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SCIENCE, TECHNOLOGY & MEDICINE

Conference

PROCEEDINGS



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ACSTM2026

P-hailing Riders Intention to Risk Taking Behavior at Road Intersection

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Presenter
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Type
Oral Presentation

Track
Social Sciences and Humanities

Abstract

Risk-taking at road intersections among p-hailing riders in the Klang Valley represents a major road safety concern, particularly as delivery time pressure and platform performance targets may encourage unsafe time-saving practices, including speeding and red-light violations. Guided by the Theory of Planned Behavior (TPB) and incorporating platform-specific factors, this cross-sectional study examined the influence of attitude toward risky behavior, platform influence, and behavioral control and enforcement on riders' risk-taking intentions at intersections. Data were collected through a quantitative online survey of 220 p-hailing riders, predominantly young males with high daily road exposure. Descriptive statistics, Pearson correlation, and multiple linear regression were used for data analysis. The findings indicated moderate acceptance of risky actions, particularly speed-limit violations (M=3.55) and risky shortcuts (M=3.48), while strong agreement was observed regarding the influence of visible enforcement cues (M=4.37). All three predictors were significantly correlated with risk-taking intention ($p<0.01$), with attitude toward risky behavior showing the strongest association ($r=0.629$), followed by platform influence ($r=0.589$) and behavioral control and enforcement ($r=0.533$). The regression model was statistically significant ($F(3,216)=59.824$, $p<0.001$) and explained 45.4% of the variance in risk-taking intention (R²=0.454). Attitude toward risky behavior ($\beta=0.395$, $p<0.001$) and platform influence ($\beta=0.271$, $p<0.001$) significantly predicted risk-taking intention, whereas behavioral control and enforcement did not ($\beta=0.085$, $p=0.260$). These findings suggest that risk-taking intentions are more strongly influenced by riders' attitudes toward risky behavior and platform-related delivery pressures than by perceived enforcement alone. Interventions should therefore prioritize safety-oriented attitude change, platform policies that reduce delivery time pressure, and visible enforcement at high-risk urban intersections.

Keywords

P-Hailing, Intersection Safety, Risk-Taking Intention, TPB, Regression, Klang Valley



PROCEEDING
ACSTM2026

Rethinking Goods and Services Tax (GST) and its Impact on Academic Research in India

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Presenter
Venkataramana Kandi

Type
Oral Presentation

Track
Social Sciences and Humanities

Abstract

Academic research in India has expanded significantly in recent decades, with increasing emphasis on translational science, innovation, and global collaboration. However, the Goods and Services Tax (GST) framework has introduced financial and administrative challenges that disproportionately affect research institutions, laboratories, and individual investigators. The taxation of essential research materials, equipment, and services has raised concerns about affordability, accessibility, and sustainability of scientific inquiry. This study aims to critically examine the implications of GST on academic research in India, highlighting structural barriers, economic inefficiencies, and potential reforms that could foster a more supportive environment for scientific advancement. A narrative review of policy documents, taxation guidelines, and published literature was conducted to assess the impact of GST on procurement, funding utilization, and institutional operations. Case examples from Indian universities and research centers were analyzed to illustrate practical challenges faced by investigators. Findings suggest that GST has increased the cost burden on research projects, particularly those funded by limited grants. Essential consumables, laboratory reagents, and imported equipment are subject to taxation that reduces effective research budgets. Smaller institutions and independent researchers are disproportionately affected, often forced to compromise on quality or scale of projects. Moreover, administrative complexities in GST compliance divert time and resources away from core scientific activities. While GST was designed to streamline taxation and promote economic efficiency, its current application to academic research in India risks undermining innovation and global competitiveness. Policy reforms, such as exemptions for essential research inputs, simplified compliance mechanisms, and targeted subsidies, are urgently needed to align taxation with national priorities in science and technology. Rethinking GST in the context of academic research is critical to ensuring that India's scientific community can thrive, contribute to global knowledge, and address pressing societal challenges.

Keywords

Goods and Services Tax (GST), Academic Research, India, Science Policy, Research Funding, Innovation



PROCEEDING
ACSTM2026

Global Claims in Energy Construction Projects: Distinction, Avoidance, Mitigation and Methods to Substantiate and Succeed

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Presenter
Ahmad Kashfi

Type
Oral Presentation

Track
Social Sciences and Humanities

Abstract

Global claims in energy construction contracts present significant challenges because they involve multiple events, causes, and associated costs or losses. Establishing causation, responsibility, contractual entitlement, and the relationship between multiple events and overall losses can make such claims particularly difficult to substantiate. Effective prevention, avoidance, mitigation, and documentation throughout the different stages of an energy construction project are therefore important for improving the prospects of successful claims. This research examines the concept of "global claims" in energy construction contracts, with particular emphasis on defining their essential characteristics, distinguishing them from other forms of construction claims, and identifying the principal legal, contractual, and methodological principles that may contribute to their successful substantiation. The study adopts a comparative legal and case-law-based approach, examining relevant principles derived from common law and civil law jurisdictions. Particular emphasis is placed on judicial decisions and their treatment of global claims, including requirements concerning causation, proof, contractual entitlement, and loss quantification. The study also considers project-management practices and contractual administration techniques applicable to energy construction projects, including design, pre-construction, procurement, and construction stages. The analysis identifies key criteria for determining whether a claim constitutes a global claim and highlights the principal challenges associated with establishing causation, responsibility, and the relationship between multiple events and overall costs or losses. It further identifies practical and analytical methodologies for demonstrating and quantifying total costs, losses, and damages, supported by appropriate contractual records, contemporaneous documentation, and reliable cost analysis. The findings indicate that effective risk prevention, avoidance, mitigation, and systematic contract administration can strengthen the evidentiary basis of global claims. The study concludes that successful substantiation of global claims requires an integrated approach combining legal principles, contractual requirements, project-management practices, and reliable loss-quantification methods. Strengthening documentation, establishing causal relationships, and applying appropriate analytical methodologies throughout the project lifecycle can improve the prospects of successfully substantiating global claims before resorting to formal dispute-resolution mechanisms.

