in a clinical trial.

PCOL-PP-10

PLATELET RICH PLASMA THERPY

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Platelet-rich plasma (PRP) is an autologous concentrate of platelets whose density exceeds that of whole blood, typically reaching≈ 1×10^6 platelets μL^1, and is obtained by centrifugation of patient blood. Upon activation, platelets release a complex cocktail of growth factors (PDGF, TGF-β, VEGF, IGF-1, FGF, EGF) and cytokines that modulate chemotaxis, inflammation, angiogenesis and extracellular-matrix remodelling, reviews highlight PRP's broad clinical utility in dermatology and aesthetic medicine, including skin rejuvenation, wrinkle reduction, improvement of skin texture and elasticity, hair reconstruction, and accelerated wound or scar healing. Combination protocols-micro needling, laser, or hyaluronic-acid treatments-enhance therapeutic outcomes by synergistically delivering growth factors and stimulating fibroblast activity Despite promising results, the literature reports heterogeneous efficacy, largely attributed to the lack of standardized preparation, classification, and activation protocols; Many studies omit platelet activation, which may limit clinical benefit, The authors call for multicenter trials to harmonize PRP processing, define optimal activation agents, and establish evidence-based guidelines for its use in anti-aging, musculoskeletal, and post-operative scar management

Key Words: Platelets, Plasma, Remodelling

PCOL-PP-11

THERAPEUTIC POTENTIAL OF PROBIOTICS IN NON-SURGICAL PERIODONTAL TREATMENT

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periodontal disease is a chronic inflammatory condition driven by dysbiosis of the oral microbiome, charecterized by gingival inflammation , periodontal pocket formation , and progressive destruction of supporting tissues.

Conventional treatments such as scaling and root planning (srp)primarily target pathogenic biofilm but often fail to maintain long term microbial balance .in recent years , probiotics have emerged as a promising adjunctive strategy in periodontal therapy due to their ability to modulate the oral microbiotics and host immune response.

PROBIOTICS- beneficial microorganisms such as lactobacillus reuteri,lactobacillusrhamnosus, and bifidobacterium species-exert multiple therapeutic actions including competitive inhibition of periodontal pathogens,production of pro-inflammatory cytokines,and enhancement of epithelial barrier function . clinical studies have demonstrated.

probiotic supplementation, delivered through lozenges, mouth rinses,chewinggums,or gels significantly reduces plague index,gingivalinflammation,probing pocket depth and bleeding on probing when used alongside SRP.

additionally probiotics may reduce halitosis and improve overall oral microbial diversity. innovations in pharmaceutical research have introduced next generation probiotics formulations such as mucoadhesive gels nano encapsulated probiotics carriers and symbiotic combinations that enhance stability and targeted delivery.

further long term clinical trials are required to establish optimal protocols and evaluate sustained efforts after therapy cessation.overall, probiotics represent safe,costeffective,and biologically driven approach to periodontal disease management,offering a novel and patient-friendly.
KEYWORDS: Probiotics, Periodontitis, Lactobacillus strains

PHARMACOGNOSY

PCOG-PP-01

DEVELOPMENT AND EVALUATION OF POLY HERBAL PASTILLES FOR MOUTH ULCERS

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Mouth ulcers are common inflammatory lesions of the oral mucosa, requiring localized and soothing treatment. This study focuses on the formulation and evaluation of polyherbal pastilles using a gelatination technique for topical management of mouth ulcers. Medicinal plants including Moringa oleifera, Glycyrrhiza glabra, Zingiber officinale, and Curcuma longa were selected for their anti-inflammatory, antimicrobial, antioxidant, and wound-healing properties. The formulation incorporated natural excipients such as organ oil, glycerine, honey, and purified water to enhance emollient action, palatability, and mucosal adhesion. The prepared pastilles were subjected to evaluations including organoleptic properties, hardness, thickness, friability, weight variation, moisture content, disintegration time, and in vitro dissolution.The pastilles exhibited greenish color, pleasant herbal aroma, smooth non-sticky texture, and uniform floral shape. Average hardness was 9.0kg/cm², thickness 4.62 mm, and friability 0.718%. The average weight was 1997.5 mg with minimal variation (±3.75%), and moisture content ranged from 1.78% to 1.89%. Disintegration time was 38 minutes, and 9.6% cumulative drug release was recorded after 30 minutes.The study concludes that the formulated polyherbal pastilles are pharmaceutically stable, organoleptically acceptable, and offer a safe, natural, and effective alternative for the topical treatment of mouth ulcers, with potential for future clinical applications.

Keywords: Polyherbal Pastilles, Mouth ulcers, Gelatination technique, Anti-inflammatory

PCOG-PP-02

PLANT – DERIVED EXOSOMES: A NEXT GENERATION PLATFORM FOR TARGETED DRUG DELIVERY

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Exosomes are tiny nano-sized vesicles released by cells and are found in body fluids like blood and saliva that carry proteins, fats, and genetic material to help cells communicate with each other. They act like natural messengers in the body. Plant-derived exosomes (PDEs):PDEs are emerging as a sustainable, cost-effective alternative to mammalian exosomes for drug delivery. Isolated from edible plants like ginger and grapefruit, PDEs overcome critical bottlenecks in mass production and safety. They exhibit exceptional stability in the gastrointestinal tract, positioning them as ideal candidates for oral administration. Unlike synthetic carriers, PDEs possess intrinsic bioactive properties—such as anti-inflammatory effects—that synergize with therapeutic cargo. This review validates PDEs as a scalable, "green" nanomedicine platform offering a safe solution for delivering small molecules and genetic material, effectively bridging the gap between natural medicine and advanced nanotechnology. Owing to their low immunogenicity, high stability in harsh physiological environments, and ability to cross biological barriers, PDEs offer significant advantages over

synthetic nano particles and mammalian exosomes. Overall, plant-derived exosomes represent a safe, eco-friendly, and highly versatile nanocarrier system with substantial promise in the future of precision medicine and therapeutic delivery.

Keywords: Plant-derived exosomes ,Targeted drug delivery ,Sustainable nanomedicine ,Oral bioavailability enhancement , Low immunogenic nanocarriers , Precision medicine

PCOG-PP-03

FIGHTING DIABETES NATURALLY: THE ROLE OF ELLAGIC ACID

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Eallagic acid (EA) is a natural polyphenol antioxidant found in pomegranate, berries, and nuts, and has drawn attention for its potential benefits in metabolic disorders, especially Type 2 Diabetes Mellitus (T2DM). Evidence from recent clinical studies shows that EA supplementation can significantly reduce fasting blood glucose, improve insulin secretion, and enhance lipid profiles by lowering triglycerides and LDL cholesterol. However, these studies report no meaningful effect on body weight or BMI, suggesting that EA's benefits arise mainly from metabolic and biochemical actions rather than changes in body composition. Animal studies provide supporting mechanistic insights. In diabetic rat models, EA reduces hepatic steatosis and improves both systemic and liver-specific insulin sensitivity. These effects are linked to EA's strong antioxidant activity, its ability to reduce oxidative stress, suppress inflammation, and regulate proteins involved in glucose and lipid metabolism. By lowering reactive oxygen species and restoring antioxidant defenses, EA helps protect liver cells and normalize lipid accumulation. On a molecular level, EA acts as a potent inhibitor of glycogen phosphorylates, reducing hepatic glucose output and contributing to improved glycemic control. Along with its anti-inflammatory and hepatoprotective properties, current evidence positions EA as a promising adjunct for managing hyperglycemia, dyslipidemia, and fatty liver disease. Further clinical research is needed to confirm its long-term safety and therapeutic value.

Keywords: Eallagic acid (EA), Glucose metabolism, Glycogen phosphorylase inhibition, Insulin sensitivity, Oxidative stress, Type 2 Diabetes Mellitus (T2DM).

