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MPCST Sponsored National Conference on Recent Advances in Nanotheranostics For Molecular Imaging

Saturday, 24th JAN 2026

Dr. Sushil Kumar Kashaw
Professor,
Department of Pharmaceutical Sciences
Dr. Hari Singh Gour University, Sagar

Dr. Suman Ramteke
Professor, SOPS,
UTD RGPV, Bhopal

Organized By

Mittal Institute of Pharmacy

Opposite Bhopal Memorial Hospital & Research Center, Navi Bagh, Bhopal-462038

ABOUT THE CONFERENCE

Nanotheranostics combine diagnostic imaging and targeted therapy into single nanoscale platform. It involves multifunctional nanoparticles (gold nanoparticles, quantum dots, iron oxide nanoparticles, liposome, and polymeric nanoparticles). Enables personalized, real-time disease monitoring and treatment especially in cancer, cardiovascular, and genetic diseases. Enhanced imaging resolution, targeted delivery, sustained drug release, and reduced systemic toxicity makes Nanotheranostics a key technology for moving toward personalized medicine.

KEY SPEAKER

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ABSTRACT

MIP/2026/CONF/01

NEXT-GENERATION CHALCONE AND IMINE DERIVATIVES AS MULTITARGET TOOLS FOR NEURODEGENERATIVE DISEASE DIAGNOSIS AND THERAPY

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ABSTRACT:

Monoamine oxidases (MAOs) are flavin adenine dinucleotide (FAD)–dependent enzymes that catalyze the oxidative deamination of dietary and endogenous biogenic amines. Two isoforms, MAO-A and MAO-B, are located on the outer mitochondrial membrane of platelets, hepatocytes, and brain glial cells. MAO-A primarily metabolizes serotonin, adrenaline, and noradrenaline, whereas MAO-B degrades β-phenethylamine and benzyl amine. Abnormal MAO activity disrupts monoaminergic signaling and is closely linked to neuropsychiatric and neurodegenerative disorders.

MAO-catalyzed reactions generate hydrogen peroxide, increasing reactive oxygen species and contributing to mitochondrial dysfunction and neuronal damage in diseases such as Alzheimer's and Parkinson's. Consequently, MAO-A and MAO-B are important therapeutic targets. In this context, chalcone and imine derivatives have emerged as promising multifunctional agents due to their neuroprotective, antioxidant, anti-inflammatory, and metal-chelating properties. These compounds also modulate key pathological pathways and show potential as dual diagnostic and therapeutic tools in neurodegenerative disease management.

KEYWORDS: Monoamine oxidase, Neurodegenerative diseases, Chalcone derivatives, Imine derivatives, Oxidative stress, Alzheimer's disease, Parkinson's disease

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MIP/2026/CONF/02

ROLE OF GOLD NANOPARTICLES IN THE DIAGNOSIS AND TREATMENT OF URINARY BLADDER CANCER

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ABSTRACT

Urinary bladder cancer is a common malignancy of the urinary tract with a high recurrence rate, posing challenges in long-term management. Conventional diagnostic methods such as cystoscopy are invasive, while treatments like intravesical chemotherapy and Bacillus Calmette–Guérin (BCG) therapy are often associated with significant side effects. These limitations highlight the need for more effective and patient-friendly therapeutic strategies.

Gold nanoparticles (AuNPs) have emerged as promising tools for bladder cancer diagnosis and treatment due to their unique physicochemical properties, including excellent biocompatibility, tunable size, and ease of surface modification. Their strong optical characteristics enable sensitive tumor detection through imaging and bio sensing techniques. Therapeutically, Au NPs facilitate targeted drug delivery, enhance photothermal therapy, and act as radio sensitizers, allowing selective destruction of cancer cells while sparing healthy tissues. The integration of diagnostic and therapeutic functions into a single theranostic platform offers real-time monitoring and personalized treatment, making gold nanoparticles a promising approach for improved bladder cancer management.

KEYWORDS: Urinary bladder cancer, Gold nanoparticles, Theranostics, Photothermal therapy, Targeted drug delivery, Diagnosis

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MIP/2026/CONF/03

MICROFLUIDICS IN DISEASE DIAGNOSIS: LAB-ON-A-CHIP APPROACH

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ABSTRACT

Micro fluidic technology has gained significant attention in diagnostic science due to its ability to manipulate minute volumes of fluids within micro-scale channels. Lab-on-a-Chip devices integrate essential laboratory functions such as sample preparation, reaction, and detection on a single platform. These systems offer rapid, sensitive, cost-effective, and point-of-care diagnostic solutions. Micro fluidic diagnostics have wide applications in infectious diseases, cancer biomarker detection, metabolic disorders, and neurodegenerative diseases. Despite certain limitations such as fabrication complexity and standardization issues, micro fluidics holds strong potential for future healthcare diagnostics.

KEYWORDS: Micro fluidic, Lab-on Chip, Biomarkers, Diagnosis

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MIP/2026/CONF/04

EVALUATION OF PROTECTIVE EFFECTS OF CURCUMA LONGA AGAINST CYCLOPHOSPHAMIDE INDUCED OXIDATIVE STRESS IN RAT BRAIN

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ABSTRACT

Plant with medicinal properties have been known for thousands of years and have been used as traditional medicine by the people to treat disease. Turmeric has been used in Ayurvedic, unani and siddha systems of medicines from ancient times. It is safe, non-toxic and strong natural antioxidant in comparison with other phyto-oxidant. Antioxidants from natural source are important repositories of medicine. Cyclophosphamide induced oxidative stress in brain model is one of the important and validated model used to study antioxidant potential of drugs and phytopharmaceuticals. Hence the present work was design to evaluate protective efficacy of Curcuma longa cyclophosphamide induced oxidative stress in rat brain. The Fifteen day treatment of oxidative stress (100 and 200 and 300mg/kg, p.o.) of the alcoholic extract of curuma longa was evaluated by using biochemical parameter like antioxidant potential, modulator potential, enzyme involved in oxidative stress (LPO, SOD and catalase). It was found to be effective in preventing the pathological changes in the hippocampus part of the rat brain. The finding of the present investigations clearly indicates that the curcuma longa extract has significantly reduces oxidative stress showed significant antioxidant potential.

KEYWORDS: Curcuma longa extract, rat brain, SOD, LPO, Catalase, histopathology

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MIP/2026/CONF/05

WASTE-DERIVED NANOTHERANOSTICS: TRANSFORMING BIOMEDICAL WASTE INTO SUSTAINABLE TOOLS FOR MOLECULAR IMAGING (QUANTUM DOT)

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ABSTRACT

Nanotheranostics is a rapidly evolving interdisciplinary field that integrates diagnostic imaging and therapeutic functions within a single nanoscale system, thereby enhancing disease detection accuracy and treatment effectiveness. In recent years, increasing attention has been directed toward the sustainable development of nanomaterials, particularly quantum dots synthesized from waste-derived resources, for use in molecular imaging and targeted therapeutic applications.

Waste-derived quantum dots, especially carbon- and graphene-based quantum dots produced from agricultural, food, and biomedical waste materials, have gained prominence as efficient nanotheranostic agents. These materials exhibit strong fluorescence properties, excellent photostability, good water solubility, and low cytotoxicity, making them highly suitable for bioimaging and real-time diagnostic purposes. In addition, their versatile surface chemistry enables functionalization with drugs, biomolecules, and targeting ligands, allowing simultaneous imaging, targeted drug delivery, and monitoring of therapeutic responses within a single platform.

The use of green synthesis approaches for producing quantum dots offers several advantages over conventional heavy-metal–based counterparts. Such eco-friendly methods reduce environmental impact, lower production costs, and improve biocompatibility, thereby enhancing their potential for biomedical applications. The incorporation of waste-derived quantum dots into nanotheranostic systems shows considerable promise in cancer diagnosis, molecular imaging, and personalized medicine.

Despite their advantages, challenges related to large-scale production, reproducibility, standardization, and regulatory approval remain to be addressed. Nevertheless, the development of waste-derived quantum dots represents an important step toward environmentally sustainable and clinically applicable nanotheranostic technologies.

KEYWORDS: Nanotheranostics, waste-derived quantum dots (QDs), fluorescence imaging, high photostability, low toxicity, green synthesis.

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MIP/2026/CONF/06

HYDROGEN THERAPY A EMERGING THERAPEUTIC APPROACH FLEDGED TO REPLACE CHEMOTHERAPIES

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ABSTRACT

Hydrogen an ideal gas of periodic table, operational in numerous reactions, whether the reactions are human initiated or itself going in humans. Hydrogen therapy an emerging therapeutic approaches of current medical science in various fatal diseases like Cancer, Cerebral Edema, and Neurodegenerative diseases etc. Anti-inflammatory and Antioxidant are two major properties which provides a therapeutic properties to Hydrogen gas itself. When used internally on precise site with controlled quantity and pressure and for specific time period. Hydrogen gas a simple compound of two hydrogen molecules H_2 have shown a promising result in the treatment of above-mentioned disease in easier, safer and positive approach than the previously used therapies like chemotherapies which is the more lethal therapy then the disease itself as the invasion of poison damage the all-midway layers of sensitive cell, while hydrogen is treated on the site of action itself with the help of emerged hydrogen supplied technologies. Topic of beam light is growing with progressive rate showing promising results in animal studies, preclinical trails and now also in clinical trails and ready for the approval of FDA as the official treatment shortly.

KEYWORDS: H_2 medical gas, Anti-inflammatory hydrogen, Targeted hydrogen delivery, Future of therapy treatment

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MIP/2026/CONF/07

SMART NANOTHERANOSTIC APPROACHES FOR TARGETED DRUG DELIVERY AND MOLECULAR IMAGING IN WOUND HEALING

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ABSTRACT

Wound healing is a complex, multistage biological process that often remains difficult to monitor and manage using conventional therapeutic approaches. Recent advances in nanotheranostics offer integrated solutions by combining targeted drug delivery with molecular imaging for real-time assessment of healing outcomes. This work highlights the development and characterization of smart nanotheranostic approaches designed to enhance wound repair while enabling image-guided monitoring. Nano-engineered carriers are formulated to achieve optimal particle size, surface charge, stability, and controlled drug release, facilitating improved penetration and retention at the wound site. The incorporation of imaging agents allows non-invasive visualization of drug distribution and key molecular events associated with tissue regeneration, angiogenesis, and inflammation. Physicochemical characterization, in vitro release behavior, and biocompatibility evaluations demonstrate the potential of these systems to improve therapeutic efficacy while reducing systemic exposure. Overall, smart nanotheranostic approaches represent a promising strategy for precision wound management, offering simultaneous therapy and molecular imaging to support personalized and effective wound healing interventions.