Keywords

Delays, Disruptions, Global Claim, Energy Construction Law, Substantiation



PROCEEDING
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Smart Energy, Water, and Environment: Integrated Intelligence for Resource Security Artificial Intelligence, Smart Systems, and Digital Transformation

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Presenter
Walid K. Alrawi

Type
Oral Presentation

Track
Social Sciences and Humanities

Abstract

The UAE is a highly globalized, multicultural, innovation-oriented economy where organizations must manage diverse workforces, rapid digital transformation, Emiratization priorities, well-being expectations, ethical responsibilities, and sustainable development goals. Social sciences and humanities provide important perspectives for understanding human behavior, culture, identity, communication, ethics, values, and meaning at work. This research examines the role of social sciences and humanities in strengthening management practice in the United Arab Emirates and explores how these perspectives can support human-centered, culturally intelligent, and socially responsible management systems. The study uses a qualitative research design based on secondary data, academic literature, UAE policy documents, and thematic analysis. The analysis indicates that integrating sociology, psychology, anthropology, ethics, communication studies, and humanities-based leadership into management can improve organizational resilience, employee engagement, innovation, responsible decision-making, and inclusive leadership. These perspectives are particularly relevant in the UAE context, where organizations operate within a culturally diverse society shaped by national identity, tolerance, public-sector modernization, private-sector growth, and knowledge-economy ambitions. The study recommends strengthening interdisciplinary education in business and management programs, embedding ethics and cultural intelligence into leadership training, promoting employee well-being and inclusive communication, encouraging humanities-based reflection in executive development, and aligning organizational practices with UAE national priorities. Ultimately, the study argues that the future of effective management in the UAE depends on the ability of leaders and institutions to understand people, culture, values, and society as deeply as they understand strategy, technology, and performance.

Keywords

United Arab Emirates, Social Sciences, Humanities, Management, Leadership, Cultural Diversity, Wellbeing, Emiratisation, Organizational Behavior, Sustainable Performance



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The Energy Growth Carbon Emissions Nexus in Transition Economies: Reassessing the Role of the Digital Economy

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Presenter
Alexey Mikhaylov

Type
Oral Presentation

Track
Social Sciences and Humanities

Abstract

Energy consumption, economic growth, and CO_2 emissions are closely interconnected in transition economies, where efforts to sustain economic development may increase energy demand and environmental pressure. Understanding these relationships across different levels of economic and environmental conditions is important for designing effective sustainability policies. This study investigates the dynamic interrelationships between energy consumption, CO_2 emissions, and economic growth in six transition countries over the period 1970–2021. It aims to provide a more nuanced understanding of these linkages across different points of their conditional distributions and identify an important factor that remains underexplored within the conventional Environmental Kuznets Curve (EKC) framework. We employ a novel quantile-on-quantile approach, which allows for a more detailed examination of how these variables interact across different quantiles. Three distinct pairwise linkages are examined: the relationship between CO_2 emissions and economic growth, the relationship between CO_2 emissions and energy consumption, and the relationship between economic growth and energy consumption. This approach captures asymmetric and heterogeneous effects that standard regression techniques may overlook. The empirical results yield three key findings. Energy consumption exerts a positive and statistically significant effect on both CO_2 emissions and economic growth. In parallel, economic growth demonstrates a positive and significant influence on CO_2 emissions. These results suggest that, within the six transition countries studied, increased energy use drives economic expansion while simultaneously contributing to higher environmental degradation, and rising economic output further exacerbates CO_2 emissions. Taken together, these findings highlight a clear trade-off between sustaining economic growth and mitigating environmental harm in transition economies. Strategies aimed at decoupling growth from emissions, including investment in renewable energy, improvements in energy efficiency, and carbon pricing mechanisms, will be essential to support long-term sustainable development.

Keywords

Energy Consumption, CO_2 Emissions, Economic Growth, Quantile-on-Quantile



Green Credit for Eco-Restoration and Socio-Economic Empowerment of Indigenous Communities

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Presenter
Jitin Rahul

Type
Oral Presentation

Track
Social Sciences and Humanities

Abstract

Green credit mechanisms are emerging as an important approach for environmental rehabilitation and alleviating the socio-economic burdens of indigenous communities. This research examines the transformative power of green credit mechanisms in balancing economic development and environmental sustainability. Green credits (GC) are attracting increasing attention from the production industry, research, and policy due to their role in helping to balance the relationship between economic development and environmental sustainability. They are of fundamental importance in combating global climate change and promoting the transition to a low-carbon society. Globally, research and development over the last two decades have shifted toward nature-based solutions, sustainable financing, and models that include everyone in conservation. Green credits, as fiscal and market-based incentives accepted instead of verified ecological restoration actions, such as tree planting, habitat conservation, carbon sequestration, or sustainable land management and socio-economic development, can be used to strategically integrate conservation and development. These models acknowledge and enable indigenous and local peoples as key custodians of the environment. This paper recommends a community-based Green Credit concept that links ecological indicators with socio-economic impacts. This type of concept may contribute to climate adaptation, biodiversity protection, improved livelihoods, and sustainable development, among other objectives in environmental management and the Sustainable Development Goals.