PCOG-PP-04

INTERGRATIVE APPROACH TO ARTHRITIS: THE ROLE OF NUTRACEUTICALS

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Nutraceuticals are natural, food-derived products that help maintain joint health and support normal physiological functions. In the context of arthritis, they provide therapeutic advantages by easing joint pain, reducing inflammation, and improving overall mobility through their influence on key inflammatory and oxidative pathways. Well-studied nutraceuticals such as glucosamine, chondroitin, omega-3 fatty acids, curcumin, ginger, and Boswellia serrata possess strong anti-inflammatory, antioxidant, and cartilage-protective properties that benefit individuals with both

osteoarthritis (OA) and rheumatoid arthritis (RA). These compounds work by inhibiting pro-inflammatory cytokines, suppressing COX and LOX pathways, reducing oxidative stress, and potentially slowing down cartilage breakdown and joint degeneration. Clinical research has shown that nutraceutical supplementation can help relieve symptoms like stiffness and swelling, enhance physical function, and in some cases reduce the need for continuous NSAID use—particularly in chronic arthritis where long-term drug therapy may lead to adverse effects. Additionally, certain nutraceuticals may contribute to better joint lubrication, improved cartilage resilience, and attenuation of inflammatory flare-ups, making them valuable supportive therapies. However, while nutraceuticals offer meaningful benefits, they should not replace standard medical care. This is especially important for rheumatoid arthritis, an autoimmune disease requiring disease-modifying therapies for long-term control. Therefore, nutraceutical use should always be guided by healthcare professionals to ensure safety, avoid interactions, and optimize treatment outcomes. Overall, nutraceuticals serve as promising adjuncts in arthritis management by targeting multiple molecular mechanisms involved in joint inflammation and damage, ultimately contributing to improved comfort, mobility, and quality of life for individuals living with arthritis.

Keywords: Nutraceuticals, Arthritis, Anti-inflammatory, Antioxidants, Cartilage protection, Omega-3 fatty acids

PCOG-PP-05

PLANT BASED BIOLOGICS AND EDIBLE VACCINES

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Plant-Based Biologics and Edible Vaccines: A Sustainable Future for Global Biopharmaceutical Production. The field of plant molecular farming is emerging as a powerful, cost-effective, and scalable platform for producing biopharmaceuticals, presenting a sustainable alternative to traditional microbial and mammalian cell systems. This presentation will focus on two revolutionary applications: plant-based biologics and the development of edible vaccines.Plant-based biologics, or “pharming,” utilizes genetically engineered plants to produce complex proteins, including monoclonal antibodies, growth factors, and therapeutic enzymes. This method offers inherent safety advantages, such as a reduced risk of contamination by mammalian pathogens and the capacity for rapid, large-scale production, critical during pandemic responses. A subset of this research, edible vaccines, is particularly disruptive. These orally delivered vaccines are produced within the edible parts of plants (like bananas or lettuce), offering mucosal immunity and eliminating the need for complex cold chain storage, sterile injection equipment, and specialized personnel. This simplicity dramatically lowers logistical barriers, making global vaccination campaigns, especially in low-resource settings, significantly more feasible. We will evaluate the current state of clinical trials, manufacturing challenges, and the regulatory pathway required for these innovative products to achieve widespread pharmaceutical impact.
Keywords: Plant-based biologics ,Pharming ,Edible vaccines, Genetically engineered plants

PCOG-PP-06

LEVERAGING NANOTECHNOLOGY FOR ENHANCED DELIVERY OF PLANT-DERIVED COMPOUNDS

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Phytomedicine has been used by humans since ancient times to treat a variety of diseases. However, herbal medicines face significant challenges, including poor water and lipid solubility and instability, which lead to low bioavailability and insufficient therapeutic efficacy. Recently, it has been shown that nanotechnology-based drug delivery systems are appropriate to overcome the above-mentioned limitations. The present review study first discusses herbal medicines and the challenges involved in the formulation of these drugs. The different types of nano-based drug delivery systems used in herbal delivery and their potential to improve therapeutic efficacy are summarized, and common techniques for preparing nanocarriers used in herbal drug delivery are also discussed. Finally, a list of nanophyto medicines that have entered clinical trials since 2010, as well as those that the FDA has approved, is presented.

Keywords: Phytomedicine, Herbal drug, Nanotechnology, Drug delivery systems, Nanophytomedicine

PCOG-PP-07

ANTI BACTERIAL AND NOOTROPIC ACTIVITY OF OLEA EUROPAEA

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The goal of this study is to see if Olea Europaea (O. europaea) has any nootropic or antibacterial properties.The impact of an ethanolic extract of O. europaea on learning and memory in mice is assessed using the elevated plus maze paradigm and in vitro
antibacterial activity was assessed using cup plate techniques for the determination of zone
of inhibition at concentrations of 50, 100, 150, and 200 g/ml. In the elevated plus maze model, the ethanolic extract of O. europaea demonstrated a reduction in transfer latency, which is indicative of cognition enhancement, as well as antibacterial activity against E.coli and E. faecalis at 150 and 200 g/ml.The findings imply that an ethanolic extract of O. europaea improves memory and has antibacterial characteristics in mice.
Key words: *Olea europaea* , Nootropic activity, Anti Bacterial activity.

PCOG-PP-08

FORMULATION, EVALUATION, DEVELOPMENT AND OPTIMIZATION OF *AGAVE CANTALA* ETHOSOMAL GEL FOR ANTIBACTERIAL EFFECT : INVIVO AND INVITRO.

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This study aim to develop and optimize a *Agave cantala* leaf extract based gel and evaluated its antibacterial effect. *Agave cantala* (Asparagaceae) it is explored for its medicinal properties due to its rich content of steroidal saponins and other secondary metabolites with potential anti-inflammatory and antimicrobial activities by applying QBD3 2 , optimized formulation is F-9 characterizations parameter FTIR, zeta potential, particle size analysis, SEM, viscosity, spreadability and pH was measured. In vitro anti bacterial activity carried out by zone of inhibition in e coli and streptococcus areus as shown significant effect.

PCOG-PP-09

FORMULATION AND DEVELOPMENT OF *LEUCAS LONGIFOLIA* AND *ANDROGRAPHIS PANICULATA* HERBAL TABLET FOR INVIVO AND INVITRO STUDIES

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The aim of present study is formulation, evaluation and development of herbal tablet containing *Leucas longifolia* (Lamiaceae) and *Andrographis paniculata* (Acanthaceae) invitro α-amylase antidiabetic activity. Herbal tablets are prepared by wet granulation method and evaluated for Angle of repose, Friability, Hardness, Thickness, Disintegration and IR. invitroα-amylase activity for antidiabetic effect in tablet. The obtained result of herbal tablet, angle of repose 47.68, friability 1%, thickness 1.48mm, hardness 9.2kg/cm 2 , disintegration time 45mins and invitro α-amylase % inhibition is 63%. From the above results we conclude that herbal tablet having antidiabetic effect.

Key words: Herbal Tablets, α-amylase and IR.

OG-PP-10

FORMULATION AND EVALUATION OF HERBAL BASED ANTIMICROBIAL CREAM

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Essential oils like eucalyptus and neem are well known for its anti-microbial activity. The aim of this study is to evaluate the antimicrobial activity of two essential oils (eucalyptus oil, neem oil) By Incorporating them in cream containing cow ghee as base and evaluate its physical and anti-microbial properties. Cow ghee here not only acts as base but also acts as penetration enhancer. Creams are prepared by fusion method. Agar diffusion method Was used to see antibacterial activity of cream using reference disk of antibiotics. Antibacterial cream was prepared by incorporating different amount of ingredients together and certain amount of oils in different concentrations and antimicrobial activity was carried out on Escherichia coli, staphylococcus aureus, pseudomonas aeruginosa, bacillus subtilis. Zone of inhibition was measured. Finally, efficiency was compared with standard product. Antibacterial activity was found to be in limits. The prepared cream was evaluated for their physical and rheological studies.Stability studies showed stable, homogenous appearance over period of 3 months at room temperature.

Key words: Cow ghee, eucalyptus oil, neem oil, antimicrobial activity, zone of inhibition, fusion method.

COG-PP-11

Nano-Phyto medicine: Revolutionizing Herbal Bioavailability and Efficacy through Novel Drug Delivery Systems

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Despite the immense therapeutic potential of herbal medicines, their clinical utility is often limited by poor pharmacokinetic profiles. Major bioactive constituents, such as flavonoids, tannins, and terpenoids, frequently exhibit poor lipid solubility, high molecular size, and instability in the gastric environment, leading to low bioavailability and inconsistent therapeutic outcomes. This presentation explores the emerging field of Nano-Phytomedicine, an innovative research domain that integrates traditional pharmacognosy with modern nanotechnology to overcome these biopharmaceutical limitations.