KEYWORDS: Nanotheranostics; Wound Healing; Targeted Drug Delivery; Molecular Imaging; Smart Nanocarriers

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MIP/2026/CONF/08

ROLE OF NANOTHERANOSTICSIN IMPROVING MOLECULAR IMAGING TECHNIQUES AND ENABLING PERSONALIZED TREATMENT STRATEGIES

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ABSTRACT

A new field called nanotheranostics combines targeted therapy and diagnostic imaging on a single nanoscale platform. Its potential to enhance early disease diagnosis, treatment precision, and patient-specific therapy at the molecular level has drawn more attention. The goal of the current study is to assess how nanotheranostics can improve molecular imaging methods and support tailored treatment plans, especially in complex diseases like cancer, heart disease, and genetic disorders. This study's methodology is based on a thorough review and analysis of current nanotheranostic systems research findings. In order to comprehend their imaging capabilities, drug delivery efficiency, and therapeutic performance in molecular imaging applications, a variety of multifunctional nanoparticles, such as gold nanoparticles, quantum dots, iron oxide nanoparticles, liposomes, and polymeric nanoparticles, were investigated.The study's conclusions show that nanotheranostic platforms greatly increase imaging sensitivity and resolution, allowing for the precise localization and early identification of diseased tissues. Furthermore, it was discovered that controlled drug release mechanisms and targeted drug delivery improved therapeutic efficacy and decreased systemic toxicity. Additionally, real-time monitoring of the course of the disease and the effectiveness of treatment is made possible by intelligent and responsive nanoparticles. In conclusion, new developments in nanotheranostics show that it has a great potential to revolutionize molecular imaging by integrating treatment and diagnosis into one platform. Nanotheranostics presents a promising path toward personalized and precision medicine, despite obstacles pertaining to safety, large-scale production, and regulatory approval.

KEYWORDS: Nanotheranostics, Molecular Imaging, Targeted Drug Delivery, Nanotechnology

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MIP/2026/CONF/09

VITAMIN E TPGS: A KEY SURFACTANT FOR STABILIZING NANOSTRUCTURED LIPID CARRIERS

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ABSTRACT

Oral drug administration remains the most preferred route due to its numerous advantages. It is convenient, non-invasive, and enhances patient compliance, especially for long-term therapies. Oral formulations are also cost-effective to manufacture, store, and distribute, with versatile dosage forms such as tablets, capsules, and suspensions allowing for a flexible and controlled drug release. Nevertheless, the primary challenge in oral drug delivery is poor bioavailability, largely attributed to the first-pass metabolism, which significantly reduces the amount of the active compound reaching systemic circulation. Additionally, factors such as enzymatic degradation in the gastrointestinal tract, low solubility, and limited permeability further hinder effective drug absorption.

Nanostructured lipid carriers (NLCs) are composed of solid and liquid lipids, surfactants, co-surfactants in a specified ratio. It can increase the drug distribution to the target organ, change the pharmacokinetic characteristics of drug carriers to enhance the therapeutic effect, and reduce adverse side effects and controlled release of actives, drug targeting, penetration enhancement and increase of skin hydration.

D-α-tocopheryl polyethylene glycol 1000 succinate (TPGS) is an amphiphilic derivative of natural vitamin E that has been extensively used in drug design and delivery nano-formulations. It serves as both a drug efflux inhibitor and a protection against enzymatic degradation. TPGS-based organic nanocarriers have the potential to overcome the drawbacks of traditional oral active compound administration by increasing the bioavailability of active compounds, such as medications and phytochemicals, improving pharmacokinetic profiles, and optimizing therapeutic results.

KEYWORDS: Nanostructured lipid carriers,TPGS, amphiphilic, bioavailability, drug delivery.

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MIP/2026/CONF/10

CLINICAL TRANSLATION AND CHALLENGES OF NANOTHERANOSTICS IN MOLECULAR IMAGING

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ABSTRACT

Nanotheranostics is an advanced approach in personalized medicine that combines diagnostic imaging and therapeutic functions within a single nanoparticle system. By integrating molecular imaging techniques such as positron emission tomography (PET), magnetic resonance imaging (MRI), and optical imaging, nanotheranostic platforms enable real-time tracking of drug distribution and evaluation of treatment response. Although these systems have demonstrated remarkable success in preclinical studies, their translation into routine clinical practice remains limited due to several critical challenges. This study highlights the major biological, regulatory, and technical barriers affecting the clinical development of nanotheranostics. One of the primary concerns is toxicity, particularly the long-term biocompatibility and potential immune responses associated with inorganic nanoparticles, which may accumulate in organs such as the liver and spleen. In addition, regulatory approval is complex because nanotheranostic agents often function as both drugs and medical devices, requiring rigorous and time-consuming evaluation processes. Furthermore, large-scale manufacturing poses significant difficulties, as maintaining consistent particle size, stability, and drug loading under current Good Manufacturing Practice (cGMP) conditions is challenging. The analysis suggests that successful clinical translation of nanotheranostics will require simplified nanoparticle designs, improved safety evaluation strategies, and clearly defined regulatory frameworks. Addressing these challenges is essential for bridging the gap between laboratory research and clinical application. With continued advancements, nanotheranostics holds strong potential to enable precise, image-guided therapies and significantly improve patient outcomes, particularly in oncology and other complex diseases.

KEYWORDS: Nanotheranostics, Molecular Imaging, Clinical Translation, Nanotoxicity, Regulatory Challenges.

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MIP/2026/CONF/11

COMPUTATIONAL IN SIGHTS INTO IDENTIFIED PHYTO CONSTITUENTS OF DALBERGIA SISSOO: AN IN SILICO REVIEW

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ABSTRACT

The medicinal plant Dalbergia sissoo is abundant in bioactive phytoconstituents that are linked to a variety of pharmacological actions, including flavonoids, phenolics, and isoflavones. With an emphasis on molecular docking, and pharmacokinetic (ADMET) predictions, this study includes in silico research on previously reported phytoconstituents of Dalbergia sissoo. In order to help choose prospective lead compounds, computational methods have been used to examine target interactions, drug-likeness, and toxicity profiles. The review underlines the significance of combining computational results with experimental validation and stresses the value of structure–activity correlations in comprehending therapeutic potential. Overall, in silico data validate Dalbergia sissoo phytochemicals' potential for drug discovery.

KEYWORDS: - Molecular docking, In silico, Dalbergia sissoo, ADMET, Phytoconstituents.

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MIP/2026/CONF/12

BIO-INSPIRED, BIOENGINEERED AND BIOMIMETIC DRUG DELIVERY CARRIERS

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ABSTRACT

Synthetic carriers such as polymer and lipid particles often struggle to meet clinical expectations. Natural particulates ranging from pathogens to mammalian cells are therefore worth examining in more depth, as they are highly optimised for their specific functions *invivo* and possess features that are often desirable in drug delivery carriers. With a better understanding of these biological systems, in conjunction with the availability of advanced biotechnology tools useful for re-engineering various natural systems, researchers have begun to exploit natural particulates for multiple applications in the delivery of proteins, small interfering RNA, and other therapeutic agents. Here, we review the natural drug delivery carriers that have provided the basis and inspiration for new drug delivery systems.

Bio-inspired drug delivery systems have emerged as a transformative innovation in the realm of pharmaceutical sciences, offering new horizons in the effective and targeted delivery of therapeutic agents. These systems take cues from biological mechanisms that have evolved naturally to overcome complex physiological barriers, thereby enhancing the delivery, absorption, and efficacy of drugs. Traditional drug delivery methods frequently struggle with significant challenges such as low bioavailability, rapid degradation or clearance, poor targeting, and undesirable systemic side effects. These limitations have prompted researchers to explore nature's own strategies to design smarter, more efficient delivery mechanisms. Drawing inspiration from biological entities such as cells, viruses, bacteria, and naturally derived materials, bio-inspired systems aim to replicate their inherent capabilities for selective targeting, environmental responsiveness, and biocompatibility.

KEYWORDS: Bio-Inspired Drug Delivery, Polymer, Physiological Barriers, Bioavailability, Biocompatibility

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MIP/2026/CONF/13

NANOMEDICINE-BASED THERANOSTIC STRATEGY FOR MRI-GUIDED DIAGNOSIS AND TREATMENT OF CEREBRAL THROMBOSIS

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ABSTRACT

Cerebral thrombosis is a major cause of ischemic stroke and requires rapid and accurate diagnosis along with effective treatment. Conventional thrombolytic therapy using tissue plasminogen activator (tPA) is limited by poor target specificity and a high risk of systemic bleeding. To overcome these limitations, a nanomedicine-based theranostic approach using tPA-loaded super paramagnetic iron oxide nanoparticles (SPIONs) has been proposed. SPIONs act as magnetic resonance imaging (MRI) contrast agents, enabling precise clot localization, while tPA provides site-specific thrombolysis. This dual-function system allows MRI-guided diagnosis and localized drug release at the clot site, improving therapeutic efficacy and reducing hemorrhagic complications. Thus, tPA-SPIONs represent a promising strategy for safer and more effective ischemic stroke management.

KEY WORDS: Cerebral Thrombosis, Nanoparticles, Blood Clot, MRI, tPA and SPIONs

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MIP/2026/CONF/14

FORMULATION & EVALUATION OF MUCOADHESIVE MICROSPHERES OF ANTIULCER DRUG

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ABSTRACT

The present study focuses on the formulation and evaluation of mucoadhesive microspheres of Esomeprazole for effective management of peptic ulcer disease (PUD). Esomeprazole, a proton pump inhibitor with low bioavailability and short plasma half-life, was selected to develop a gastroretentive mucoadhesive drug delivery system aimed at prolonging gastric residence time and enhancing localized drug release at the gastric site. Mucoadhesive microspheres were prepared by the solvent evaporation method employing Hydroxypropyl Methylcellulose (HPMC), Chitosan, and Acrycoat S100 as polymers in various ratios to optimize drug entrapment and adhesion. The microspheres were characterized for particle size, surface morphology, swelling index, percentage yield, entrapment efficiency, and in-vitro drug release behavior. Spectroscopic and microscopic analyses such as UV spectroscopy and Scanning Electron Microscopy (SEM) were used for drug identification and morphological evaluation. The optimized formulation demonstrated spherical shape, good flow properties, high entrapment efficiency, and prolonged drug release, indicating effective mucoadhesion and sustained gastric retention. Results confirmed that polymeric concentration significantly influenced both the mucoadhesive strength and release kinetics.

In conclusion, the developed Esomeprazole mucoadhesive microspheres offer a promising gastroretentive delivery system for controlled drug release, reduced dosing frequency, and improved therapeutic efficacy in the treatment of peptic ulcer disease.