Keywords

Carbon, Eco-Restoration, Indigenous, Green Credit, Sustainable Development



Pharmacological Treatment of Long COVID

Presenter
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Type
Oral Presentation

Track
Medical & Health Sciences

Abstract

Long COVID, also known as post-acute sequelae of COVID-19 (PASC), has become an important global health concern, encompassing a diverse range of persistent and sometimes debilitating symptoms that continue beyond the acute phase of SARS-CoV-2 infection. Clinical manifestations may include fatigue, breathlessness, cognitive dysfunction, autonomic disturbances, thrombo-inflammatory abnormalities, and neuropsychiatric symptoms. The management of these conditions remains challenging because of the complex, multifactorial pathophysiology of Long COVID and the considerable variability in individual clinical courses. The lecture will provide a comprehensive review of established and emerging pharmacotherapeutic approaches for Long COVID. Particular attention will be given to the mechanistic basis for selecting specific treatments, including the potential roles of persistent viral reservoirs, immune dysregulation, chronic inflammation, endothelial injury, microvascular thrombosis, and mitochondrial dysfunction. The available evidence supporting commonly used pharmacological interventions, including antivirals, corticosteroids, antihistamines, immunomodulatory agents, anticoagulants, medications targeting autonomic dysfunction, and neuropsychiatric therapies, will be critically examined. The contribution of symptom-directed pharmacotherapy will also be considered. In addition, promising therapeutic candidates and ongoing clinical trials will be briefly discussed to highlight potential future developments in the pharmacological management of Long COVID. A structured and practical framework for treatment selection will be presented, while emphasising the importance of multidisciplinary care and well-designed, high-quality clinical trials to establish robust evidence-based approaches in this rapidly evolving field.

Keywords

Long COVID, Pharmacology, Symptoms, Treatment, Clinical Features



PROCEEDING
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Chaos-Based Quantification of Preclinical 3D Tumor Models

Presenter
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Type
Oral Presentation

Track
Medical & health Sciences

Abstract

Three-dimensional (3D) tumor models, including organoids and tumor-on-chip systems, have become central tools in cancer immunotherapy research due to their ability to recapitulate key aspects of patient-specific tumor biology. Despite their increasing adoption, the microenvironmental heterogeneity and structural complexity of these models are still predominantly assessed through qualitative observations or a limited set of classical morphological descriptors. This limitation hampers the translational value of preclinical findings and complicates the comparison and validation of different 3D model systems. The present study aims to introduce a quantitative and theory-driven framework for characterizing spatial disorder in preclinical 3D tumor models by integrating concepts from chaos theory and fractal geometry into image-based analysis. The central hypothesis is that tumor–immune microenvironment heterogeneity is not purely stochastic, but instead exhibits deterministic chaotic behavior that can be captured through appropriate mathematical descriptors. Microscopy images derived from organoid and tumor-on-chip systems, together with their corresponding segmentation masks, constitute the sole input of the proposed pipeline. No temporal imaging, molecular annotations, or supervised learning models are required. For each image, a mask-based region of interest (ROI) is defined, and two complementary complexity metrics are computed: • Fractal Dimension (FD): The geometric complexity of the tumor or organoid boundary is quantified using a box-counting approach applied exclusively to the mask boundary. This metric captures the degree of irregularity and self-similarity of the tumor contour. Higher fractal dimension values indicate increasingly complex, heterogeneous, and potentially invasive morphologies, which have been associated with aggressive tumor behavior and disrupted tissue organization. • Lyapunov Exponent (LLE): To characterize internal spatial disorder, pixel intensities within the ROI are sampled radially from the centroid toward the periphery, forming a one-dimensional profile analogous to a time series. The largest Lyapunov exponent is then estimated using the Rosenstein method, providing a quantitative measure of chaotic sensitivity within the tumor interior. Elevated LLE values reflect strong sensitivity to small spatial perturbations, consistent with heterogeneous cell distributions, immune infiltration patterns, or stromal irregularities.

Keywords

3D tumor Model, Chaos Theory, Fractal Geometry, Structural Complexity



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Microbial Identification of Kefir Grains and their Antimicrobial Effect Against Gastrointestinal Pathogens

Presenter
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Type
Oral Presentation

Track
Medical & health Sciences

Abstract

Gastrointestinal (GIT) infections remain a major public health concern, compounded by the increasing prevalence of antimicrobial resistance, highlighting the need for effective alternative therapies. Kefir, a fermented dairy beverage produced from kefir grains (KGs), contains a diverse microbial consortium with reported antimicrobial properties that vary according to geographical origin. This study aimed to identify the predominant microbial isolates in Pakistan-originated KGs and evaluate their antimicrobial activity against common gastrointestinal pathogens. Methods: Lactic acid bacteria (LAB) were characterized phenotypically by assessing cell morphology, carbon dioxide production, and growth in 6.5% NaCl. Genotypic identification was performed by PCR amplification of the 16S rRNA gene followed by Sanger sequencing, BLASTn analysis, and phylogenetic tree construction. Antimicrobial activity was evaluated using different concentrations of kefir milk supernatant (KMS) and suspensions of individual lactic acid bacteria (SILB) against selected gastrointestinal pathogens. Results: Phenotypic characterization confirmed the presence of Gram-positive coccobacillary LAB exhibiting homofermentative metabolism and tolerance to 6.5% NaCl. Molecular analysis identifies Lactococcus sp. clone 172, Lactococcus lactis subsp, lactis, and Bacillus amyloliquefaciens. KMS at concentrations of 50%, 60%, and 70% completely inhibited the growth of Pseudomonas aeruginosa, Staphylococcus aureus, and Salmonella Typhi. In contrast, Escherichia coli, Vibrio cholerae, Helicobacter pylori, Salmonella paratyphi and Bacillus subtilis showed no inhibition. Similarly, SILB did not exhibit detectable antimicrobial activity against the tested pathogens. Conclusions: Pakistan-originated kefir grains harbor a diverse microbial community with concentration-dependent antimicrobial activity, suggesting that the synergistic action of metabolites produced during kefir fermentation contributes to pathogen inhibition. These findings support the potential of kefir-derived products as adjunctive antimicrobial agents against selected gastrointestinal pathogens. Further metagenomic characterization and in vivo studies are warranted to elucidate their microbial diversity and optimize therapeutic applications.