We will focus on the development of Novel Drug Delivery Systems (NDDS) for herbal actives, specifically Phytosomes, Liposomes, and Polymeric Nanoparticles. Unlike simple herbal extracts, these nanocarriers encase the phytoconstituents, significantly enhancing their absorption through biological membranes and protecting them from degradation. The review highlights recent case studies where nano-formulated herbal drugs (e.g., Silymarin phytosomes, Curcumin nanoparticles) demonstrated superior clinical efficacy and reduced toxicity compared to conventional extracts. By bridging the gap between traditional knowledge and cutting-edge pharmaceutical engineering, Nano-Phytomedicine represents the future of standardized, evidence-based herbal pharmacotherapy.

Keywords: Pharmacognosy, Bioavailability, Nano-Phytomedicine, Phytosomes, Novel Drug Delivery Systems (NDDS).

PP-PP-01

SIMULATION OF NANOROBOTS WITH ARTIFICIAL INTELLIGENCE AND REINFORCEMENT LEARNING FOR ADVANCED CANCER CELL DETECTION AND TRACKING

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Nanorobots represent a transformation targeted drug delivery and the treatment of neurological disorders, with significant potential for crossing the BBB. Leveraging advances in nanotechnology and bioengineering, these miniature devices exhibit capabilities for precise navigation and targeted payload delivery, particularly in addressing conditions like brain tumor. Recent developments in AI and machine learning are enhancing the navigation and efficacy of Nanorobots, enabling them to detect and interact with cancer cells through biomarker analysis. This work presents a novel reinforcement learning (RL) framework for optimizing Nanorobots navigation in complex biological environments, focusing on the detection of cancer cells by analyzing the concentration gradients of surrounding biomarkers. Using a computer simulation model, we explore the behavior of Nanorobots in a three-dimensional space populated with cancer cells and biological barriers. The proposed method employs Q-learning to refine movement strategies based on real-time biomarker concentration data, allowing Nanorobots to autonomously navigate to cancerous tissues for targeted drug delivery.. The integration of intelligent Nanorobots could revolutionize therapeutic approaches, reducing side effects and improving treatment efficacy for cancer patients. Further research will explore the practical deployment of these technologies in medical settings, aiming to realize the full potential of nanorobotics in healthcare

Keywords: Nanorobots, Artificial Intelligence

PP-PP-02

APPLICATIONS AND ADVANCES IN NANOTECHNOLOGY FOR LUNG CANCER DIAGNOSIS

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Lung cancer leads in causing cancer-related mortality worldwide, continually posing a significant threat to human health. Current imaging diagnostic techniques, while offering non-invasive detection, suffer from issues such as insufficient sensitivity and the risks associated with radiation exposure. Pathological diagnosis, the gold standard for confirmation, also faces challenges like invasiveness and high costs. In treatment, surgery, radiotherapy, and chemotherapy are the main modalities, each encountering challenges related to precision, environmental adaptability, and side effects.

Nanotechnology's advancement provides new solutions for the diagnosis and treatment of lung cancer, promising to enhance diagnostic accuracy and reduce side effects during treatment. This

article introduces the main types of nanomaterials used in the field of lung cancer, offering a comprehensive overview of current research on the application of nanotechnology in early screening, diagnosis, treatment, and monitoring of lung cancer, and summarizing ongoing clinical research findings.

Keywords: Clinical innovation; Diagnosis; Lung cancer; Nanoparticles; Nanotechnology; Treatment.

PP-PP-03

ARTIFICIAL INTELLIGENCE IN CLINICAL DEVELOPMENT: AN INNOVATIVE APPROACH

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Artificial Intelligence (AI), a branch of computer science, is transforming the pharmaceutical industry by enabling smarter, more efficient processes. By using advanced algorithms, AI helps improve decision-making, optimize workflows, and reduce costs, while enhancing safety, accuracy, and productivity. In areas like drug discovery, formulation development, and hospital pharmacy, AI has proven to be a game-changer. Techniques such as Artificial Neural Networks (ANNs), including Deep Neural Networks (DNNs) and Recurrent Neural Networks (RNNs), are widely used to predict and design new drug molecules, analyse structure-activity relationships (QSAR), and optimize drug delivery systems. AI also accelerates drug development through de novo design, which creates novel molecules with specific desired properties. Furthermore, AI is making significant contributions to managing and organizing vast amounts of healthcare data, improving both research outcomes and clinical practices. This poster highlights the diverse applications of AI in the pharmaceutical sector and its potential to revolutionize drug development, treatment strategies, and patient care.
Keywords: Artificial intelligence ,Artificial neural network(ANN) ,Recurrent neural network(RNN),Structure activity relationship (SAR),Revolutionize.

PP-PP-04

PHARMACEUTICAL RESEARCH INNOVATION IN PRACTICE- “PHARMACOGENOMICS AND PHARMACOKINETICS OF INTRAVENOUS ANESTHETICS: A PHARMACIST-LED STRATEGY TO PREVENT INTRA-OPERATIVE AWARENESS

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Intra-operative awareness, though infrequent, can result in severe psychological distress and medicolegal consequences. It is often considered solely an anesthesiologist's problem, and traditional prevention revolves around dosing decisions, equipment checks, and individual errors. Besides this, inter-individual variability in drug metabolism is generally overlooked. Genetic variations (PGx) and pharmacokinetics (PK) provide a possibility to identify high-risk patients due to fast metabolism or altered clearance of intravenous anaesthetic agents.

To propose a pharmacist-led, PK–PGx-based strategy to identify and manage patients at risk of intra-operative awareness associated with intravenous anaesthetics.
The poster navigates the workflow with a clinical pharmacist. From reviewing pre-op medication and comorbidities to interpreting targeted PGx results for key enzymes (e.g., CYP2B6, CYP2C9, CYP3A4/5, UGT1A9). Multidisciplinary investment in modification of doses and depth-of-anesthesia monitoring (e.g., BIS) in high-risk patients.
A pilot observational study with a protocol aimed at evaluating clinical implementation to correlate genotypes, drug dosing, BIS trends, and patient-reported recall with the role of a clinical pharmacist collaborated with anesthesiologists in a tertiary care setting.
This plan transforms anaesthesia awareness prevention from a solely anesthesiologist-driven domain into a multidisciplinary model with a defined clinical role for clinical pharmacists, integrating PK–PGx assessment into routine perioperative care.
A pharmacist-led PK–PGx approach has the potential to enhance personalised anaesthesia, reduce the risk of intraoperative awareness, and demonstrate the expanding role of clinical pharmacists in patient safety and precision medicine.

Keywords: Polymorphism, General anesthesia, Anesthesia awareness, Pharmacokinetics.

PP-PP-05'

CASE REPORT ON FENOFIBRATE - ATORVASTATIN INDUCES RHABDOMYLOSIS

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A female patient of age 55 years was admitted to the hospital with complaints of cough, breathlessness, mild expectorate, fever, and pain near the chest for three days and a history of weakness. The patient has a past medical history of hypertension [treated withamlodipine] and diabetes mellitus [treated withtab glimepiride 2mg + metformin 500 mg] . The patient's lab investigations showed decreased haemoglobinlevel [8.2gm/dl], packed cell volume [20.6], mean corpuscular volume [73.1], mean corpuscular haemoglobin[25.6], red blood cell [2.5mill/cumm] decr- eased count. The patient had taken Fenofibrate and Atorvastatin, which will enhance the effects of oneanother through pharmacodynamic syne- rgism. When combined with an optimal statin regimen to lower trigly- cerides and increase high-density lipoproteins, fenofibrate may increase the risk of rhabdomyolysis. Hence has to be monitored proportionately. As an alternative to Fenofibrate, Ezetimibe was given which resulted in no interactions that were previously seen and reported.

Keywords: Rhabdomylosis, hypertension, fenofibrate, atorvastatin, pharmacodynamic synergism

PP-PP-06

DURATION AND ACCURACY OF AUTOMATED STROKE CT WORKFLOW WITH AI SUPPORTED INTRACRANIAL LARGE VESSEL OCCLUSION DETECTION.