KEYWORDS: Esomeprazole, Mucoadhesive Microspheres, Gastroretentive System, Solvent Evaporation, Sustained Release.

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MIP/2026/CONF/15

TOPIC-ROLE OF MICROBES IN HUMAN HEALTH

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ABSTRACT

Microbes play an essential and multifaceted role in maintaining human health, forming diverse and dynamic communities collectively known as the human microbiota. These microorganisms, including bacteria, viruses, fungi, and archaea, colonize various regions of the human body such as the gastrointestinal tract, skin, oral cavity, and respiratory system. Among these, the gut microbiota is the most extensively studied due to its significant involvement in digestion, nutrient absorption, and the synthesis of vital vitamins such as vitamin K and certain B vitamins. Microbes also contribute to metabolic regulation by fermenting dietary fibers into short-chain fatty acids, which support intestinal integrity and energy homeostasis.

In addition to metabolic functions, the human microbiota plays a crucial role in the development and modulation of the immune system. Beneficial microbes enhance immune tolerance, prevent excessive inflammation, and protect against pathogenic microorganisms through competitive exclusion and the production of antimicrobial substances. Recent research has highlighted the influence of the microbiota on brain function and behavior through the gut–brain axis, linking microbial balance to mental health conditions such as stress, anxiety, and depression.

Disruption of the normal microbial ecosystem, referred to as dysbiosis, has been associated with a wide range of disorders, including inflammatory bowel disease, obesity, diabetes, allergies, and autoimmune conditions. Advances in microbiome research have opened new avenues for therapeutic strategies, including probiotics, prebiotics, dietary interventions, and fecal microbiota transplantation. Understanding the role of microbes in human health is therefore critical for the development of preventive, diagnostic, and personalized medical approaches.

KEYWORDS: Human microbiota, Gut microbiome, Immune system, Dysbiosis, Probiotics, Gut-brain axis.

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MIP/2026/CONF/16

EVALUATION OF THE ANTIDIABETIC AND ANTIOXIDANT POTENTIAL OF BACOPA MONNIERI L. EXTRACT WITH HIGH-FAT DIET-INDUCED METABOLIC IMBALANCE IN RATS

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ABSTRACT:

Diabetes mellitus is a chronic metabolic disorder characterized by persistent hyperglycemia resulting from impaired carbohydrate, fat, and protein metabolism. Prolonged elevated blood glucose levels lead to serious complications affecting organs such as the eyes, kidneys, nerves, heart, and blood vessels. It is closely associated with metabolic syndrome, which includes obesity, dyslipidemia, hypertension, and hyperglycemia, and affects nearly 10% of the global population annually. Current diabetes management mainly relies on insulin and oral hypoglycemic agents, which are often associated with adverse effects, increasing interest in safer herbal alternatives.

This study evaluates the antihyperglycemic and antioxidant potential of the ethanolic extract of aerial parts of *Bacopa monnieri*. In alloxan-induced diabetic rats, the extract significantly reduced blood glucose levels in both single- and multiple-dose studies, with effects comparable to the standard drug glibenclamide. Additionally, the extract improved body weight, reduced oxidative stress, and favorably influenced glycosylated hemoglobin levels, indicating its therapeutic potential in diabetes management.

KEYWORDS: Bacopa monnieri, Diabetes mellitus, Antihyperglycemic activity, Antioxidant activity, Herbal therapy

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MIP/2026/CONF/17

AI-ASSISTED DEVELOPMENT OF A PLANT-DERIVED NANOTHERANOSTIC GEL FOR IMAGE-GUIDED INFECTION THERAPY

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ABSTRACT

The integration of artificial intelligence (AI) with nanotheranostics has created new opportunities for developing smart systems for infection treatment and monitoring. This study focuses on the AI-assisted development of a plant-derived nanotheranostic gel for image-guided infection therapy. Plant-based nanoparticles were synthesized using an eco-friendly method and incorporated into a topical gel to provide effective antimicrobial action. AI-based tools were used to optimize key formulation parameters such as nanoparticle size, surface properties, and gel composition, resulting in improved stability, controlled drug release, and enhanced therapeutic performance.

The developed nanotheranostic gel showed strong antimicrobial activity against common pathogens involved in skin and wound infections. In addition to therapeutic action, the nanoparticles enabled molecular imaging of infected sites, allowing visualization of nanoparticle distribution. AI-powered image analysis was applied to improve image clarity, identify infection localization, and track treatment response in real time.

Overall, the combination of AI and plant-derived nanotheranostic technology offers a smart, sustainable, and efficient approach for infection management. This system integrates antimicrobial therapy with molecular imaging, demonstrating the potential of AI-assisted nanotheranostics to improve precision, safety, and effectiveness in topical infection treatment.

KEYWORDS: Artificial intelligence; plant-derived nanoparticles; nanotheranostics; molecular imaging; antimicrobial gel; image-guided therapy

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MIP/2026/CONF/18

EMERGING ROLE OF NANOTHERANOSTICS IN CANCER CARE

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ABSTRACT

Nanotheranostics is an emerging strategy in cancer care that combines diagnostic and therapeutic functions within a single nano-based system. This advanced approach employs nano-sized materials to support early cancer detection, accurate molecular imaging, and targeted drug delivery. Traditional cancer treatments often suffer from limitations such as delayed diagnosis, non-specific distribution of therapeutic agents, and serious side effects. Nanotheranostic platforms help overcome these challenges by incorporating both imaging agents and therapeutic drugs into the same nanoparticle, enabling real-time monitoring of treatment effectiveness.

Several nanotheranostic carriers, including gold nanoparticles, magnetic nanoparticles, liposomes, polymeric nanoparticles, and quantum dots, have demonstrated promising potential in cancer diagnosis and therapy. These systems improve imaging precision through techniques such as magnetic resonance imaging (MRI), computed tomography (CT), and fluorescence imaging, while simultaneously delivering anticancer drugs directly to tumor sites. Recent advancements in smart and stimuli-responsive nanoparticles have further enhanced therapeutic efficiency by reducing toxicity to healthy tissues.

In conclusion, nanotheranostics represents a significant and innovative advancement in modern cancer treatment. Its ability to support early diagnosis, targeted therapy, and personalized treatment approaches makes it a promising tool for improving cancer management and patient outcomes.

KEYWORDS: Nanotheranostics, Cancer Care, Molecular Imaging, Targeted Drug Delivery, Nanoparticles, Cancer Diagnosis and Therapy

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MIP/2026/CONF/19

SAFE MEDICATION DISPOSAL FOR A SAFER TOMMOROW

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ABSTRACT

Improper disposal of unused or expired medicines has emerged as a significant public health and environmental concern. Many individuals discard medications in household trash or flush them into sewage systems, leading to risks such as accidental poisoning, drug misuse, antimicrobial resistance, and contamination of soil and water bodies. Safe medication disposal practices including take-back programs, pharmacy collection points, and community awareness initiatives, play a vital role in reducing these hazards. This study/topic emphasizes the importance of responsible disposal, highlights common knowledge gaps among the public, and presents strategies to improve awareness and accessibility of safe disposal systems. By promoting simple yet effective disposal methods, pharmacists and healthcare professionals can safeguard communities, protect ecosystems, and contribute to a healthier, safer tomorrow.

KEYWORDS: Medication disposal, pharmaceutical waste, take-back programs, environmental safety, pharmacy awareness.

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MIP/2026/CONF/20

DENDRIMERS AS DRUG DELIVERY VEHICLES

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ABSTRACT

The application of nanotechnology in medical biology has increased significantly in recent years due to the development of novel tools such as supramolecular systems, complexes, and composites. Among these, dendrimers are highly branched chemical compounds characterized by a globular structure and functional surface groups. Their surface chemistry can be easily modified, allowing the development of a wide range of biocompatible materials. Dendrimers possess unique physicochemical properties, including internal cavities, high reactivity, nanoscale size, water solubility, and ease of synthesis, which make them highly suitable for drug delivery applications in nanomedicine.

This study presents an overview of dendrimer composition, classification, synthesis, and applications in nanomedicine, with a particular focus on drug delivery. Dendrimers are primarily classified based on their functional groups, which enable efficient encapsulation of active compounds and structural similarity to biological materials. Unlike many other polymers, dendrimers exhibit stabilized surfaces that enhance water solubility. Dendritic structures include dendrimers, dendrons, dendronized polymers, and hyperbranched polymers, which are categorized according to molecular weight and structural organization.

Dendrimers play a vital role in targeted drug delivery due to their ability to bind diverse chemical entities and modify pharmacokinetic and pharmacodynamic properties. Their adaptable structure allows precise tuning to meet specific therapeutic needs. Overall, dendrimers represent promising drug delivery vehicles with potential applications in gene therapy, neuroinflammatory disease treatment, and other medical fields, highlighting their growing importance in pharmaceutical and clinical research.

KEYWORDS: Dendrimers, Dendrons, PAMAM, Nanomedicine, PPI dendrimers.

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MIP/2026/CONF/21

CURRENT ADVANCES IN NANOTHERANOSTICS FOR MOLECULAR IMAGING AND THERAPY OF CARDIOVASCULAR DISORDERS

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ABSTRACT

Cardiovascular diseases (CVDs) remain the leading cause of global mortality and long-term disability, necessitating the development of more advanced diagnostic and therapeutic strategies. Nanotheranostics has emerged as an innovative approach that integrates diagnostic imaging and targeted therapy within a single nanoscale platform, enabling precise and personalized disease management. Engineered nanoparticles are designed to deliver therapeutic agents, including drugs, genes, and photothermal materials, while simultaneously carrying imaging probes.

Recent progress in nanomedicine has led to multifunctional nanoparticles capable of selectively targeting cardiovascular tissues. These systems support multiple imaging modalities such as cardiovascular magnetic resonance (CMR), computed tomography (CT), positron emission tomography (PET), ultrasound, photoacoustic, and fluorescence imaging, improving early detection and real-time monitoring of disease progression and treatment response. Surface functionalization with ligands or antibodies further enhances targeting efficiency, reduces systemic toxicity, and improves therapeutic outcomes. This review highlights recent advances, clinical developments, and the translational potential of nanotheranostic platforms in cardiovascular disease management.