Keywords

kefir Grains, Probiotics, Gastrointestinal Diseases, Foodborne Illnesses



PROCEEDING
ACSTM2026

Genomic Analysis of Pathogenic Variants in Pakistani Families with Charcot–Marie–Tooth Disease

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Comsats University Islamabad, Sahiwal Campus, Pakistan

Presenter
Muhammad Asif Rasheed

Type
Oral Presentation

Track
Medical & health Sciences

Abstract

Peripheral neuropathies are common neurological disorders that substantially affect patients' quality of life. Pakistan has a high prevalence of consanguineous marriages, increasing the risk of inherited disorders. Charcot–Marie–Tooth (CMT) disease is a common inherited peripheral neuropathy with considerable genetic heterogeneity. Patients may exhibit diverse clinical phenotypes and additional features beyond the classical presentation. Accurate CMT diagnosis requires integration of clinical, molecular, and genetic information. The main objective of this study was to identify the genetic causes of CMT in Pakistani patients using whole exome sequencing (WES) and to analyze the impact of causative mutations on protein structure through bioinformatics analysis. In the first phase, CMT patients were recruited based on clinical diagnosis for molecular analysis using WES. Pathogenic variants were prioritized using established databases, including the 1000 Genomes Browser, and in silico tools such as SIFT and PolyPhen-2. Selected pathogenic variants were then confirmed by capillary sequencing. Mutations in SH3TC2, HK1, REEP1, and MFN2 were identified, which are implicated in CMT4C, CMT4G, dHMN5B (DSMA5B), and CMT2A, respectively. In total, five pathogenic or likely pathogenic mutations were detected in consanguineous Pakistani families with early-onset CMT. These findings contribute to expanding the understanding of the genetic basis of peripheral neuropathies and may improve molecular diagnostics and treatment strategies.

Keywords

Genomics, Bioinformatics, Charcot-Marie-Tooth disease, Sequencing



PROCEEDING
ACSTM2026

AI-Driven Personalized Digital Twin Framework for Multi-System Health Report–Based Drug Prediction and Optimization

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Presenter
Indra Vijay Singh

Type
Oral Presentation

Track
Medical & health Sciences

Abstract

Precision therapeutics requires integration of heterogeneous physiological information across multiple organ systems to characterize patient-specific disease states and predict drug-response variability. Conventional approaches often evaluate organ systems independently, limiting their ability to capture clinically relevant cross-organ interactions. This study aimed to develop an Artificial Intelligence (AI)-enabled Personalized Digital Twin (PDT) framework for integrating multi-system health-report variables to support individualized drug-response prediction and adaptive dose optimization. Quantitative biomarkers from cardiovascular, hepatic, renal, neurological, gastrointestinal, and musculoskeletal domains were transformed into a patient-specific physiological feature representation. The variables were normalized and embedded within a weighted multi-organ interaction network representing physiological dependencies, including hemodynamic coupling, metabolic exchange, inflammatory signaling, and drug-clearance pathways. AI-based modeling was combined with systems pharmacology, graph-based representation learning, and adaptive optimization to simulate drug-response behavior under different physiological conditions. Scenario-based simulations and global sensitivity analysis were used to evaluate the effects of organ dysfunction and cross-system interactions on pharmacokinetic parameters. The framework identified clinically relevant interactions between hepatic and renal dysfunction that substantially altered predicted systemic drug exposure, particularly clearance (CL) and area under the curve (AUC). Reduced hepatic detoxification capacity (0.183) combined with elevated renal stress was associated with increased predicted drug exposure and greater deviation in pharmacokinetic behavior compared with isolated organ impairment. Global sensitivity analysis indicated nonlinear amplification of drug exposure when hepatic and renal dysfunction occurred concurrently, demonstrating the importance of multi-organ interaction modeling for individualized pharmacological prediction and dose optimization. The proposed AI-driven PDT framework provides a computational approach for integrating multi-system physiological information into patient-specific drug-response modeling. By incorporating cross-organ interactions rather than treating organ systems independently, the framework may support more individualized prediction of pharmacokinetic responses and adaptive therapeutic optimization. Prospective clinical validation is required before its use in clinical decision-making.

Keywords

Digital Twin, Personalized Medicine, Drug Optimization, Multi-System Modeling, AI in Healthcare, Graph Neural Networks, Reinforcement Learning, Systems Pharmacology



PROCEEDING
ACSTM2026

From Novelty to Rationality: Rethinking Innovation in Nanomedicine Through a Rationality Guidance Index

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Presenter
Aliasgar F Shahiwala

Type
Oral Presentation

Track
Medical & health Sciences

Abstract

Nanomedicine has generated remarkable advances in drug delivery, yet the field continues to face a persistent translational challenge: the proliferation of nanocarrier systems that are structurally or functionally similar without demonstrating meaningful clinical advantages. This raises an important question: Are we creating genuinely better nanomedicines, or simply creating more nanomedicines? This talk examines the scientific and systemic drivers of redundancy in nanocarrier innovation, including design convergence, incremental formulation modifications, novelty-driven academic incentives, patent-oriented development, and insufficient comparative benchmarking. Examples from doxorubicin- and paclitaxel-based nanomedicines illustrate how extensive preclinical innovation does not necessarily translate into improved clinical outcomes. A rational innovation pathway is proposed, centered on four principles: starting with an unmet clinical need, benchmarking against established gold-standard technologies, using predictive computational approaches to reduce empirical trial-and-error, and considering development feasibility early. At the center of this framework is the Rationality Guidance Index (RGI), a semi-quantitative pre-initiation triage tool that evaluates unmet-need alignment, expected benchmark superiority, structural similarity, development cost, and manufacturability/CMC complexity. The RGI is intended to identify projects with high redundancy risk before substantial resources are committed. The talk will also distinguish redundant innovation from purposeful iteration, using successful nanomedicines such as Doxil, Abraxane, Onpattro, and mRNA lipid nanoparticles as examples of how clinically meaningful problems can justify platform evolution. Ultimately, the discussion proposes a shift from novelty-driven nanomedicine toward needs-driven, benchmarked and translationally rational innovation, with the RGI serving as a practical decision aid alongside broader frameworks such as DELIVER and the 6Rs roadmap.