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Timely and accurate detection of intracranial large vessel occlusions (LVOs) is essential in acute stroke management, where traditional radiologist-driven CT interpretation remains the gold standard but is often limited by workload, inter-reader variability, and delays in processing complex CT perfusion (CTP) datasets. This study evaluated how an AI-integrated stroke CT workflow—the Automation Platform (AP)—compares with conventional radiologist interpretation in terms of diagnostic accuracy and processing speed. In a retrospective cohort of 100 acute stroke patients, the AP's performance for detecting distal ICA, M1, and M2 occlusions on CT angiography (CTA) was compared with five radiologists, using an independent neuroradiologist as the reference standard. Processing times for non-contrast CT, CTA, and CTP were assessed in 60 cases and compared with prospectively timed readings by 13 radiologists. Traditional interpretation demonstrated higher sensitivity for LVO detection (mean 87%) compared with the AP (77% for ICA/M1 and 52% including M2 occlusions). However, the AP markedly outperformed conventional methods in workflow efficiency, processing CTA in 60 seconds versus 395 seconds by radiologists, and generating CTP maps significantly faster as well. While AI cannot replace radiologists due to lower sensitivity—particularly for M2 occlusions—the AP offers a substantial advantage by reducing turnaround time, standardizing analysis, and supporting quicker triage in high-pressure emergency settings. Thus, AI-assisted workflows complement traditional methods by accelerating stroke imaging without fully compromising diagnostic reliability.
Keywords: stroke, large vessel occlusion, artificial intelligence, CT angiography, CT perfusion, automated workflow.

PP-PP-07

INHALED INSULIN: A BREAKTHROUGH IN PULMONARY DRUG DELIVERY

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Diabetes Mellitus (DM) is a chronic metabolic disorder characterized by insulin deficiency or resistance, leading to persistent hyperglycemia. Despite being effective, conventional subcutaneous insulin injections are often associated with pain, inconvenience, and poor patient compliance. Inhaled insulin represents a promising advancement in diabetes management, offering a non-invasive and rapid-acting alternative. The pulmonary route provides a large absorptive surface and rich vascularization, facilitating efficient systemic absorption of insulin. Exubera, the first inhaled insulin approved in 2006, was withdrawn due to poor patient acceptance, high cost, and bulky delivery devices. However, Afrezza, approved by the FDA in 2014, overcame these limitations through Technosphere® technology, delivering ultra-fine insulin particles via a compact inhaler.

Clinical trials demonstrated comparable glycemic control to subcutaneous insulin, with a faster onset and reduced risk of hypoglycemia. Although long-term pulmonary safety requires continuous evaluation, inhaled insulin marks a significant step toward improving patient adherence and quality of life in diabetes therapy. Its innovation highlights the evolving direction of insulin research toward patient-friendly and effective delivery systems.

Keywords: Diabetes Mellitus, Inhaled Insulin, Afrezza, Technosphere Technology, Insulin Delivery

PP-PP-08

DIABETES INSIPIDUS

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Diabetes Insipidus [DI] is a disorder characterized by an imbalance of water in the body, leading to significant polyuria [excessive urination] and polydipsia [excessive thirst]. It is classified into two primary types: central diabetes insipidus [CDI], caused by a deficiency in the secretion of anti-diuretic hormone [ADH] from the posterior pituitary, nephrogenic diabetes insipidus [NDI], where the kidneys are unable to respond to ADH due to receptor or aquaporin channel defects. Less common forms include dipsogenic diabetes insipidus and gestational diabetes insipidus. This abstract highlights the critical aspects of diabetes insipidus, emphasizing the importance of awareness, timely diagnosis, and effective management to enhance patient quality of life and clinical outcomes. Continued research into the pathophysiology and treatment options for DI promises to improve understanding and care for individuals affected by this condition.

Keywords:Diabetes Insipidus ,Central Diabetes Insipidus (CDI) ,Nephrogenic Diabetes Insipidus (NDI),Dipsogenic DI ,Gestational DI .

PP-PP-09

DIGITAL HEALTH & TELEPHARMACY: TRANSFORMING PATIENT CARE

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Digital health and telepharmacy are revolutionizing patient care by leveraging telemedicine, mobile apps, wearables, remote monitoring, and virtual pharmaceutical services. These technologies improve access (especially in rural and underserved areas), enhance medication adherence, enable real-time pharmacist intervention, and reduce costs. While offering significant benefits in chronic disease management and care continuity, challenges remain in data security, regulatory alignment, digital literacy, and reimbursement. Strategic integration of technology and policy is key to achieving equitable, efficient, and sustainable healthcare delivery.

Keywords: digital health, telepharmacy, telemedicine, medication adherence, healthcare access

PP-PP-10

RISE OF DIGITAL HEALTH & AI IN PHARMACY PRACTICE

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The rapid evolution of digital health and artificial intelligence (AI) is transforming pharmacy practice, enabling pharmacists to deliver more efficient, personalized, and clinically informed care. AI-powered clinical decision support systems are increasingly used to analyze large volumes of patient data—such as lab results, electronic health records, and medication profiles—to predict drug–drug interactions, optimize dosages, and identify adverse drug events. Automation and robotics, driven by AI, are streamlining the dispensing process and reducing manual workload, freeing pharmacists to focus more on patient counselling and therapy management. Machine learning algorithms are also enhancing inventory management by predicting drug demand, minimising stock-outs, and reducing waste.
Digital health platforms—including telepharmacy and virtual health assistants—leverage AI to broaden access, offering remote prescription counseling, medication reminders, and real-time monitoring. Meanwhile, language models and natural-language processing tools simplify prescription instructions, making them more patient-friendly and reducing misunderstanding. However, the adoption of AI also raises important concerns around data privacy, algorithmic bias, and regulatory governance. To realize the full potential of AI in pharmacy, it is critical for pharmacists to lead in model validation, integration, and ethical deployment—ensuring that technological innovation enhances safety, equity, and patient outcomes.
Keywords: Digital health, artificial intelligence, pharmacy practice, clinical decision support, automation, robotics, telepharmacy.

PP-PP-12

MEDICATION ERRORS: PREVENTION USING INFORMATION TECHNOLOGY SYSTEMS

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Given the high frequency of medication errors with resultant patient harm and cost, their prevention is a worldwide priority for health systems.Systems that use information technology (IT), such as computerized physician order entry, automated dispensing, barcode medication administration, electronic medication reconciliation, and personal health records, are vital components of strategies to prevent medication errors, and a growing body of evidence calls for their widespread implementation. However, important barriers, such as the high costs of such systems, must be addressed through economic incentives and government policies.
Keywords: CPOE, decision support, electronic health record, health information technology, medication errors, patient safety.

PP-PP-13

AI-BASED VOICE BIOMARKERS FOR EARLY DETECTION OF DRUG-INDUCED MENTAL HEALTH DISORDERS: A NOVEL PHARMACIST-DRIVEN SCREENING MODEL

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Drug-induced mental health disturbances—such as anxiety, depression, irritability, and cognitive slowing—are frequently associated with medications including corticosteroids, isotretinoin, antiepileptics, hormonal therapies, and certain antibiotics. However, these adverse effects often remain unrecognized in outpatient care due to subtle onset and limited patient-provider interaction time. This study proposes an innovative pharmacist-driven screening model using AI-based voice biomarkers to identify early neuropsychological changes linked to medication use. Voice recordings were analysed using machine-learning algorithms assessing acoustic parameters such as pitch variability, jitter, shimmer, articulation patterns, and speech rate. Alterations in these biomarkers demonstrated strong correlation with early mood changes validated through standardized psychological scales. The proposed approach enables real-time, non-invasive monitoring during telepharmacy consultations or routine refill visits. Integrating AI voice analytics in pharmacy practice has the potential to improve early detection of drug-induced mental health adverse drug reactions (ADRs), enhance medication safety, and support timely therapeutic interventions—representing a futuristic step towards precision pharmacovigilance and digital patient care.
Keywords: AI voice biomarkers, drug-induced mental health disorders, adverse drug reactions, pharmacovigilance, machine learning, telepharmacy.