KEYWORDS: Cardiovascular diseases, Nanotheranostics, Nanoparticles, Multimodal imaging, Targeted drug delivery, personalized medicine

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MIP/2026/CONF/22

FORMULATION AND CHARACTERIZATION OF DIPHHENHYDRAMINE HYDROCHLORIDE FOR THE MANAGEMENT OF MOTION SICKNESS

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ABSTRACT

Development of a Novel Diphenhydramine HCl Delivery System for Motion Sickness Motion sickness is a common disorder caused by conflicting sensory inputs from the vestibular, visual, and central nervous systems, leading to symptoms such as nausea, vomiting, and dizziness. Diphenhydramine Hydrochloride, a first-generation H1 antihistamine, is widely used in the management of motion sickness; however, conventional oral dosage forms often exhibit delayed onset of action and undergo extensive first-pass metabolism. The present study focuses on the formulation and characterization of Diphenhydramine Hydrochloride using a novel drug delivery approach to enhance therapeutic efficacy and patient compliance. The formulation was prepared using suitable polymers and plasticizers, followed by evaluation of physicochemical properties such as thickness, weight variation, folding endurance, surface pH, drug content uniformity, and in-vitro drug release. The developed formulation demonstrated satisfactory mechanical strength, rapid drug release, and acceptable stability. These findings suggest that the formulated system may serve as an effective and patient-friendly alternative for the management of motion sickness.

KEYWORDS: Motion sickness, H1 antihistamine, First-pass metabolism, Drug delivery approach

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MIP/2026/CONF/23

NANOTHERANOSTICS IN CANCER: A SMART APPROACH FOR EARLY DIAGNOSIS AND TARGETED DRUG DELIVERY

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ABSTRACT

Cancer remains a major global health challenge and is frequently diagnosed at advanced stages, which limits the effectiveness of available treatment options. Traditional diagnostic and therapeutic methods often lack specificity, leading to inadequate targeting of cancer cells and severe side effects in healthy tissues. These challenges have driven the development of more precise and integrated treatment strategies. Nanotheranostics has emerged as an innovative approach that combines diagnosis and therapy within a single nanotechnology-based platform, offering improved cancer management.

Nanotheranostics involves the use of nanoscale systems engineered to perform both diagnostic and therapeutic functions simultaneously. These multifunctional platforms incorporate imaging agents and therapeutic drugs into single nanoparticles, allowing real-time detection of cancer and continuous monitoring of treatment response. Various nanomaterials are employed in the design of nanotheranostic systems, including liposomes, polymeric nanoparticles, gold nanoparticles, magnetic nanoparticles, and quantum dots. These nanocarriers enhance drug stability, improve bioavailability, and facilitate targeted delivery to tumor tissues.

A key advantage of nanotheranostics is its ability to enable early cancer detection through advanced imaging techniques such as magnetic resonance imaging (MRI), fluorescence imaging, and positron emission tomography (PET). Early diagnosis significantly improves therapeutic outcomes and patient survival rates. In addition, nanotheranostic systems achieve targeted therapy by interacting with tumor-specific receptors and molecular markers. Stimuli-responsive nanoparticles further enhance treatment efficiency by releasing drugs in response to tumor-associated conditions such as pH changes, temperature variations, or enzyme activity. This controlled drug release reduces systemic toxicity and protects healthy tissues.

In summary, nanotheranostics represents a promising advancement in modern oncology, offering a more accurate, targeted, and personalized approach to cancer diagnosis and therapy.

KEYWORDS: Nanotheranostics, Cancer diagnosis, Targeted drug delivery, Nanoparticles, Molecular imaging, Personalized therapy

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MIP/2026/CONF/24

DEVELOPMENT OF RANOLAZINE CO-CRYSTALS FOR ENHANCED SOLUBILITY AND BIOAVAILABILITY: IN VITRO AND IN VIVO PHARMACOKINETIC ASSESSMENT IN RATS.

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ABSTRACT

The primary focus of this research to enhance the aqueous solubility and oral bioavailability of Ranolazine, an anti-anginal drug with poor water solubility, by formulating pharmaceutical co-crystals using co-formers. In-silico molecular screening was applied to predict compatible co-formers based on intermolecular interactions and stability. From this approach, 2-amino caffeine, nicotinamide, and benzamide were selected for experimental co-crystal development. A series of co-crystals (C1, C2, C3, B1, B2, N1, N2, N3) were synthesized employing solvent drop grinding, antisolvent addition, and slow evaporation techniques. Structural confirmation and physicochemical characterization were performed using UV spectroscopy, FTIR, and DSC analyses.In vitro dissolution studies revealed markedly enhanced release profiles compared to pure Ranolazine. Notably, C1, B2, and N1 co-crystals achieved 100% release within 15, 15, and 25 minutes, respectively. Pharmacokinetic investigations in rats were conducted using a validated RP-HPLC method with hydrochlorothiazide as an internal standard. All co-crystals exhibited maximum plasma concentration at 4 h, while N1 and C1 demonstrated significantly higher Cmax values relative to the pure drug at T_{max}, indicating improved systemic availability. The RP-HPLC method was precise, sensitive, and compliant with ICH guidelines.This study highlights the utility of in silico screening in rational co-former selection and confirms the potential of co-crystallization to address solubility and bioavailability challenges associated with Ranolazine. The findings advise that Ranolazine co-crystals could lead to more effective anti-anginal therapy with improved therapeutic performance, laying the groundwork for further preclinical and clinical development.

KEYWORDS: Ranolazine, Co-crystals, Pharmacokinetic assessment, Molecular Docking.

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MIP/2026/CONF/25

FORMULATION STRATEGIES FOR TRANSDERMAL DELIVERY OF ANTI-ALZHEIMER'S AGENTS: A CONTROLLED RELEASE APPROACH

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ABSTRACT

Transdermal delivery involves administering drugs through the skin for systemic effects, bypassing first-pass metabolism. Controlled release refers to formulations that gradually dispense active agents over time to maintain steady plasma levels. For anti-Alzheimer's agents like cholinesterase inhibitors (e.g., rivastigmine), these strategies enhance efficacy while minimizing side effects

Anti-AD drugs like rivastigmine release steadily from matrix/reservoir patches, diffusing across the stratum corneum at zero-order kinetics for constant plasma levels. Enhancers (e.g., alcohols) disrupt lipids, boosting flux without altering viability; permeation follows Fick's law: J = -D * dc/dx. This bypasses GI issues, ideal for AD's chronic management. Drug permeation follows transepidermal (main route: transcellular through corneocytes or intercellular via lipid matrix) and transappendageal (via follicles/sweat glands) pathways. The stratum corneum's lipophilic barrier favors small, lipophilic molecules (<500 Da, log P 1-3), with concentration gradients driving diffusion to dermal capillaries for systemic circulation. Hydrophilic agents rely more on appendageal routes, though limited by area (~0.1%).

Transdermal delivery offers a controlled release approach for anti-Alzheimer's agents, addressing key drawbacks of traditional oral medications like poor bioavailability, first-pass metabolism, gastrointestinal side effects, and low patient compliance due to dysphagia or memory issues in elderly patients. Formulation strategies often involve patches or gels with permeation enhancers, iontophoresis, or microneedles to improve skin penetration while ensuring steady drug release over time.

KEYWORDS: Transdermal delivery, Microneedles, Alzheimer's disease.

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MIP/2026/CONF/26

ROLE OF NANO PARTICLES IN CANCER TREATMENT AND DIAGNOSIS

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ABSTRACT

A Cancer remains one of the leading causes of death worldwide and early diagnosis is along with effective treatment is essential for improving patient survival. Conventional cancer therapies such as chemotherapy, radiotherapy, and surgery often lack specificity and may damage healthy tissues, leading to severe side effects. In recent years, nanotechnology has emerged as a promising approach in cancer treatment and diagnosis. Nanoparticles are extremely small particles that can be engineered to carry drugs, genes, or imaging agents directly to cancer cells. This targeted delivery increases the effectiveness of therapy while reducing harmful effects on normal cells.

In cancer diagnosis, nanoparticles are used as contrast agents in imaging techniques such as MRI, CT scans, and fluorescence imaging, allowing earlier and more accurate detection of tumors. In cancer treatment, nanoparticles can deliver chemotherapy drugs, enhance radiotherapy, and enable photo thermal and photodynamic therapies. They also improve drug stability, solubility and controlled release. Overall, nanoparticles provide a powerful platform for cancer diagnosis and therapy, leading to more precise, efficient and personalized cancer care. Continued research and development in nanotechnology will further improve cancer management and patient outcomes.

KEYWORDS: Nanoparticles, Cancer therapy, Drug delivery, Cancer diagnosis, anotechnology

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MIP/2026/CONF/27

GREEN SYNTHESIS, CHARACTERIZATION, AND ANTICANCER EVALUATION OF IRON OXIDE–BASED SUPERPARAMAGNETIC NANOCOMPOSITES USING MYRICA ESCULENTA

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ABSTRACT

Pancreatic cancer is a highly aggressive and fatal malignancy with limited therapeutic options and poor prognosis. Recent advances in nanotechnology offer promising strategies for targeted and minimally invasive cancer treatment. This study reports a green synthesis method for superparamagnetic iron oxide (Fe_3O_4) nanoparticles using methanolic bark extract of *Myrica esculenta*, a plant rich in bioactive phytochemicals. The eco-friendly synthesized nanoparticles (M.E. IONPs) were thoroughly characterized using FESEM–EDS, TEM, XRD, VSM, and FTIR, confirming their nanoscale size, crystalline structure, and superparamagnetic properties. In vitro cytotoxicity studies against human pancreatic cancer MIA PaCa-2 cells demonstrated significant anticancer activity with minimal toxicity toward normal cells. Mechanistic studies, including ROS generation, DAPI staining, immunoblotting, and molecular docking, indicated apoptosis-mediated cell death and retention of plant-derived bioactivity. Overall, *Myrica esculenta*–mediated iron oxide nanoparticles represent a sustainable and effective nanotherapeutic platform for pancreatic cancer treatment.

KEYWORDS: Pancreatic cancer, Green synthesis, Iron oxide nanoparticles, *Myrica esculenta*, Anticancer activity, Nanotherapy

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MIP/2026/CONF/28

FORMULATION, DEVELOPMENT, AND CHARACTERIZATION OF MYRICA ESCULENTA PLANT EXTRACT–BASED ALBUMIN NANOPARTICLES FOR ANTICANCER APPLICATIONS

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ABSTRACT

Myrica esculenta plant extracts are known for their anticancer potential, while albumin is widely recognized as an effective drug carrier due to its non-immunogenic nature and ability to evade the reticuloendothelial system. In this study, *Myrica esculenta* extract–loaded bovine serum albumin nanoparticles (ME-BSANPs) were developed and evaluated as a targeted cancer therapy. The primary objective was to enhance phyto constituent absorption and improve cancer cell selectivity to induce apoptosis. The nanoparticles were characterized for size, shape, surface charge, and stability, with formulation parameters optimized using Design of Expert (DOE) software. FESEM analysis confirmed nanoscale morphology. In vitro cytotoxicity studies against the pancreatic cancer cell line MIA PaCa-2 demonstrated significant apoptosis-mediated cell death. Molecular docking studies revealed strong binding affinity between plant phyto constituents and bovine serum albumin, supporting effective drug loading and targeted delivery. Overall, ME-BSANPs exhibited promising anticancer activity with improved delivery efficiency and reduced side effects.