Keywords

Nanomedicine, Nanocarriers, Drug Delivery, Translational Nanomedicine, Rational Drug Delivery Design, Innovation Benchmarking, Clinical Translation, Rationality Guidance Index



PROCEEDING
ACSTM2026

Modulating the Gut–Brain Axis Through Therapeutic Phytocomponents and a Novel Probiotic

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National Research Centre, Teodor Bilharz Research Institute

Presenter
Sohair Aly Hassan

Type
Oral Presentation

Track
Medical & health Sciences

Abstract

Hepatic encephalopathy (HE) is a severe complication of liver disease, primarily associated with hyperammonemia, which contributes to neurological dysfunction and disease progression. This study investigated the protective effects of Saccharomyces boulardii and Lepidium sativum seed extract, administered individually or in combination, in a thioacetamide (TAA)-induced rat model of HE. Thirty-six rats were randomly divided into six groups. Treatments were administered orally for 14 consecutive days, beginning 24 h after TAA administration. S. boulardii was administered at 10^{10} colony-forming units (CFU)/kg/day, while L. sativum seed extract was administered at 20 mg/kg/day. Cognitive and motor functions, antioxidant status, serum ammonia, acetylcholinesterase activity, liver function markers, inflammatory cytokines, intestinal integrity, lipid profile, and histopathological changes were evaluated. LC–ESI–MS/MS was used to characterize the bioactive compounds in L. sativum seeds. Thirty-six bioactive compounds were identified. Treatment with L. sativum, S. boulardii, or their combinations significantly improved cognitive and motor functions in TAA-induced HE rats. The interventions enhanced antioxidant status, reduced brain acetylcholinesterase activity and serum ammonia levels, attenuated astrocyte injury, suppressed TLR4 overexpression, improved liver function markers, downregulated TNF-α, and upregulated IL-10. They also improved intestinal integrity, ameliorated TAA-induced dyslipidemia, and reduced histopathological alterations in the liver and brain. S. boulardii and L. sativum seed extract, individually or in combination, exerted protective effects against TAA-induced HE. Their beneficial effects may be associated with antioxidant, anti-inflammatory, hepatoprotective, and gut barrier-modulating properties, highlighting their potential as complementary therapeutic agents for hepatic encephalopathy.

Keywords

Hepatic Encephalopathy, Lepidium Sativum, Glutamine Synthetase, TNF-α



PROCEEDING
ACSTM2026

Co-Culturing 3D Organoids to Establish Patient-Specific Signatures in Cancer Modeling

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Presenter
Sobia Tabassum

Type
Oral Presentation

Track
Medical & health Sciences

Abstract

Organoids are three-dimensional, multicellular cultures derived from stem or progenitor cells that recapitulate key structural, genetic, and functional characteristics of their tissue of origin. In cancer research, patient-derived organoids provide physiologically relevant models that bridge the limitations of conventional two-dimensional cultures and complex in vivo models, with applications in disease modeling, drug screening, biomarker discovery, and personalized medicine. This study investigated the potential of co-cultured 3D organoids for characterizing cancer-associated processes and establishing patient-specific signatures relevant to cancer modeling and drug screening. A modified co-culture protocol was developed using different media formulations supplemented with niche-specific factors to support organoid growth and differentiation. The effects of media formulations and growth-factor withdrawal on cellular differentiation were assessed using stem-cell markers. Selected colon organoids and polyps were further co-cultured with primary stromal fibroblasts and immune cells to better recapitulate the tumor microenvironment. Cell imaging and viability assays were performed across multiple passages, while differentiation markers were evaluated to characterize phenotypic changes in 3D culture. The findings demonstrated that media composition and niche factors influenced organoid differentiation and maintenance, with dynamic changes in differentiation markers observed during prolonged 3D culture. Co-culture with stromal and immune components provided a more representative model of tumor–microenvironment interactions. Overall, co-cultured 3D organoids represent a promising platform for investigating cancer biology, identifying patient-specific molecular signatures, and evaluating therapeutic responses, with potential applications in single-cell analysis and precision oncology.

Keywords

3D Organoids, Stem Cells, Mutational Signatures, Single-Cell Analysis



PROCEEDING
ACSTM2026

Assessment of Environmental and Health Risks Associated with Constructed Wastewater Treatment Systems in Peri-Urban Areas

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Presenter
Maeti Antoinette George

Type
Oral Presentation

Track
Medical & health Sciences

Abstract

On-site wastewater treatment systems (OWTSs) are intended to minimise human exposure to hazardous and pathogenic substances associated with faecal matter. However, poorly constructed and inadequately maintained systems may pose substantial environmental and public health risks, particularly in peri-urban communities without access to municipal sewer networks. This study assessed the condition of constructed OWTSs and evaluated the associated environmental and health risks in Roma, Lesotho, where evidence on these systems remains limited. A cross-sectional mixed-methods design was employed, involving semi-structured interviews with 60 purposively selected participants and observational assessments of wastewater structures using structured checklists. Septic tanks were the predominant wastewater disposal systems. Most structures were ageing, cracked, poorly constructed, and inadequately maintained. Damaged wastewater pipes were reported in 66.7% of cases, while overflowing septic systems were reported by 73.3% of respondents in one village and 76.7% in the second village. Overall, 59.6% of respondents associated soil pollution with wastewater leakages. Environmental contamination was evidenced by wastewater spillages, foul odours, stagnant wastewater pools, and distressed vegetation. The findings indicate that dysfunctional and poorly maintained OWTSs contribute to environmental pollution and increase potential health risks among peri-urban residents. These conditions may undermine progress towards Sustainable Development Goals 6 and 11. The study recommends risk-based assessment standards, enforcement of regulations for the construction and maintenance of standardised OWTSs, and strengthened environmental health education and monitoring. The findings provide evidence to guide safer wastewater management and infrastructure planning in high-density communities that lack municipal sewer connections.