PP-PP-14

ARTIFICAL INTELIGENCE AND DIGITAL HEALTH: TRANSFORMING CLINCAL PHARMACY PRACTICE TOWARDS PATIENT CENTERED CARE

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Digital health [DH] and Artificial intelligence [AI] in healthcare is a technological innovation that transforms clinical pharmacy towards digitalization. Digital health is important aspect in generating real world data which is useful for decision making process where the benefits of digital health in improving health outcomes and reduces healthcare expenses. AI is potential tool in digital health where it can be embedded in technology like medical automated devices, apps, websites, phone software, handling data are essential in healthcare.These together can organise and store vital information such as electronic health records [EHRs]. DH and AI tools can help healthcare transforming patient outcomes like AI powered telemedicine, remote monitoring, patient counselling sessions can offer measurable impact on patient by improving early disease detection and reducing readmission rates. For clinical pharmacist all the required information regarding drug, special conditions, drug interactions and specific warnings are given in CDSS-clinical decision support system. Chatbots and virtual assistant can help patient to address their concerns comfortably during counselling session, whereas AI is more open to customised and effective patient care. These technological tools can communicate with patient by answering the questions regarding dose, side effects, drug interact

Keywords: Digital health, Artificial intelligence, clinical pharmacist, precision medicine

PP-PP-15

MAPPING GENIUS: NEUROIMAGING INNOVATIONS IN DIAGNOSING SAVANT SYNDROME

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Savant Syndrome is characterized by extraordinary, highly specialized abilities that emerge alongside developmental or cognitive challenges, making accurate diagnosis both complex and essential. Accurate diagnosis has historically been challenging due to the reliance on behavioral observation and the absence of objective clinical markers. Recent advances in neuroimaging have reshaped diagnostic possibilities by offering deeper insights into the structural and functional characteristics of the savant brain. Cutting-edge techniques such as functional MRI (fMRI), Diffusion Tensor Imaging (DTI), and Magnetoencephalography (MEG) enable clinicians to visualize patterns of enhanced regional connectivity, altered hemispheric dominance, and specialized neural pathways supporting exceptional skills in areas such as memory, music, mathematics, and visual art. These imaging methods reveal neural pathways and compensatory mechanisms that traditional evaluations cannot detect. When combined with comprehensive cognitive profiling, neuroimaging establishes a more accurate and scientifically informed diagnostic framework. This integrated approach not only enables earlier recognition and clearer differentiation from related conditions such as autism spectrum disorder but also deepens our understanding of brain plasticity and the mechanisms that drive exceptional human abilities.Ultimately, these innovations push the boundaries of how we perceive intelligence itself, offering a clearer, more humane framework for distinguishing savant abilities and honoring the unique neuroarchitecture behind them.

Keywords: Savant syndrome, Neuroimaging, FMRI, DTI, MEG, Exceptional abilities, Cognitive profiling

PP-PP-16

ROBOTIC DISPENSING SYSTEM IN PHARMACY

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Reporting on the clinical and economic value of automated dispensing system hospital pharmacy services with a primary focus on systems supporting the dispensing of medicines. The studies demonstrate that automated dispensing system offer benefits over traditional manual dispensing methods in terms of clinical and economic outcomes.The primary benefits following implementation of an automated dispensing system include reduction in medication errors, medication adminstration time and costs.Replacing counting and filling the medication functions by automated dispensing system has decreased the number of pharmacists.The published evidence suggests positive impacts of automated dispensing system and should encourage pharmacies to invest in automation, with a global strategy to improve the reliability and the efficiency of the medication process. Automated dispensing system improves patient safety. However automation is a costly investment and the implementation process is complex and time consuming.

Keywords: Drug Dispensing robots, Hospital pharmacy automation, Automated drug Dispensing

PP-PP-17

THE GLIMPSE OF AI IN HEALTHCARE

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Artificial Intelligence (AI) is transforming healthcare by enhancing diagnostic accuracy, supporting clinical decision making, and improving patient outcomes. Advances such as machine learning, natural language processing, and predictive analytics enable faster disease detection, efficient workflow management, and personalized treatment strategies. This poster provides a comprehensive overview of AI innovations in healthcare and highlights their significance in modern clinical practice. Healthcare systems face challenges including rising patient loads, diagnostic delays, and clinical errors. AI technologies were introduced to support healthcare professionals by automating tasks, analyzing complex datasets, and improving the precision of medical interventions.A literature-based review was conducted focusing on recent innovations in AI applications within healthcare settings. Sources included clinical research articles, hospital reports, and AI technology white papers. Key innovations were classified based on diagnostic tools, therapeutic support, and clinical workflow enhancements.AI demonstrates major impact in radiology, pathology, drug discovery, predictive analytics, and patient monitoring. Tools such as AI-powered imaging systems, virtual assistants, and risk prediction models significantly reduce diagnostic turnaround time and enhance accuracy. Pharmacists benefit from AI through drug interaction alerts, medication error detection, and improved pharmacovigilance reporting.AI continues to revolutionize healthcare by improving efficiency, reducing errors, and supporting evidence-based clinical decisions. As technology advances, AI will play an increasingly important role in personalized medicine and healthcare delivery. Integration with pharmacy practice further strengthens patient safety and therapeutic outcomes.
Keywords: AI , machine learning , Robotics natural language processing ,algorithmic bias ,healthcare delivery , diagnostic precision, pharmacovigilence reporting.

PP-PP-18

FROM TABLETS TO TECH: THE RISE OF DIGITAL PILLS IN MODERN HEALTHCARE

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Digital pills embedded with ingestible sensors are reshaping the future of medication adherence by merging traditional pharmacotherapy with advanced digital monitoring. Once swallowed, these sensors activate and transmit signals to external devices, enabling real-time tracking of ingestion events and patient response. This innovation addresses long-standing challenges of non-adherence, particularly in chronic diseases where missed doses compromise treatment outcomes and increase healthcare costs. A review of global patent trends reveals a rapid rise in technologies related to smart pills, mobile clinical monitoring, intelligent drug delivery, and digital diagnostics. Leading contributors include the United States, European Patent Office, China, Canada, and Australia. Therapeutic domains such as mental health, cardiovascular care, diabetes, oncology, infectious diseases, and gastroenterology show significant patent activity. While digital pills promise improved compliance, enhanced safety, and personalised therapy, they also raise concerns regarding privacy, ethical data use, and patient autonomy. This analysis highlights both the opportunities and

challenges associated with ingestible sensors, underscoring their potential to build a connected, transparent, and patient-centred healthcare ecosystem growth in Pharmaceutical Research

Keywords: Digital pills, digital monitoring, patient-centred healthcare.

PP-PP-19

TRENDS AND INNOVATIONS IN MRNA-BASED THERAPEUTICS (2015–2025): A DECADE OF TRANSFORMATIVE

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MRNA-based therapeutics have emerged as one of the most revolutionary advancements in pharmaceutical research, transforming vaccine development, oncology, and targeted genetic medicine. Over the past decade, rapid scientific innovations, improved delivery systems, and the success of mRNA COVID-19 vaccines have accelerated global research and development efforts.Objectives are to evaluate global trends in mRNA-based therapeutics from 2015–2025,to analyze statistical data on clinical trials, therapeutic areas, and market growth,to identify major innovations that have shaped mRNA drug development and to assess the impact of mRNA technology on future pharmaceutical research.A descriptive statistical review was conducted using data from clinical trial registries, peer-reviewed articles, regulatory reports, and market analytics. Trends were analyzed for the number of mRNA clinical trials per year, therapeutic distribution, technological innovations, and market expansion. Graphical representations were generated to visualize year-wise growth and therapeutic focus. There was a substantial rise in mRNA-related clinical activity, particularly between 2020–2022 following vaccine breakthroughs. Clinical trials increased significantly across infectious diseases, oncology, and rare genetic disorders. Market data showed sharp growth in global investment and industry adoption. Innovations such as lipid nanoparticles (LNPs), self-amplifying mRNA, and personalized mRNA cancer vaccines contributed to accelerated development and improved translational potential.The decade from 2015 to 2025 marks an exceptional phase of innovation in mRNA therapeutics. The rapid expansion of research, technological breakthroughs, and diverse clinical applications demonstrate the transformative potential of mRNA platforms. These trends indicate that mRNA therapeutics will continue to play a central role in future pharmaceutical research and precision medicine.

Keywords: mRNA therapeutics, pharmaceutical innovation, lipid nanoparticles, clinical trials, vaccine technology, oncology, genetic medicine, drug development trends.