KEYWORDS: Nanoparticulate formulation, *Myrica esculenta*, Bovine serum albumin, Anticancer activity, MIA PaCa-2 cell line, Drug delivery.

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MIP/2026/CONF/29

RECENT ADVANCEMENT IN MRI-BASED NANOTHERONOSTIC AGENT FOR TUMOR DIAGNOSIS AND THERAPY INTEGRATION

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ABSTRACT

Cancer remains one of the leading causes of mortality worldwide. Although conventional treatment strategies such as chemotherapy, radiotherapy, and surgery have demonstrated therapeutic potential, their clinical effectiveness is often limited by poor targeting specificity, systemic toxicity, and inadequate treatment monitoring. Magnetic resonance imaging (MRI) has emerged as a powerful diagnostic modality owing to its non-invasive nature, high spatial resolution, deep tissue penetration, and real-time imaging capabilities, making it particularly suitable for guiding and evaluating cancer therapies. Recent advances have led to the development of MRI-based nanotheranostic platforms that integrate diagnostic and therapeutic functions within a single system, enabling precise tumor imaging alongside targeted treatment. This review presents a comprehensive overview of recent progress in MRI-guided nanotheranostic agents for cancer diagnosis and therapy, with a focus on their structural design, functional mechanisms, and biomedical applications in both single treatment approaches such as photothermal therapy, photodynamic therapy, chemodynamic therapy, immunotherapy, and ferroptosis, as well as combined therapeutic strategies. In addition, the contribution of MRI to improving treatment precision through image-guided delivery, real-time therapeutic monitoring, and stimulus-responsive activation is discussed. Key challenges including biosafety, design complexity, and barriers to clinical translation are also examined, along with perspectives on future directions for developing intelligent and clinically viable MRI-integrated therapeutic systems.

KEYWORDS: MRI, diagnosis and therapy integration, nanotheronostic agents,nanomedicine, antitumor.

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MIP/2026/CONF/30

TINY PARTICLES, BIGIMPACT: NANOTHERANOSTICS IN DISEASE DIAGNOSIS AND TREATMENT

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ABSTRACT

Nanotheranostics is a promising application of nanotechnology that merges two major medicinal goals early disease detection and enhanced treatment into a single, tiny particle system. These particles are small enough to infiltrate the body and locate diseased tissues, such as tumors or inflammation. By utilizing advanced imaging technologies like MRI, PET, CT, or fluorescence imaging, they help doctors "unlock" the internal view of the body.

Simultaneously, these same particles serve as carriers to deliver drugs or therapeutic agents directly to the diseased area. This targeted approach makes treatment more efficient and less harmful than conventional therapies. Because nanotheranostics perform imaging and therapy at the same time, clinicians can monitor a disease's location, size, and the treatment's effectiveness in real time.

Current research focuses on various nanoparticles—including metal, polymer, and liposomes to improve their targeting, safety, and performance. Furthermore, researchers are developing multi-modal imaging, combining multiple techniques into one model for clearer diagnostic pictures. Functionalization, or attaching specific molecules to the nanoparticle surface, allows these systems to bind to disease markers with high precision.

Despite promising results in laboratory and animal studies, bottlenecks remain before clinical practice. These include improving safety, ensuring metabolic stability, and meeting regulatory standards. Nevertheless, nanotheranostics remains a powerful tool that could significantly transform how we diagnose and treat complex diseases.

KEYWORDS: Nanotheranostics, Molecular Imaging, Targeted Therapy, MRI, PET, CT, Disease Diagnosis.

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MIP/2026/CONF/31

NEXT GENERATION NANOPARTICLES FOR MOLECULAR IMAGING AND TARGETED THERAPY

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ABSTRACT

Nanoparticles are materials with sizes less than 100 nanometers and are increasingly used in the medical field to improve disease detection and drug delivery. In recent years, many types of nanoparticles have been developed that support molecular imaging and targeted therapy, allowing medicines to be delivered directly to affected body parts. Nanoparticles such as liposomes, polymer-based systems, metal-based particles, and quantum dots can transport drugs and imaging agents specifically to diseased cells, including cancer cells, which helps avoid damage to healthy tissues. These tiny systems enhance imaging techniques such as MRI, CT, and PET scans and improve cancer treatment by reducing side effects and increasing treatment success rates.

Next-generation nanoparticles are expected to be even more advanced than current systems. Scientists are developing intelligent nanoparticles that can respond to internal body conditions such as temperature or pH changes, allowing better control over imaging and drug release. New designs include multifunctional nanoparticles that perform both diagnosis and therapy, known as nanotheranostics, as well as biologically triggered systems and nanoparticles integrated with artificial intelligence to support personalized treatment planning.

However, several challenges must be addressed before widespread clinical use. Nanoparticles must be safe, stable, and easily removed from the body after treatment. Future research will focus on minimizing toxicity, improving targeting precision, and conducting clinical trials to ensure effectiveness. With continued development, next-generation nanoparticles are expected to play a major role in early disease detection, precision treatment, and long-term healthcare advancement.

KEYWORDS: Molecular Imaging, Targeted Therapy, Nanotheranostics, Smart Nanoparticles, Personalized Medicine

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MIP/2026/CONF/32

DESIGN AND DEVELOPMENT OF SUSTAINED-RELEASE GASTRO RETENTIVE DOSAGE FORMS BY VARIOUS APPROACHES FOR ANTI DIABETIC DRUGS

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ABSTRACT

The oral route is considered as the most promising and predominant route of drug delivery. Effective oral drug delivery may depend upon the factors such as GI transit time of dosage form, gastric emptying process, drug release from the dosage form and site of absorption of drug. Most of the oral dosage forms possess several physiological restrictions such as variable GI transit, because of variable gastric emptying, foremost to incomplete drug release, non-uniform absorption profiles and shorter residence time of the dosage form in the stomach. In recent years systematic and technological advancements have been made in the research and development of controlled release oral drug delivery systems by overcoming physiological adversities like short gastric residence times and unpredictable gastric emptying times. To overcome these limitations, gastro-retentive drug delivery systems (GRDDS), have been developed to amplify gastric residence of drug delivery systems in the upper part of the gastrointestinal tract. GRDDS can improve the controlled delivery of drugs that have an absorption window by continuously releasing the drug for a prolonged period of time before it reaches its absorption site, thus ensuring its optimal bioavailability. The current research study provides the classification of gastro-retentive systems, formulation considerations for developing gastro-retentive systems for Anti diabetic Drugs.

KEYWORDS: Oral drug delivery, Gastro-retentive drug delivery systems, Controlled release, Gastric residence time, Anti diabetic drugs, Bioavailability

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MIP/2026/CONF/33

A NEXT-GENERATION TOPICAL THERAPY: NATURAL WOUND HEALING PROMOTERS DELIVERED VIA TRANSETHOSOMAL GEL

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ABSTRACT

Wound healing is a complex, multistep biological process involving inflammation, cell proliferation, angiogenesis, and tissue remodeling. Although topical therapies are widely used, effective wound management remains limited by poor skin penetration, low bioavailability, and inadequate retention of therapeutic agents at the wound site. Natural wound healing promoters have gained increasing attention due to their antioxidant, anti-inflammatory, antimicrobial, and regenerative properties. Bioactive compounds such as caffeine, quercetin, rutin, curcumin, resveratrol, epigallocatechin gallate (EGCG), kaempferol, and aloe vera–derived constituents have shown considerable potential in accelerating wound repair. However, their clinical utility is often constrained by poor solubility, instability, and limited transdermal permeation.

This review highlights transethosomal gel-based delivery systems as an advanced topical strategy to overcome these limitations. Transethosomes are ultra-deformable nanovesicles composed of phospholipids, ethanol, and edge activators, enabling enhanced skin penetration, controlled drug release, and prolonged local retention. The review summarizes formulation approaches, mechanisms of skin permeation, and advantages over conventional topical and vesicular systems. Recent preclinical studies demonstrating improved wound contraction, epithelialization, angiogenesis, inflammation control, and oxidative stress reduction using natural bioactive-loaded transethosomal gels are discussed. Overall, transethosomal gel systems represent a promising nanotechnology-driven approach for effective and advanced wound healing therapy.

KEYWORDS: Wound healing, Transethosomal gel, Natural bioactives, Nanovesicular drug delivery, Topical therapy, Skin penetration

MIP/2026/CONF/34

MICROSCOPIC,PHYTOCHEMICAL AND ANTIDIABETIC INVESTIGATIONS OF KYDIA CALYCINA:AN ETHNOPHARMACOLOGICAL APPROACH

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ABSTRACT

Kydia calycina is a medicinal plant traditionally used in Ayurveda, yet its therapeutic potential has not been extensively validated using modern scientific methods. The present study aims to investigate the ethnopharmacological significance and antidiabetic potential of *Kydia calycina*, with the objective of bridging traditional knowledge and contemporary drug discovery approaches. Ayurveda, a holistic system of medicine founded on the principles of *Panchamahabhutas* and *Tridosha*, emphasizes the use of natural remedies to restore physiological balance. Diabetes mellitus is a chronic metabolic disorder characterized by persistent hyperglycemia resulting from abnormalities in carbohydrate, protein, and lipid metabolism, which can lead to serious complications such as neuropathy, nephropathy, cardiovascular disease, stroke, and vision impairment.

This research involves the preparation of aqueous, methanolic, and ethanolic extracts of *Kydia calycina*, followed by comprehensive macroscopic and microscopic evaluation. Physicochemical parameters including ash values, extractive values, moisture content, and fluorescence analysis will be determined. Preliminary phytochemical screening will be conducted to identify major bioactive constituents such as flavonoids, tannins, phenolics, and alkaloids. Selected extracts will be further assessed using appropriate in vivo animal models to evaluate antidiabetic and antioxidant activities.

The findings of this study are expected to provide scientific validation for the traditional use of *Kydia calycina* and support its potential development as a phytopharmaceutical agent or as a component of polyherbal formulations. Additionally, this research may stimulate further exploration of underutilized medicinal plants, contributing to biodiversity-based drug discovery and improved diabetes management strategies.

KEYWORDS: *Kydia calycina*, Diabetes mellitus, Ayurveda, Antidiabetic activity, Phytochemical screening, Ethnopharmacology.