Keywords

Environmental Pollution, On-Site Septic Tanks, Wastewater Management



PROCEEDING
ACSTM2026

Beyond Conventional Therapy: Bioactive Approaches to Psoriasis and Inflammatory Skin Disorders

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Presenter
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Type
Oral Presentation

Track
Medical & health Sciences

Abstract

Plaque psoriasis (psoriasis vulgaris) is a chronic immune-mediated inflammatory skin disorder characterized by keratinocyte hyperproliferation, abnormal epidermal differentiation, and infiltration of pro-inflammatory cytokine-producing immune cells. Although monoclonal antibody therapies provide clinical efficacy, their high cost and potential risks associated with systemic immunomodulation highlight the need for safe, targeted topical therapies. Trigonella foenum-graecum (fenugreek) seeds contain bioactive phytosteroidal sapogenins, particularly diosgenin, as well as trigonelline and 4-hydroxyisoleucine, which exhibit anti-inflammatory and NF-κB-modulating properties. This study evaluated the clinical efficacy, safety, histomorphometric effects, and immunomodulatory activity of a standardized topical Trigonella foenum-graecum nanoemulsion gel (TFG-NE 2.5%), standardized to ≥3.8% w/w diosgenin, in patients with moderate-to-severe plaque psoriasis. In a 12-week, double-blind, randomized, controlled Phase IIb trial, 200 adults were randomized 1:1 to receive TFG-NE 2.5% (n = 100) or placebo vehicle gel (n = 100) twice daily. The primary endpoint was achievement of PASI-75 at Week 12. Secondary outcomes included PASI-50, PASI-90, PASI-100, DLQI, epidermal thickness, lesion cytokine expression, and treatment-emergent adverse events. At Week 12, PASI-75 was achieved by 79% of patients receiving TFG-NE compared with 15% receiving placebo. PASI-90 was achieved by 60.8% versus 4.0%, respectively ($p < 0.0001$). Histomorphometric analysis showed a reduction in mean epidermal thickness from 340.2 to 190.5 μm ($p < 0.0001$), while IL-6 levels decreased by 72.1%. DLQI scores improved by 14.2 versus 2.3 points ($p < 0.0001$). Mild local erythema occurred in 4.0% of patients, with no reported cutaneous atrophy, systemic toxicity, or clinically relevant laboratory abnormalities. Standardized topical TFG-NE 2.5% demonstrated substantial clinical improvement and good tolerability in patients with moderate-to-severe plaque psoriasis, supporting further investigation as a potential topical therapeutic approach.

Keywords

Psoriasis Vulgaris, Trigonella Foenum-Graecum, Diosgenin, Randomized Controlled Trial



PROCEEDING
ACSTM2026

Association Between Radiofrequency Electromagnetic Field Exposure and Oxidative Stress and Inflammatory Biomarkers in Young Children

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Presenter
Swarna Rani U P

Type
Oral Presentation

Track
Medical & health Sciences

Abstract

The widespread expansion of mobile communication systems has increased environmental exposure to radiofrequency electromagnetic fields (RF-EMFs), raising concerns regarding their potential effects on human health. This study investigated the association between RF-EMF exposure and selected biomarkers of oxidative stress and inflammation, including myeloperoxidase (MPO), fibrinogen, and C-reactive protein (CRP), in young children using correlation and regression-based analytical approaches. A total of 113 children younger than five years were included in the study. RF-EMF exposure was assessed within a 600-m radius surrounding cellular base stations. Ambient electromagnetic field levels were measured using a Narda SRM-3006 spectrum analyzer operating at frequencies up to 10 GHz. Blood concentrations of MPO and fibrinogen were determined using standard enzyme-linked immunosorbent assay (ELISA) methods. Correlation and regression analyses were performed to examine the relationships between RF-EMF exposure and biomarker concentrations. RF-EMF exposure showed a moderate positive correlation with MPO concentration ($r = 0.5407$), indicating an association between higher exposure levels and increased MPO concentrations. However, the reported regression results require statistical verification before interpretation, particularly because the reported R^2 value (0.7923) is not consistent with the reported correlation coefficient ($r = 0.5407$) for a simple linear regression model. Fibrinogen demonstrated a weak inverse correlation with RF-EMF exposure ($r = -0.3802$), with low explanatory power in the regression analysis ($R^2 = 0.1446$). CRP results should be reported separately if this biomarker was included in the analysis. Overall, the findings suggest an association between RF-EMF exposure and MPO concentrations in children; however, the observational design does not establish a causal relationship. Further studies involving larger populations, longitudinal follow-up, comprehensive exposure assessment, and adjustment for potential confounding factors are warranted to clarify the potential biological significance of these findings.