PP-PP-20

TRANSDERMAL PATCHES AND MICRONEEDLES - A NEW ERA OF VACCINATION

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Conventional vaccination relies on hypodermic needles, which present challenges such as pain, needle phobia, risk of blood borne infections, medical waste, and dependency on trained personnel. Transdermal vaccination using micro needles and patch-based systems has emerged as an innovative, painless, and minimally invasive alternative. These systems target the epidermis and dermis, which contain abundant antigen-presenting cells such as Langerhans and dendritic cells,

enabling strong immunological responses. A combined analysis of current literature on micro needle-mediated vaccination was conducted, focusing on micro needle design, fabrication, antigen incorporation techniques, and delivery performance. Findings from preclinical and clinical studies were synthesized to evaluate safety, immunogenicity, patient acceptability, and technical challenges. Methods included comparison of biodegradable, solid, coated, and dissolving micro needle systems, along with transdermal patch delivery strategies. Micro needle arrays ranging from 50–900 μm showed efficient penetration of skin layers and effective antigen delivery. Studies demonstrated robust immune responses comparable to or higher than conventional injections. Patches offered additional benefits such as cold-chain independence, reduced medical waste, and self-administration feasibility. Slow antigen release from biodegradable micro needles enhanced immune activation. Antigens delivered in solution, suspension, Nano/micro particles, or nucleic-acid-based forms broadened the applicability of the platform. Clinical and preclinical evaluations consistently reported high safety profiles, minimal discomfort, and strong patient acceptability.Microneedle and transdermal patch-based vaccination represent a transformative advancement in immunization. Their painless delivery, strong immunogenicity, safety, and potential for self-administration make them a promising solution for global vaccination challenges. Overcoming limitations such as dosing consistency, stability, and scalable manufacturing will accelerate widespread adoption of this next-generation vaccine technology.

Keywords: micro needles, transdermal vaccination, vaccine delivery, skin immunization, micro particles.

PP-PP-21

REVOLUTIONIZING CHRONIC DISEASE MANAGEMENT WITH SMART IOT DEVICES.

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Chronic diseases, such as diabetes, hypertension, and asthma, affect millions of people worldwide, imposing significant burdens on healthcare systems. Traditional disease management approaches often rely on manual tracking, sporadic monitoring, and reactive interventions, leading to suboptimal outcomes and decreased quality of life. This abstract explores the transformative potential of smart IoT devices in revolutionizing chronic disease management. By harnessing the power of connected sensors, wearable technologies, and artificial intelligence, smart IoT devices can facilitate proactive, personalized, and predictive care.
Keywords: Smart loT devices, Chronic diseases, Quality of life, wearable technologies, AI.

PP-PP-22

GENES AND DRUGS: PERSONALISING THERAPY THROUGH PHARMACOGENOMICS

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Pharmacogenomics, the study of how genes influence an individual's response to drugs, is revolutionizing modern medicine by enabling personalized therapy. This emerging field aims to optimize drug efficacy, minimize adverse drug reactions, and ensure safer treatment by tailoring medications based on a patient's genetic profile. Genetic variations in metabolizing enzymes (e.g., CYP2D6, CYP2C19), drug transporters (e.g., SLCO1B1), and receptors significantly affect drug pharmacokinetics and pharmacodynamics, leading to variability in therapeutic outcomes. By incorporating pharmacogenomics testing into clinical decision-making, healthcare providers can identify patients at risk for therapeutic failure or toxicity and adjust drug choices and dosages accordingly. This poster highlights the foundational concepts of pharmacogenomics, key gene-drug interactions, clinical applications in cardiology, oncology, psychiatry, and infectious diseases, and the technologies enabling this precision approach. It also addresses the current challenges in clinical implementation and the promising future role of artificial intelligence and bioinformatics in interpreting complex genomic data. With pharmacogenomics at the forefront of personalized medicine, this presentation advocates for its broader adoption in clinical practice to ensure individualized, effectiveandsafetherapeuticregimens.

Keywords: Pharmacogenomics Personalized Medicine, Genetic Polymorphism, Drug Metabolism, CYP Enzymes, Gene-Drug Interaction, Adverse Drug Reactions, Clinical Pharmacogenomics, and Precision Therapy, Genetic Testing.

PP-PP-23

ROLE OF DIGITAL TWINS IN "PATIENT- CENETERED" CARE

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Role of Digital Twins in Patient -Centered Care: Digital twins are virtual replicas of real patients that integrate clinical data, physiological parameters, lifestyle factors, and treatment responses to simulate and predict health outcomes in real time. In the context of patient centred care, digital twins enable highly personalized therapy by allowing healthcare professionals, including Pharm D students, to analyze individual drug responses, optimize dosage regimens, and anticipate adverse drug reactions before they occur. This technology supports shared decision-making by improving communication between patients and healthcare teams, enhancing treatment adherence and clinical outcomes. For Pharm D students, understanding digital twins strengthens skills in pharmacotherapy planning, therapeutic drug monitoring, and clinical decision support. By bridging technology with clinical pharmacy practice, digital twins contribute to safer, more efficient, and individualized patient care, aligning with the evolving role of pharmacists in precision medicine.

Keywords: Digital Twins, Patient-Centered Care, Pharm D, Personalized Medicine, Clinical Pharmacy, Precision Therapeutics, Pharmacotherapy Optimization, Healthcare Technology.

PP-PP-24

CANCER AWARENESSAND PREVENTION

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Cancer is a major global health problem, but many types can be prevented or treated if detected early. Awareness helps people recognize warning signs and adopt healthy habits such as avoiding tobacco and alcohol, eating a balanced diet, staying physically active, and going for regular health screenings. Vaccinations like HPV and HBV also help prevent certain cancers. Early detection, lifestyle modification, and public education are key to reducing cancer risk. Together, awareness and prevention can save lives and build a healthier, cancer-free community.

Keywords: Cancer, Types, Risk Factors

PP-PP-25

NEXT-GENERATION TB VACCINES: LATEST PHARMACEUTICAL INNOVATIONS AND CLINICAL ADVANCES

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Next-Generation TB Vaccines: Current Clinical and Pharmaceutical Developments"
Beyond the century-old Bacilli Calmette-Guérin (BCG) vaccine, which offers only modest protection against adult pulmonary tuberculosis (TB), tuberculosis (TB) continues to be a significant global health concern that requires immediate advancement. By utilizing developments in antigen design, adjuvant technology, delivery platforms, and clinical trial science, recent pharmaceutical innovations have expedited the development of next-generation tuberculosis vaccines. The most recent developments are highlighted in this presentation, including subunit vaccines like M72/AS01E, which demonstrated encouraging efficacy in preventing active TB among people with latent infection, and live-attenuated candidates like MTBVAC, which exhibits enhanced immunogenicity compared to BCG. Novel protein-adjuvant combinations, viral vectors, and mRNA vaccines are examples of emerging platforms that are broadening the vaccine pipeline and providing fresh chances for focused and long-lasting immune responses.Improved knowledge of host immunity, the discovery of possible correlates of protection, and the application of systems biology and bioinformatics for accurate antigen selection all contribute to advancements in pharmaceutical research. Despite these developments, there are still issues, such as the need for vaccines appropriate for a variety of global populations, cost barriers, limited correlates of protection, and manufacturing complexity.

Key words: Tuberculosis, subunit vaccination, M72/AS01E, MTBVAC, AS01 adjuvant, tb vaccination pipeline

PP-PP-26

ONAPGO: A NEW ERA OF MOTOR SYMPTOM CONTROL IN PARKINSON'S DISEASE

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Bradykinesia, rigidity, rest tremors, postural instability, and motor fluctuations are among the cardinal motor symptoms of Parkinson's disease (PD), a chronic, progressive neurodegenerative disease that severely hinders day-to-day functioning. Even though levodopa and dopamine agonists are still the mainstay of treatment, many patients still have erratic "off" episodes, a delayed onset of relief, and a diminished therapeutic response over time. The need for newer, more effective pharmaceutical options is highlighted by these unmet needs. Recently, Onapgo has become a promising therapeutic development targeted at enhancing motor symptom control in Parkinson's disease. Onapgo exhibits a quick onset of action and long-lasting therapeutic benefit due to its improved pharmacokinetic stability and dopaminergic signalling optimization mechanism. Clinical results show significant decreases in the amount of time spent off-time, enhanced motor function, and increased patient satisfaction. Additionally, better adherence—which is essential for long-term disease management—is supported by its tolerability profile and practical dosing schedule. The pharmacological properties, clinical data, safety issues, and therapeutic significance of Onapgo are examined in this talk, with a focus on how it can fill in existing treatment gaps. Onapgo is a major development in the management of Parkinson's disease and has the potential to improve patients' quality of life by providing a more dependable and consistent improvement in motor symptoms.

keywords: Parkinson’s disease (PD) ,Motor symptoms , Rest tremors ,Postural instability ,Motor fluctuations , Levodopa, Dopamine agonists.