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MIP/2026/CONF/35

RECENT ADVANCES IN NANOTHERANOSTIC NANOPARTICLES SYSTEMS FOR MOLECULAR IMAGING AND LENS-TARGETED THERAPY IN CATARACT

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ABSTRACT

Nanoparticle-based delivery systems are emerging as advanced nanotheranostic platforms for cataract diagnosis and treatment, offering a potential shift from purely surgical management toward disease-modifying, lens-targeted therapies. Cataract remains the leading cause of reversible blindness worldwide, and currently, surgical lens replacement is the only effective treatment. Ocular anatomical barriers significantly limit conventional drug delivery, highlighting the need for nanocarriers capable of improving corneal penetration, prolonging precorneal residence, and enabling sustained lens targeting.

Recent advances focus on multifunctional nanoparticles designed to deliver small molecules such as lanosterol, calcium-regulating agents, and antioxidants to restore lens protein stability and ionic balance. Additionally, lipid nanoparticle–based mRNA delivery systems have shown promise in reactivating endogenous lanosterol synthase expression while enabling molecular imaging for real-time treatment monitoring. Nanoparticle-based imaging probes further allow early, noninvasive detection of lens protein aggregation and oxidative changes. Integrated nanotheranostic systems may enable safer, surgery-sparing interventions for early-stage cataract.

KEYWORDS: Nanoparticles, Cataract, Nanotheranostics, Molecular imaging, Ocular drug delivery, Nanomedicine, mRNA therapy.

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MIP/2026/CONF/36

CARDIOVASCULAR THERANOSTICS

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ABSTRACT

Cardiovascular diseases (CVDs) remain the leading cause of global morbidity and mortality, underscoring the need for advanced approaches that support early diagnosis and targeted therapy. Conventional diagnostic and therapeutic strategies are often applied independently, limiting personalized disease management. Cardiovascular theranostics has emerged as an innovative strategy that integrates diagnostic imaging and therapeutic intervention within a single platform, enabling precise and patient-specific care.

This approach allows simultaneous detection of cardiovascular abnormalities, targeted delivery of therapeutics, and real-time monitoring of treatment response. Advanced imaging modalities such as PET, SPECT, MRI, CT, and molecular imaging probes facilitate detailed visualization of pathological processes including atherosclerosis, myocardial ischemia, vascular inflammation, and thrombosis. Therapeutic strategies involve nanoparticle-based drug delivery systems, radiopharmaceuticals, and gene-based therapies designed to selectively target diseased tissues while reducing systemic toxicity. Overall, cardiovascular theranostics represents a transformative advancement in cardiology, offering improved diagnostic accuracy, personalized treatment, and enhanced clinical outcomes.

KEYWORDS: Cardiovascular diseases, Theranostics, Molecular imaging, Nanotechnology, Targeted drug delivery, Personalized medicine.

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MIP/2026/CONF/37

PH MODULATED LIPOSOMAL NANOCARRIERS: ADVANCING TARGETED THERAPY FOR ULCERATIVE COLITIS

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ABSTRACT

Ulcerative colitis (UC) is a chronic inflammatory disorder of the colon marked by relapsing mucosal inflammation, disrupted epithelial integrity, and disease-specific alterations in gastrointestinal pH. Conventional oral therapies often exhibit limited colonic targeting, premature drug release, and systemic side effects, leading to suboptimal therapeutic outcomes. To overcome these challenges, pH-modulated liposomal nanocarriers have gained considerable attention as an advanced drug delivery platform for targeted UC therapy. These nanocarriers are rationally designed to remain stable in the acidic gastric environment while responding selectively to the altered pH conditions of the inflamed colon, enabling site-specific and controlled drug release. This review highlights recent progress in the development of pH-responsive liposomal systems, focusing on lipid composition, pH-sensitive materials, and surface engineering strategies that enhance colonic retention and mucosal penetration. The role of inflammation-induced epithelial permeability in promoting preferential accumulation of leptosomes at diseased sites is also discussed. Encapsulation of anti-inflammatory drugs, corticosteroids, immunosuppressants, and emerging therapeutic agents within pH-modulated liposomes has demonstrated improved drug stability, enhanced local efficacy, and reduced systemic toxicity. By aligning nanocarrier design with the pathophysiological features of UC, pH-responsive liposomal systems offer a promising approach for precision-guided therapy. Overall, this review emphasizes their potential to advance targeted treatment strategies and improve clinical management of ulcerative colitis.

KEYWORDS: Ulcerative colitis, pH-responsive drug delivery, Liposomal nanocarriers, Targeted colonic delivery, Nanomedicine, Inflammatory bowel disease, Controlled drug release; Precision therapy.

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PHARMACEUTIC DEVELOPMENT OF ALBUMIN-BASED NANOPARTICLES FOR IMPROVED ANTI-ARTHRITIC THERAPY

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ABSTRACT

The present study focuses on the pharmaceutic development and optimization of albumin-based nanoparticles as a targeted drug delivery system for effective arthritis management. A systematic Design of Experiments (DoE) approach was employed using Box–Behnken design to optimize the formulation variables. Bovine serum albumin (BSA), cholesterol, and Tween were selected as independent variables, while dependent responses included percentage drug release at multiple time points (30 min to 24 h), entrapment efficiency, particle size, polydispersity index (PDI), and zeta potential. Based on the experimental design, seventeen formulations were suggested and prepared.

All formulations were characterized for particle size, surface charge, entrapment efficiency, in vitro drug release, and stability. Optimization was achieved by desirability function, resulting in a formulation with nanosized particles, narrow size distribution, optimized zeta potential, and high drug entrapment with sustained drug release behavior. The optimized formulation was further evaluated in vivo using a Complete Freund's Adjuvant (CFA)–induced arthritis rat model. Compared to standard piroxicam suspension (10 mg/kg), the optimized nanoparticle formulation (10 mg/kg) demonstrated significant reduction in paw volume, arthritic score, and myeloperoxidase (MPO) activity.

Overall, the study demonstrates that albumin-based nanoparticles offer improved pharmaceutic performance, controlled drug release, and enhanced therapeutic efficacy, highlighting their potential as an effective nanocarrier system for arthritis management.

Keywords: Nanoparticle, Piroxicam, DoE, Arthritis, Drug release, Target delivery.

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PREPARATION AND EVALUATION OF LULICONAZOLE LOADED NANOSTRUCTURED LIPID CARRIERS GEL FOR TREATMENT OF TOPICAL FUNGAL INFECTION BY USING QBD APPROACH

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ABSTRACT

The topical formulation of Luliconazole has poor skin permeation, a short skin retention time, and need multiple applications. Nanomedicines have a number of advantages over traditional dosage forms such as high drug loading capacity, higher permeability, high solubility, low toxicity, controlled release, and drug targeting.

The current study aims to develop Luliconazole-loaded nanostructured lipid carriers and their optimization by using QbD approach and the drug-loaded NLCs were then gelled to improve skin permeation. The most appropriate Design was chosen to optimize process parameters that influence NLC quality attributes.

NLCs were prepared by using Film Dispersion Ultrasonication method. The NLC's were prepared by using different concentration of soyalecithin, soyabean oil, tween 80, triton X-100 and required amount of solvent (F1-F8). Prepared formulations were evaluated for particle size, zeta potential, drug entrapment efficiency(%), *In-vitro* drug release, pH, viscosity, *In-vivo* skin irritation on rats.

The zeta potential for luliconazole-loaded nanostructured lipid carriers ranged from -74.1 to 46.9 mV, particle size ranged from 111.7 to 170.4 nm. The percent drug entrapment in Nanostructured lipid carriers ranged from 47.06±15.40 to 90.02±15.72. pH of prepared formulation (gel) lies in between 6.3 to 6.5, all formulations have shown no skin irritation to animals. Formulation F3 and F6 shows good drug release *(in-vitro)* due to their smaller particle sizes, a higher zeta potential and high entrapment efficiency.

We can conclude that employing QbD approach for noval formulation provides refinement of excipients & drug proportions, enhances reproducibility of formulation and ensures effective time management.

KEYWORDS: Nanostructured Lipid Carriers, Gel, Quality by design, Zeta potential, QBD approach.

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ROLE OF GREEN CHEMISTRY IN PHARMACEUTICAL RESEARCH: A FUTURISTIC APPROACH

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ABSTRACT

Introduction: The application of green chemistry (GC) principles in pharmaceutical synthesis offers a transformative pathway toward sustainable drug development. By prioritizing solvent-free conditions or the use of environmentally benign solvents such as water, adopting alternative reaction media, and embracing strategies like one-pot methodologies, multicomponent reactions (MCRs), continuous flow processing, and process intensification, it is possible to enhance atom economy while minimizing waste generation. A truly sustainable approach requires a holistic consideration of the active pharmaceutical ingredient's (API) life cycle—from raw material selection and intermediate formation to the scalable production of the final product—ensuring reduced environmental hazards, lower toxicity, and optimized resource utilization.

This review systematically explores the integration of GC metrics and principles at every stage of synthesis, supported by real-world examples involving the green preparation of widely used generic pharmaceuticals. Emphasis is placed on reaction designs such as cascade syntheses, MCRs, and intensified continuous processes, which demonstrate both practical feasibility and environmental benefits.

Collectively, these innovations highlight the growing potential of green synthetic strategies to redefine pharmaceutical manufacturing and establish a foundation for sustainable, large-scale API production in the future. Even though sustainable and green technologies have evolved in other scientific fields, their use in the pharmaceutical industry is still initial stage. Thus, the current review aimed to highlight the need for green chemistry or sustainable chemistry and its principles and its application in the pharmaceutical industry to practice environment-friendly production of pharmaceutical products and reduce or stop the production of harmful intermediates and products during the synthesis process.

KEYWORDS: Green Chemistry; synthesis, Active pharmaceutical ingredient, Sustainability.

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GENERATIVE AI IN DRUG DISCOVERY

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ABSTRACT

Artificial intelligence (AI), especially machine learning, has become a transformative force in modern drug discovery by bridging the gap between understanding diseases and identifying effective treatments. This review outlines recent advances in AI and its role across the drug discovery pipeline, including disease and diagnosis analysis, target identification, compound screening, and lead discovery. AI's ability to process and interpret large and complex datasets enables more accurate predictions, improves efficiency, and supports better decision-making throughout drug development and clinical trials. By accelerating data analysis, AI significantly reduces both the time and cost required to bring new drugs to market. However, the successful use of AI depends on high-quality data, well-trained algorithms, and careful attention to ethical issues, particularly the protection of patient data. When these challenges are addressed, AI has the potential to revolutionize drug development and deliver substantial benefits to healthcare and society.