Keywords

Electromagnetic Radiation, Oxidative Stress, Myeloperoxidase (MPO), Fibrinogen, Inflammation



PROCEEDING
ACSTM2026

Maternal Health Insurance Reforms in Nigeria: Implementation Challenges

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Presenter
Oluwadamisi Tayo-Ladega

Type
Oral Presentation

Track
Medical & health Sciences

Abstract

Maternal mortality remains a major public health concern in Nigeria despite policy reforms aimed at improving access to maternal healthcare. Financial barriers continue to limit access to antenatal, delivery, and postnatal services, particularly among women in rural and low-income communities. Nigeria has introduced several health financing reforms, including the National Health Insurance Authority (NHIA) Act 2022, National Health Act 2014, Basic Healthcare Provision Fund (BHCPF), and State Health Insurance Schemes, to reduce out-of-pocket expenditure, improve access to essential healthcare, and advance Universal Health Coverage (UHC). This study examined maternal health financing and insurance policies in Nigeria, focusing on their provisions, implementation priorities, and implications for maternal healthcare access. A qualitative documentary analysis was conducted using national and state-level legislative, policy, and strategic documents related to health financing, health insurance, and maternal healthcare in Nigeria. Documents were purposively selected and analysed thematically, focusing on policy objectives, financing arrangements, implementation strategies, equity considerations, accountability mechanisms, and anticipated outcomes for maternal healthcare access. The reviewed policies demonstrated strong commitments to expanding health insurance coverage, strengthening primary healthcare, reducing financial barriers, and improving maternal health outcomes. However, implementation challenges included low insurance enrolment, limited public awareness, inadequate and inconsistent funding, healthcare workforce shortages, weak monitoring and accountability mechanisms, and regional inequalities in service access. These challenges disproportionately affected women in rural and low-income communities, limiting the extent to which policy objectives have translated into improved maternal healthcare access. Nigeria's health financing and insurance reforms provide an important framework for improving maternal healthcare access and advancing UHC. However, persistent gaps between policy intentions and implementation continue to constrain their effectiveness. Sustainable financing, stronger implementation and accountability mechanisms, increased public awareness, and targeted strategies for underserved populations are essential to improve maternal healthcare access and contribute to reductions in preventable maternal deaths.

Keywords

Maternal Health, Health Insurance, Documentary Analysis, Universal Health Coverage, Health Policy, Nigeria



PROCEEDING
ACSTM2026

Eggshell as a Health Food Ingredient: A Review of Global Utilization, Nutritional Profile, Health Benefits, and Functional Food Potential

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Presenter

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Type

Oral Presentation

Track

Medical & health Sciences

Abstract

In recent years, with increasing egg consumption, eggshells have become an environmental problem, as most are discarded in landfills. Eggshell accounts for approximately 10% of the weight of a whole egg and is composed primarily of calcium carbonate with minor amounts of phosphorus, magnesium, and other trace elements. Due to its high calcium content and by-product status in food processing, eggshell is of great interest as a cheap, natural source of calcium for human nutrition and food fortification. This review focuses on the utilization of eggshell, particularly its nutritional value, potential dietary calcium, calcium absorption and bioavailability, and potential uses as a health and functional food ingredient. It assesses key factors affecting calcium absorption, including vitamin D, the intestinal tract, prebiotics, probiotics, and synbiotics, as well as the physiological roles of calcium. Current methods for eggshell processing and calcium extraction, including pulsed electric field, high-intensity pulsed electric field, electric discharge-assisted mechanical milling, and high-energy milling, are also presented. Other uses of eggshells beyond nutrition include eggshell-incorporated food products, patented calcium products, biomedical applications, value-added uses, and environmental and sustainability applications. Given its mineral composition and potential bioavailability, eggshell is a promising alternative natural calcium source for food fortification. Eggshell-derived calcium has been explored for fortification of foods such as cakes, yogurt, sausages, cookies, biscuits, and coffee. Eggshell waste can also be utilized in pharmaceuticals, animal feed, agricultural applications, pollution remediation, biodiesel production, biomaterials, and construction materials. In summary, the evidence supports the potential to convert eggshell waste into a valuable calcium source for food fortification and the development of healthy products. Appropriate processing is needed to produce eggshell-derived ingredients suitable for human consumption. Further work is needed to determine calcium bioavailability and bioaccessibility, optimal processing methods, incorporation into different foods, safety, sensory characteristics, and human acceptability.

Keywords

Functional Food; Global Utilization; Health Benefits; Nutritional Composition; Eggshell



PROCEEDING
ACSTM2026

Molecular Expression of SSAT1 in Suspected and Diagnosed Breast Cancer Cases Compared with Healthy Controls

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Presenter
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Type
Oral Presentation

Track
Medical & health Sciences

Abstract

Breast cancer is one of the major health concerns worldwide, and early detection is important for improving patient outcomes. Molecular markers such as Spermidine/Spermine N1-acetyltransferase 1 (SSAT-1) may provide additional information for breast cancer detection. The present study aimed to determine the gene expression of Spermidine/Spermine N1-acetyltransferase (SSAT-1) enzyme and its association with polyamine levels in suspected and diagnosed breast cancer patients. A case-control study was conducted at Medicare Cardiac and General Hospital from December 2022 to June 2024 with ERC Protocol No. 000206/22. A total of 150 participants meeting the inclusion criteria were enrolled and categorized into three groups: 100 suspected breast cancer cases, 25 healthy controls, and 25 diagnosed breast cancer cases. Mammography was performed prior to sample collection. SSAT-1 mRNA was extracted from whole blood using an RNA Miniprep Kit and quantified by RT-qPCR. Polyamine concentrations were determined through ELISA. Total RNA was successfully isolated, and SSAT-1 expression was quantified using RT-qPCR. Threshold cycle (Ct) values were analyzed to calculate ΔCt (Ct SSAT-1 – Ct GAPDH), followed by ΔΔCt and relative fold change (2^-ΔΔCt). The highest fold change (32.24) was observed in suspected and diagnosed breast cancer cases, while controls showed minimal expression (fold change 1.31). Mammographic findings demonstrated a correlation with SSAT-1 overexpression and elevated polyamine levels. Among 100 suspected cases, 6 showed concordant positive mammographic findings and SSAT-1 overexpression, whereas 24 exhibited SSAT-1 overexpression despite normal mammograms. In diagnosed cases, mammography revealed positive findings consistent with stage III disease. The study revealed the overexpression of SSAT-1 and its association with polyamine in cases of breast cancer. Integrating SSAT-1 expression with conventional screening tools like mammography may enhance early detection. Further studies are required to evaluate SSAT-1 as a potential diagnostic and prognostic marker for breast cancer.