PP-PP-27

ANTIMICROBIAL RESISTANCE (AMR):- ROLE OF CAZ-AVI+AZTREONAM

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AMR is one of the most urgent global health challenges of our time. It occurs when microorganisms such as bacteria, viruses, fungi, and parasite evolve to resist the effect of anti-microbial agents, rendering standard treatments ineffective. AMR is driven by many factors such as overuse &misuse of antibiotic. The impact of AMR is threatening the global health security & also reducing the success of major medical procedures. This poster explores (i.e., contents of poster) causes of AMR.mechanism of resistance. Combating strategies for AMR.role of Ceftazidime + Avibactam in AMR /MDR pathogens.

Key words: AMR, MDR, Antibiotic resistance, CAZ-AVI, CRE, ESBL, KPCs

PP-PP-28

THE TRANSFORMATIVE ROLE OF IN SILICO CLINICAL TRIALS IN ACCELERATING DRUG AND DEVICE DEVELOPMENT

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In silico clinical trials (ISCTs) represent a paradigm shift in pharmaceutical and medical device development, leveraging advanced computational modelling and simulation to predict the efficacy

and safety of interventions within a virtual patient population. By utilizing high-fidelity Physiologically-Based Pharmacokinetic (PBPK) and Pharmacodynamics (PD) models, researchers create digital twins of human physiology, disease progression, and patient variability. This approach allows for the execution of thousands of virtual experiments, providing comprehensive data on potential outcomes without the inherent cost, time, and ethical constraints of traditional in vivo studies. ISCTs offer substantial advantages, including: accelerated optimization of dose selection and trial design; enhanced ethical compliance through the reduction of animal testing; and the ability to model complex, personalized scenarios crucial for precision medicine. Specific applications are already transforming fields like cardiology (e.g., assessing drug-induced cardio toxicity and optimizing device placement) and oncology (e.g., predicting optimal combination therapies for specific tumour profiles).

Key words: In Silico, Virtual Clinical Trials, Computational Modelling, Digital Twin, Precision Medicine, Regulatory Science.

PP-PP-29

ANTIMICROBIAL STEWARDSHIP PROGRAMS IN HOSPITALS

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Antimicrobial resistance (AMR) has emerged as one of the most critical global public health threats of the 21st century, largely driven by the inappropriate and excessive use of antibiotics in clinical settings. Hospitals represent a major arena where antibiotic misuse occurs, due to factors such as empirical over prescription, inadequate diagnostic support, polypharmacy, and lack of adherence to treatment guidelines. A descriptive, observational, or interventional study conducted within a hospital setting to assess the effectiveness of ASP interventions. Hospital inpatients receiving antibiotics during the study period. Data Collection Tools Antibiotic prescription records Culture and sensitivity reports Evaluation Parameters Reduction in inappropriate antibiotic use Changes in DDD or DOT metrics Hospital infection rates (C. difficile, MRSA, ESBL, CRE) Length of hospital stay Mortality and clinical cure rates Cost savings from optimized prescribing Statistical Analysis Data analyzed using descriptivestatistics, comparative analysis before and after intervention, and trend evaluation. Results (Generalized for Posters & Reports) Implementing ASPs inhospitals typically demonstrates the following outcomes: 1. Reduced Antibiotic Consumption 20–40% reduction in unnecessary antibiotic use Significant dropin broad-spectrum agents such as carbapenems 2. Improved Clinical Outcomes.Lower mortality rates in infectious disease cases Faster clinical recovery due to optimized therapy 3. Reduced Resistance Rates Decline in MDROs such as MRSA, ESBL, and CRE Improved susceptibility patterns in periodic antibiograms 4. Fewer Adverse Drug Reactions Reduced nephrotoxicity and hepatotoxicity from overuse.

Key Words: Collection Tools, Study Population, antibiograms, Mortality

PP-PP-30

ARTIFICIAL ORGANS & ORGAN-ON-CHIP MODELS

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This document explores the landscape of artificial organs and organ-on-chip (OoC) models. It delves into the advancements, challenges, and future directions of these technologies, highlighting their potential to revolutionize medicine through organ replacement, drug discovery, and personalized treatment strategies. We will examine the different types of artificial organs, the principles behind OoC models, and their respective applications, limitations, and ethical consideration Advanced Materials 3D Bioprinting. Integration of Sensors and Actuators: Micro physiological Systems'. Artificial Intelligence (AI).Next-Gen Bioengineered Organs .Data Analysis Durability and Reliability .Complexity of Biological Function .Power Source and Control Ethical Considerations organ donation .Improved understanding of the .Mechanisms of lung injury.Identification of novel drug .Targets for lung diseases. .Development of more effective .Drug delivery strategies

Key Words: 3D Bioprinting, Integration, Artificial Intelligence (AI).

PP-PP-31

OPTIMIZING ANTIMICROBIAL USE: CLINICAL PHARMACIST'S INTEGRAL CONTRIBUTIONS IN STEWARDSHIP INITIATIVES

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The rapid spread and dissemination of the multidrug-resistant bacteria worldwide represents a major public health problem. The development of antibiotics decreased the mortality among the human and animals leading to a better life expectancy. But the injudicious use of antimicrobials and selection pressure the microbes have developed resistance which became more prominent during last few decades. With the evolution of Methicilin-resistant Staphylococcus aureus (MRSA), Hospital-acquired MRSA, Community acquired MRSA and MDR TB (Multidrug resistant tuberculosis) challenge for the clinicians have increased to a greater extent. The global emergence and dissemination of acquired carbapenemases among gram negative bacteria are considered a major public health problem. Gram-negative bacteria, most notably Escherichia coli, Klebsiella pneumoniae , Pseudomonas aeruginosa , and Acinetobacter baumannii , are among the most important causes of serious hospital-acquired and community-onset bacterial infections in humans, and resistance to antimicrobial agents in these bacteria has become an increasingly relevant problem. Recent development in nanotechnology based drug delivery system may prove to be solution for combating these resistant bacteria. However policies and regulations for antibiotic use should be formulated to control the further development of resistance among the microbes. we are already seeing the impact of resistance infections in every day life. For example, many urinary tract infections are becoming resistant, which can lead to people requiring a hospital stay. It is inconceivable to think that by 2050 as many people are predicted to die of drug resistant infections as cancer, if antimicrobial resistance (AMR) is not tackled now. In this review we emphasized the microorganisms primarily reported of being resistance, referred as ESKAPE pathogens (*Enterococcus faecium, Staphylococcus aureus, Klebsiella pneumoniae, Acinetobacter baumanii, Pseudomonas aeruginosa, and Enterobacteriaceae*) accentuating their capacity to "escape" from routine antimicrobial regimes and steps taken by Central Drugs Standard Control Organisation (CDSCO) to curb and control indiscriminate use of antibiotics.

Keywords: Resistant Bacteria, MRSA, Antimicrobial, misuse, Stewardship, CDSCO**.**

RA-PP-01

CYBERSECURITY APPLICATION IN MEDICAL DEVICE

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The increasing demand for secure cybersecurity in medical devices as connectivity, network-enabled operation, and system-wide interoperate become ubiquitous. It stresses that cybersecurity is a part of device effectiveness and safety, not something distinct. The document pertains to software, firmware or programmable logic containing medical devices and premarket submission routes like 510(k), De Novo, PMA, IDE/HDE, and combinations of these. It sets forth general principles such as design for security, user transparency, and the value of quality system regulation (QSR) encompassed in 21 CFR Part 820. One of its major recommendations is to embrace a Secure Product Development Framework (SPDF) for handling cybersecurity risks throughout the total product life-cycle (TPLC). The advice explains how manufacturers ought to conduct threat modelling, cybersecurity risk assessment (which includes exploitability), third-party software component analysis and interoperability analysis, and deliver a Software Bill of Materials (SBOM). Documentation of these procedures should be proportionate to device risk. In addition, it includes recommendations on labelling and user visible cybersecurity information, such as management strategies for devices that fall under the new Section 524B of the FD&C Act ("cyber devices"), and device changes and how to deal with them. Appendices include control categories (for example, authentication, cryptography, logging), templates for submission documents, and glossary. Finally, it describes what the FDA expects with regard to showing reasonable assurance of safety and effectiveness through integrated cybersecurity and quality system procedures.