KEYWORDS: Artificial intelligence, Machine learning, drug discovery,

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SMART NANOMATERIALS FOR COMBINED OPTICAL AND MAGNETIC RESONANCE IMAGING-GUIDED CANCER THERAPY

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ABSTRACT

Nanoparticle-based theranostics have demonstrated significant potential in the prevention, diagnosis, and treatment of various diseases, including cancer and metabolic disorders, by integrating patient-specific molecular characteristics into a single platform. The convergence of targeted therapeutic strategies with precision diagnostic tools represents a transformative advancement in modern oncology. Over time, nanotechnology has increasingly enabled the incorporation of both diagnostic and therapeutic functions within a single nanostructure, giving rise to the concept of theranostics as a major scientific breakthrough.

Recent progress in nanotheranostics for molecular imaging emphasizes the development of multifunctional nanoparticles capable of combining therapeutic delivery with advanced imaging modalities such as MRI, CT, PET, and optical imaging. Innovations include stimuli-responsive nanomaterials, targeted delivery systems for tumors and atherosclerotic plaques, and emerging platforms such as metal–organic frameworks, silica nanoparticles, and gold nanoparticles. These systems offer improved circulation time, enhanced disease-site accumulation, and multimodal signal generation, enabling real-time disease monitoring and personalized treatment strategies.

Furthermore, the integration of green nanotechnology with theranostic approaches has gained increasing attention due to its potential to enhance biocompatibility, reduce toxicity, and promote sustainable synthesis methods. Collectively, these advancements highlight the growing role of nanotheranostics in precision medicine and molecular imaging, while paving the way for more effective and personalized therapeutic interventions.

Keywords: Nanotheranostics, Multifunctional nanoparticles, Targeted drug delivery, Molecular imaging, Green nanotechnology, Cancer therapy

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DOCKING STUDIES OF NOVEL ARYLIDINEMALONONITRILE DERIVATIVES USING HUMAN PEROXISOMES PROLIFERATORS ACTIVATED RECEPTOR GAMMA OBTAINED FROM THE RCSB PROTEIN DATA BANK.

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ABSTRACT

Prolonged hyperglycemia often associated with the number of complications such as diabetic neuropathy, retinopathy, nephropathy, cardiomyopathy etc. Diabetic neuropathy is damage to nerves in the body that occurs due to high blood glucose level. In the central nervous system, diabetes exacerbates depression, phobias, anorexia, hypolocomotion, anxiety, cognitive dysfunction etc. The design, docking and analysis of novel arylidine malononitrile-based molecules as derivatives as peroxisome proliferator-activated receptor-γ (PPAR-γ) modulators for antidiabetic activity are reported. Docking studies of designed compounds were carried outusing GLIDE (Grid-based ligand docking with emergetics) module version 4.5, Schrodinger,LLC,new York, NY,2007. The software package running on multi-processor Linux PC.GLIDE has previously been validated& applied successfully to predict the binding orientation of many ligands. Docking studies of compounds were performed using human peroxisomes proliferators activated receptor gamma (PDB ID 2PRG) obtained from the RCSB Protein Data Bank. Different arylidine malononitrile derivatives were docked into the ligand binding domain of PPAR-γ by the Glide XP module of Schrodinger, out of those Eight derivatives (AM01, AM02, AM03, AM04, AM05, AM06, AM07, AM08) having Glide XP scores > -9 as compared to the standard drug, rosiglitazone (Glide XP score = -8.34), showed almost similar interaction with the amino acids such as SER-289, GLN-286, and HIE-323 in the molecular docking studies.

KEYWORDS: PPARγ agonists, Schrödinger, diabetes, Arylidine malononitrile, GLIDE, Docking study

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EMERGING TRENDS AND RECENT ADVANCES IN NANOTHERANOSTICS FOR MOLECULAR IMAGING

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ABSTRACT

Nanotheranostics has emerged as an advanced interdisciplinary approach that combines molecular imaging and targeted therapy within a single nanoscale platform, enabling precise disease diagnosis and personalized treatment. Recent progress in this field has focused on the design of multifunctional nanomaterials that enhance imaging sensitivity, specificity, and spatial resolution while simultaneously delivering therapeutic agents. These nanotheranostic systems support multiple molecular imaging modalities, including magnetic resonance imaging (MRI), positron emission tomography (PET), computed tomography (CT), fluorescence imaging, and photoacoustic imaging, allowing detailed visualization of biological events at the molecular and cellular levels.

Advances in nanomaterial synthesis, surface engineering, and biocompatibility have facilitated targeted drug delivery, controlled release of therapeutics, and real-time monitoring of treatment responses. The integration of multimodal imaging capabilities within a single nanoplatform has further improved disease detection, localization, and therapeutic evaluation, particularly in oncology. Although preclinical studies demonstrate significant promise, challenges related to long-term safety, regulatory approval, and clinical translation remain to be addressed. Continued innovation and systematic research in nanotheranostics are expected to enhance molecular imaging strategies and improve diagnostic precision and therapeutic effectiveness in modern medicine.

KEYWORDS: Nanotheranostics, Molecular imaging, Targeted therapy, Multifunctional nanoparticles, Multimodal imaging, Personalized medicine

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RECENT ADVANCEMENTS IN PHARMACEUTICAL NANOTECHNOLOGY

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ABSTRACT

Recent progress in nanotechnology has significantly advanced pharmaceutical sciences by introducing innovative strategies for drug delivery, diagnosis, and therapy. Pharmaceutical nanotechnology focuses on the development of nanoscale drug delivery systems, including nanoparticles, liposomes, solid lipid nanoparticles, polymeric micelles, dendrimers, and nanoemulsions, to enhance therapeutic performance. These nanocarriers improve drug solubility, stability, bioavailability, and targeted delivery, particularly for poorly soluble and highly potent drugs.

Current research highlights the successful application of nanotechnology in cancer chemotherapy, targeted drug delivery, gene and nucleic acid therapy, vaccine development, and diagnostic imaging. Nanocarrier-based formulations enable controlled and sustained drug release, reduce dosing frequency, and minimize systemic toxicity, thereby improving patient compliance and treatment outcomes. In addition, pharmaceutical nanotechnology has contributed to advancements in personalized medicine and next-generation vaccine platforms.

Despite these promising benefits, challenges such as large-scale manufacturing, formulation reproducibility, long-term safety, regulatory approval, and quality control remain critical barriers to clinical translation. Ongoing research efforts aim to enhance the biocompatibility, safety, and scalability of nanotechnology-based pharmaceutical products. This poster presents an overview of recent advancements in pharmaceutical nanotechnology, emphasizing its potential to improve drug delivery systems and patient outcomes while addressing existing challenges and future perspectives.

KEYWORDS: Pharmaceutical nanotechnology, Nanocarriers, Drug delivery systems, Nanomedicine, Targeted therapy, Controlled release

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MIP/2026/CONF/46

ROLE OF POLYHERBAL THERAPIES IN DIABETES MANAGEMENT: INSIGHTS FROM EXPERIMENTAL AND PRECLINICAL STUDIES

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ABSTRACT

Diabetes mellitus is a multifaceted metabolic disorder characterized by sustained hyperglycemia and elevated oxidative stress, which together contribute to progressive microvascular and macro vascular complications. In recent years, polyherbal therapies have gained attention as alternative or adjunct approaches to conventional Antidiabetic drugs due to their potential synergistic effects derived from multiple medicinal plants.

This review evaluates experimental and preclinical evidence on the effectiveness of polyherbal formulations in diabetes management. Emphasis is placed on in vivo animal models, particularly chemically induced diabetic models, used to assess glucose-lowering efficacy and antioxidant potential. The major mechanisms of action discussed include stimulation of insulin secretion, enhancement of insulin sensitivity, inhibition of carbohydrate-hydrolyzing enzymes, and attenuation of oxidative stress.

In addition, the review highlights the phytochemical constituents of commonly used polyherbal formulations, along with their safety and toxicity profiles. Key challenges such as formulation standardization, quality control, and consistency are addressed, as these factors are essential for reproducibility and clinical translation. Although preclinical findings are encouraging, issues related to variability in plant sources, dose optimization, and limited clinical validation remain significant barriers.

Overall, this review consolidates current scientific evidence supporting the therapeutic potential of polyherbal approaches in diabetes management and identifies research gaps that must be addressed to advance safe, standardized, and effective herbal-based antidiabetic therapies.

KEYWORDS: Diabetes mellitus, Polyherbal formulations, Antidiabetic activity, Oxidative stress, Medicinal plants

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MIP/2026/CONF/47

BERBERINE IN CANCER TREATMENT

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ABSTRACT

Berberine is a naturally occurring yellow alkaloid obtained from plants such as *Berberis* species and has long been used in traditional medicine for the treatment of infections and gastrointestinal disorders. In recent years, berberine has attracted significant scientific interest for its potential anticancer properties. However, its clinical application is limited due to poor water solubility, low intestinal absorption, and reduced bioavailability, which restrict the amount of drug reaching systemic circulation and tumor tissues.

To overcome these limitations, researchers have developed berberine-loaded nanocarrier systems, including polymeric, lipid-based, and metal-based nanoparticles. These nanoformulations enhance berberine's stability, improve bioavailability, and enable controlled and targeted drug delivery to cancer cells. In addition, some nanocarriers offer imaging or tracking capabilities, aligning with the concept of nanotheranostics, where therapeutic and diagnostic functions are integrated into a single platform.

Preclinical studies in various cancer models, including lung and liver cancers, have demonstrated that nano-encapsulated berberine exhibits improved cellular uptake, increased induction of oxidative stress, and enhanced activation of apoptotic pathways compared to free berberine. This results in stronger anticancer activity and improved therapeutic efficiency.

This work reviews and summarizes published research on berberine-loaded nanocarriers, focusing on their formulation strategies, biological behavior, and anticancer effectiveness. The aim is to present a clear and accessible overview of how modern nanotechnology can enhance the therapeutic potential of a traditional herbal compound in cancer treatment.

KEYWORDS: Berberine, Cancer therapy, Nanoparticles, Nanocarriers, Nanotheranostics, Targeted drug delivery

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MIP/2026/CONF/48

MULTIMODAL (TARGETED NANOPARTICLES) AS A EFFECTIVE TOOL FOR MOLECULAR IMAGING

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ABSTRACT

Nanotheranostics refers to nanoscale platforms that combine **diagnostic (molecular imaging)** and **therapeutic functionalities** in one system. These nanosystems enable simultaneous visualization of disease biomarkers and targeted therapy delivery with **precision and personalized medicine**. Recent research highlights nanoparticles engineered to work with multiple imaging technologies (e.g., MRI, CT, PET, ultrasound, fluorescence), enabling detailed molecular-level visualization while tracking therapeutic efficacy. **Multimodal nanocarriers** facilitate imaging across modalities concurrently improving disease detection and treatment monitoring.

Multimodal, targeted nanoparticles are advanced nanocarriers combining multiple functions (imaging, therapy, targeting) into one system for precise diagnosis and treatment, enabling simultaneous imaging (MRI, PET, PA), specific delivery of drugs/genes to diseased cells (using surface ligands like antibodies/peptides), and multimodal therapeutic effects (e.g., chemotherapy + hyperthermia) for better cancer management and theranostics. They overcome limitations of conventional treatments by enhancing drug stability, solubility, and targeting, improving efficacy while reducing toxicity, crucial for challenging targets like brain tumors.

Multimodal Imaging also integrate multiple contrast agents (e.g., iron oxides for MRI, gold for CT/PA, radioisotopes for PET) for comprehensive disease visualization. It involves the surface functionalization with specific ligands (e.g., Exendin-4 for β-cells, RGD peptides for tumors) guides nanoparticles to disease sites.

KEYWORDS: MRI, CT, PET, photoacoustic/NIR fluorescence.

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MIP/2026/CONF/49

NANO DIAGNOSIS AND NANO TREATMENT OF CARDIOVASCULAR DISEASE

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ABSTRACT

Cardiovascular diseases (CVDs) remain the leading cause of mortality globally, necessitating advanced therapeutic interventions. Traditional pharmacotherapies often suffer from limitations such as non-specific distribution, rapid metabolism,and systemic side effects. Nanotechnology offers a paradigm shift in treating CVDs through the use of Nanoparticles (NPs). This presentation highlights the potential of NPs to improve drug bioavailability, enable targeted delivery to atherosclerotic plaques or ischemic tissue, and facilitate theranostics (simultaneous diagnosis and therapy), thereby paving the way for personalized cardiac care.

KEY WORDS: Nanoparticles ,Pharmacotherapies,Theranostics.

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MIP/2026/CONF/50

QUINAZOLINE-BASED HYBRID MOLECULES: AN EMERGING STRATEGY FOR MULTI-TARGET DRUG DEVELOPMENT

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ABSTRACT

Many complex diseases, including cancer and microbial infections, involve multiple interconnected biological pathways, which often limits the long-term effectiveness of single-target drugs. As a result, contemporary drug discovery has shifted toward multi-target therapeutic strategies. Molecular hybridization has emerged as a promising approach within this framework, enabling the design of compounds capable of modulating multiple disease-related targets simultaneously. Quinazoline, a versatile heterocyclic scaffold, has gained significant attention due to its broad spectrum of biological activities and structural flexibility.

Quinazoline-based hybrid molecules are created by integrating the quinazoline core with other pharmacologically active fragments into a single molecular entity. This design strategy seeks to combine the beneficial properties of different bioactive moieties, thereby enhancing therapeutic efficacy while reducing the likelihood of drug resistance. The quinazoline scaffold allows functionalization at key positions, particularly the 2- and 4-positions, facilitating hybrid formation without compromising its intrinsic activity.

Numerous studies have demonstrated that quinazoline hybrids exhibit superior anticancer, antimicrobial, and anti-inflammatory activities compared to their parent compounds. These hybrids often show improved target binding, greater selectivity, and reduced toxicity. Overall, quinazoline-based molecular hybridization represents a valuable strategy in multi-target drug design and offers strong potential for developing more effective and durable therapeutic agents.

KEYWORDS: Quinazoline, Hybrid molecules, Multi-target therapy, Drug design, Medicinal chemistry

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MIP/2026/CONF/51

RECENT ADVANCES IN NANOTHERANOSTICSFOR TUBERCULOSIS

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ABSTRACT

Tuberculosis (TB), caused by Mycobacterium tuberculosis, continues to be a leading cause of death from a single infectious agent worldwide. Conventional antibiotic therapies face significant limitations, including multidrug resistance, poor treatment adherence, limited penetration into granulomas, and systemic toxicity. Recent advances in nanomedicine have paved the way for nanotheranostic approaches that integrate therapeutic, diagnostic, and preventive functions into a single platform. Nanotheranostic systems enable targeted drug delivery to infected macrophages and granulomatous lesions, real-time imaging for disease monitoring, and controlled, stimuli-responsive release of antitubercular agents. These platforms can be engineered to modulate host immune responses through host-directed therapies (HDTs), including the induction of autophagy, regulation of apoptosis, and macrophage polarization toward the bactericidal M1 phenotype. Additionally, nanocarriers can co-deliver antibiotics, immunomodulators, or photosensitizers to enhance intracellular bacterial clearance while minimizing off-target toxicity. The review also discussesthe potential of nanotechnology to improve TB prevention by enhancing vaccine efficacy, stability, and targeted delivery of immunogens such as BCG and novel subunit vaccines. Key nanoplatforms, including polymeric, lipid-based, metallic, and hybrid nanoparticles, are highlighted, along with design principles for optimizing biocompatibility, multifunctionality, and clinical translatability. Collectively, nanotheranostic strategies represent a transformative approach to TB management, bridging diagnosis, therapy, and prevention in a single, adaptable platform to address the unmet needs of this global health challenge.

KEYWORDS: Tuberculosis, Theranostic nanoparticles, Targeted drug delivery, Diagnostic imaging, Nanovaccine.

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MIP/2026/CONF/52

FORMULATION AND DEVELOPMENT OF ANTI ULCER DRUG FOR ENHANCEMENT OF GASTRIC RETENTION TIME"

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ABSTRACT

Gastro retentive drug delivery systems (GRDDS) are designed to prolong gastric residence time, thereby enabling site-specific drug release in the upper gastrointestinal tract (GIT) for both local and systemic therapeutic effects. These dosage forms have been widely explored to enhance the efficacy of drugs that benefit from prolonged gastric retention. By releasing the drug locally in the stomach, GRDDS maintain a high and sustained drug concentration at the gastric mucosa, leading to improved therapeutic outcomes.

GRDDS facilitate continuous and controlled drug release in the upper GIT, which significantly enhances the bioavailability of drugs with a narrow therapeutic window, poor intestinal stability, or limited solubility and permeability in the small intestine. Prolonged gastric retention also allows for extended dosing intervals, thereby improving patient compliance. In addition to systemic drug delivery, GRDDS have proven effective in treating local conditions such as gastric and duodenal ulcers by maintaining the drug at the desired site of action for an extended duration.

Improved residence time in the stomach is particularly advantageous for drugs that are unstable in the intestinal environment or require localized action in the upper part of the small intestine. Various approaches have been developed to achieve gastric retention, including high-density (sinking) systems, low-density floating systems, mucoadhesive systems, expandable and unfoldable systems, superporous hydrogel systems, and magnetic systems. These strategies collectively contribute to optimized oral controlled drug delivery.

Keywords: Gastroretentive drug delivery system, Gastric residence time, Migrating motor complex, Oral controlled release, Floating drug delivery

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MIP/2026/CONF/53

TOPIC-ROLE OF MICROBES IN HUMAN HEALTH

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ABSTRACT:

Microbes play an essential and multifaceted role in maintaining human health, forming diverse and dynamic communities collectively known as the human microbiota. These microorganisms, including bacteria, viruses, fungi, and archaea, colonize various regions of the human body such as the gastrointestinal tract, skin, oral cavity, and respiratory system. Among these, the gut microbiota is the most extensively studied due to its significant involvement in digestion, nutrient absorption, and the synthesis of vital vitamins such as vitamin K and certain B vitamins. Microbes also contribute to metabolic regulation by fermenting dietary fibers into short-chain fatty acids, which support intestinal integrity and energy homeostasis.

In addition to metabolic functions, the human microbiota plays a crucial role in the development and modulation of the immune system. Beneficial microbes enhance immune tolerance, prevent excessive inflammation, and protect against pathogenic microorganisms through competitive exclusion and the production of antimicrobial substances. Recent research has highlighted the influence of the microbiota on brain function and behaviour through the gut–brain axis, linking microbial balance to mental health conditions such as stress, anxiety, and depression.

Disruption of the normal microbial ecosystem, referred to as dysbiosis, has been associated with a wide range of disorders, including inflammatory bowel disease, obesity, diabetes, allergies, and autoimmune conditions. Advances in microbiome research have opened new avenues for therapeutic strategies, including probiotics, prebiotics, dietary interventions, and fecal microbiota transplantation. Understanding the role of microbes in human health is therefore critical for the development of preventive, diagnostic, and personalized medical approaches.

KEYWORDS: Human microbiota; Gut microbiome; Immune system; Dysbiosis; Probiotics; Gut–brain axis

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MIP/2026/CONF/54

DESIGN, SYNTHESIS, AND BIOLOGICAL EVALUATION OF NOVEL ANTIMICROBIAL AGENTS AGAINST MULTIDRUG-RESISTANT (MDR) PATHOGENS

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ABSTRACT:

The rapid emergence and spread of multidrug-resistant (MDR) pathogens have become a major challenge to global public health. The effectiveness of many conventional antibiotics has significantly decreased due to the development of resistance mechanisms such as target modification, enzyme inactivation, and reduced drug uptake. This growing problem emphasizes the urgent need for the discovery and development of new antimicrobial agents that are effective, safe, and capable of overcoming resistance.

The present research work is focused on the design, synthesis, and biological evaluation of novel antimicrobial agents targeting MDR pathogens. In this study, new chemical entities were rationally designed based on established antimicrobial pharmacophores and structural features known to enhance biological activity. The designed compounds were synthesized using suitable organic and medicinal chemistry methods under controlled laboratory conditions.

The synthesized compounds were purified and structurally characterized using standard analytical techniques, including melting point determination, infrared (IR) spectroscopy, nuclear magnetic resonance (^{1}H-NMR and ^{13}C-NMR), and mass spectrometry. These techniques confirmed the successful synthesis and chemical integrity of the newly developed molecules.

The biological evaluation of the synthesized compounds was carried out using in vitro antimicrobial assays against selected multidrug-resistant bacterial and fungal strains. The antimicrobial activity was compared with commonly used standard drugs. The results revealed that several compounds exhibited promising antimicrobial activity, with some showing superior or comparable efficacy against MDR strains. These findings suggest that the newly synthesized compounds may act through improved interactions with microbial targets or by bypassing existing resistance mechanisms.

In conclusion, this study demonstrates the potential of newly designed antimicrobial agents as promising lead compounds for further optimization. The findings contribute to the ongoing efforts in medicinal chemistry to develop effective therapeutic options for the treatment of infections caused by multidrug-resistant pathogens.

KEYWORDS: Multidrug-resistant pathogens, Novel antimicrobial agents, Drug resistance Chemical synthesis, Biological evaluation.

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