Keywords: Cybersecurity in Medical Devices, Secure Product Development Framework (SPDF), 21 CFR Part 820 (Quality System Regulation), Software Bill

RA-PP-02

NANOROBOTS FOR PRECISION MEDICINE- THE FUTURE OF TARGETED DRUG DELIVERY

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Advances in precision medicine tailor prevention and treatment to individual genetic, environmental, and lifestyle factors for optimal outcomes. Nanorobots, microscale systems capable of targeted navigation and intervention, enable precise drug delivery, sensing, and microsurgery. Together, they enhance therapeutic accuracy while minimizing side effects. The fusion of nanorobotics and precision medicine heralds a new era of personalized, cell-level healthcare. These advanced devices precisely target diseased sites, surpassing passive drug diffusion and systemic delivery to enhance efficacy and minimize side effects. However, challenges remain regarding biocompatibility, biodegradation, navigation, regulatory, translational, and ethical aspects of implementation. Nanorobots if considered as drug or biological and combination products. Then CDER, CBER or CDRH governs its review. Regulatory frameworks are evolving: the U.S. Food and Drug Administration (FDA) provide guidance for nanotechnology-based products and encourages early

engagement with developers, while the European Union's Regulation (EU) 2017/745 classifies medical devices containing nanomaterials under higher-risk categories such as Rule 19.The FDA issued two final guidance that recommend approaches to streamline the submission and review of data supporting the clinical and analytical validity of Next-Generation Sequencing based tests.The NNI (National Nanotechnology Initiative), started in 2000, coordinates U.S. government nanotechnology research. Integrating nanorobotics with precision medicine could transform diagnostics, targeted therapy, and real-time disease monitoring. These technologies enable individualized, cellular-level healthcare, offering great potential while necessitating rigorous validation, ethical oversight, and innovative regulatory frameworks for clinical adoption.

Keywords: Nanorobots, precision medicine, targeted drug delivery, nanotechnology regulation, personalized healthcare.

RA-PP-03

THE RISE OF DIGITAL HEALTH & AI IN PHARMACY PRACTICE

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The rapid evolution of digital health and artificial intelligence (AI) is transforming pharmacy practice, enabling pharmacists to deliver more efficient, personalized, and clinically informed care. AI-powered clinical decision support systems are increasingly used to analyze large volumes of patient data—such as lab results, electronic health records, and medication profiles—to predict drug–drug interactions, optimize dosages, and identify adverse drug events. Automation and robotics, driven by AI, are streamlining the dispensing process and reducing manual workload, freeing pharmacists to focus more on patient counselling and therapy management. Machine learning algorithms are also enhancing inventory management by predicting drug demand, minimising stock-outs, and reducing waste.
Digital health platforms—including tele pharmacy and virtual health assistants—leverage AI to broaden access, offering remote prescription counselling, medication reminders, and real-time monitoring. Meanwhile, language models and natural-language processing tools simplify prescription instructions, making them more patient-friendly and reducing misunderstanding. However, the adoption of AI also raises important concerns around data privacy, algorithmic bias, and regulatory governance. To realize the full potential of AI in pharmacy, it is critical for pharmacists to lead in model validation, integration, and ethical deployment—ensuring that technological innovation enhances safety, equity, and patient outcomes.
Key Words: Digital health, artificial intelligence, pharmacy practice, clinical decision support, automation, robotics, telepharmacy, remote care, machine learning, inventory management, drug safety, personalized medicine, workflow optimization, data privacy, algorithm bias, ethical implementation, patient outcomes, digital transformation, healthcare technology.

RA-PP-04

REGULATORY AND TECHNICAL ASPECTS OF SaMD

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Software as a Medical Device (SaMD) refers to software intended to perform medical functions, and it operates independently on devices like smartphones, computers, or cloud servery. As described in the International Medical Device Regulators Forum (IMDRF), SaMD encompasses standalone digital solutions designed for diagnosis, prevention, monitoring, prediction, treatment, or management of disease. Unlike traditional device software like Pacemaker software, Infusion pump software etc, SaMD runs on general-purpose platforms such as smartphones, computers, and cloud systems, making it central to modern digital health innovation.Regulatory bodies including the FDA (21 CFR 820), EU (MDR 2017/745), and Global agencies (ISO 14971, IEC 62304) govern SaMD through risk-based frameworks that evaluate safety, performance, clinical evidence, and cybersecurity. The rapid growth of AI-driven and cloud-enabled medical applications has expanded SaMD's role across health technology, demanding rigorous lifecycle management and compliance. Overall, SaMD represents a rapidly evolving class of regulated medical software that enhances accessibility, supports data-driven decision-making, and advances patient-centred healthcare.This combined approach supports innovation while upholding high standards of patient protection and global harmonization of digital health regulations.

Key Words: Software as a Medical Device (SaMD), Digital health, IEC 62304, Clinical decision support, cybersecurity and advances patient-centred healthcare.

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G. PULLA REDDY COLLEGE OF PHARMACY
(AUTONOMOUS)

SALIENT FEATURES AND ACHIEVEMENTS

* First Private Pharmacy College in the state of combined Andhra Pradesh to start M. Pharm Course in 2003.
* Parliamentary committee visit in the year 2000.
* College is a recognized Research centre for Ph.D. by Osmania University, from the year 2006-2007 onwards. Several Scholars are pursuing their Ph.D program under senior Professors.
* First Prize in IPA National Elocution Competition in 2007.
* Active role in Organization of Association of Pharmaceutical Teacher's of India (APTI) – 15th Annual National Convention (APTICON-2010) in association with APTI state branch.
* G. Pulla Reddy Memorial Gold Medal was instituted in Osmania University for University topper in B.Pharm from the AY 2011-12.
* "Best Principal of the year -2011 Award" at 16th APTICON-2011.
* FIP (International Pharmaceutical Federation) "Best Poster presentation award" in 2011.
* "Prof. M. L. Khorana medal (IPA)" for securing highest marks at B. Pharm level among all Indian Universities at 63rd IPC, Bengaluru, 2011.
* "Best Outstanding student of the year 2011" by 54th IPC Trust.
* "Best Research Guide and M. Pharm Thesis Award" by Rajanibhai. V. Patel Trust, Ahmedabad.
* "Second prize in the National level Sipra Innovative Pharma Research Award-2014".
* Second prize in National level Quiz Competition conducted by AIDCOC during 66th IPC Hyderabad in 2015.
* First prize in National Pharma Quiz Competition conducted by SKBCOP, Nagpur in Feb 2016.
* Third Position in 68th IPC National level Quiz Competition in 2016 at Vishakhapatnam, A.P.
* Best Oral Presentation in 68th IPC held from 16th - 18th Dec 2016 at Vishakhapatnam, A.P.
* First prize in 69th IPC National level Quiz Competition in 2017 and Second prize in National Elocution Competition 2017 at Chitkara University, Chandigarh.
* "Best Pharmacy Teacher of the year-2017" by Pharmacy teachers trust.
* The College conducts National Symposia and Workshops for students & faculty regularly.
* G. Pulla Reddy college of Pharmacy – USP Collaborative Training Course- 2018 to 2020.
* Active role in organization of PERCEPT-2020 held at UCT Osmania University.
* NAAC Accreditation from March 2021.
* PCI-CBIT Grant for faculty 2021.
* Student selected at state level National Youth Parliament Festival (NYPF)- 2022 and participated in mock parliament session at New Delhi.
* Indian Academy of Sciences, Summer Research Fellowships-2022 at Defence Research Laboratory, DRDO, Tezpur, Assam, India.
* "Best Pharmacy Teacher Award- 2022" by Telangana State Pharmacy Council, Hyderabad.
* "Best Phar macy Teacher of the year-2022" by Pharmacy Teachers Trust.
* Student selected for parliament visit by Nehru Yuva Kendra Sanghatan- 2022, New Delhi.
* Research Innovation presentation in PCI- Pharmaanveshan-2023 at Vigyan Bhavan, NewDelhi.
* Third Prize in IPA-C Gopala krishna murty National Pharma quiz competitions-2024 held on 12th April 2024.
* Distinguished Alumni Dr. Aravind Penmatsa, Professor-IISc, Bangalore (B.Pharm GPRCP, 1999-2003), received Vigyan Yuva-Shanti Swarup Bhatnagar Award in August 2024.
* "Eminent Academic Pharmacist - 2024" by Indian Pharmaceutical Association – Telangana State Branch.