Keywords

Breast cancer, Spermidine/Spermine, Gene expression, Mammograph, Polyamine activity.



PROCEEDING
ACSTM2026

Targeting the Ovarian Cancer Surfaceome: Preclinical Validation of MCHR-1 as a Novel GPCR Target for Precision Immunotherapy

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Presenter
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Type
Oral Presentation

Track
Medical & health Sciences

Abstract

The identification of selectively accessible tumor-surface proteins remains a major challenge in the development of precision immunotherapies for solid tumors. G protein-coupled receptors (GPCRs) constitute a large and pharmacologically important family of membrane proteins; however, their potential as cell-surface targets for engineered immune-cell therapies remains comparatively underexplored. Melanin-concentrating hormone receptor 1 (MCHR-1) represents a candidate GPCR whose expression and surface accessibility in ovarian cancer require systematic characterization. This study investigated MCHR-1 surface expression in ovarian cancer models as an initial step toward evaluating its potential as a target for antigen-directed precision immunotherapy in gynecologic oncology.

MCHR-1-associated surface immunoreactivity was evaluated in SK-OV-3 and A2780 ovarian cancer cells by flow cytometry using Alexa Fluor 488-based detection. Unstained and fluorophore-only controls were included to establish background fluorescence and gating thresholds, and antigen-positive populations were assessed across antibody dilutions of 1:10, 1:25, and 1:50.

Detectable MCHR-1-associated surface immunoreactivity was observed in both ovarian cancer models, with distinct heterogeneous fluorescence profiles between the two cell lines. SK-OV-3 cells demonstrated a distinct rightward fluorescence shift and a high-intensity subpopulation, with MCHR-1-positive fractions ranging from 12.2% to 41.2% across the evaluated antibody conditions and reaching 41.2% at the 1:25 dilution. A2780 cells also demonstrated detectable positivity, ranging from 20.8% to 34.8%, but exhibited comparatively less distinct fluorescence separation. These findings indicate heterogeneous MCHR-1 surface-associated expression across ovarian cancer models and identify a distinct MCHR-1-high subpopulation within SK-OV-3 cells. The observed heterogeneity emphasizes the need for quantitative assessment of receptor density, membrane accessibility, tumor-to-normal tissue selectivity, and histotype-specific expression. Further studies using clinically relevant ovarian cancer models and patient-derived specimens will be essential to determine whether MCHR-1 provides sufficient selectivity and therapeutic accessibility for CAR-T cell therapy and other antigen-directed immunotherapeutic strategies in gynecologic oncology.

Keywords

MCHR-1, GPCR, Ovarian Cancer, Surface Target Validation, Precision Immunotherapy



Artificial Intelligence in Pharmacovigilance: Advancing Adverse Drug Reaction Detection and Patient Safety

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Presenter
Uriti Sri Venkatesh

Type
Oral Presentation

Track
Medical & health Sciences

Abstract

Pharmacovigilance plays a crucial role in ensuring the safe and effective use of medicines by identifying, assessing, understanding, and preventing adverse drug reactions (ADRs). However, conventional pharmacovigilance systems largely depend on spontaneous reporting, which may be affected by under-reporting, incomplete information, reporting delays, and difficulties in identifying emerging safety signals. This review examines the role of Artificial Intelligence (AI), including machine learning, deep learning, and natural language processing (NLP), in ADR detection and patient safety. The available evidence on the application of AI in pharmacovigilance was reviewed, with a focus on machine learning, deep learning, and NLP-based approaches for the identification, extraction, classification, and analysis of potential ADRs. Applications across diverse data sources, including electronic health records, clinical databases, biomedical literature, social media, and spontaneous reporting systems, were considered. Challenges related to data quality, algorithmic bias, interpretability, patient privacy, cybersecurity, validation, and regulatory acceptance were also examined. AI-based technologies can facilitate the automated identification, extraction, classification, and analysis of potential ADRs from diverse data sources. Machine learning algorithms can assist in detecting previously unrecognized drug–event associations and prioritizing potential safety signals for further evaluation. NLP techniques can extract clinically relevant information from unstructured medical narratives and improve the efficiency of ADR identification and reporting. Furthermore, predictive AI models may support early identification of patients at increased risk of medication-related adverse events, thereby enabling timely clinical intervention and improving patient safety. Despite these advantages, important challenges related to data quality, algorithmic bias, interpretability, patient privacy, cybersecurity, validation, and regulatory acceptance remain. Integration of AI into pharmacovigilance should complement rather than replace expert clinical and pharmacological judgment. Overall, AI has significant potential to transform pharmacovigilance from predominantly reactive surveillance toward more proactive, data-driven, and predictive drug-safety monitoring. Responsible implementation of validated AI technologies, supported by appropriate regulatory frameworks and human oversight, could substantially strengthen ADR detection and contribute to safer medication use.

Keywords

Artificial Intelligence, Pharmacovigilance, Adverse Drug Reactions, Machine Learning, Natural Language Processing, Drug Safety, Patient Safety



Assessment of the Anticancer and Antidiabetic Activities of Chemically Characterized Essential Oil from the Leaves of Eucalyptus Camaldulensis Dehnh.

Presenter
Javed Ahamad

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Type
Oral Presentation

Track
Medical & health Sciences

Abstract

Natural medicines are gaining increasing global recognition because of their potential health benefits. *Eucalyptus Camaldulensis Dehnh*. is a medicinal plant traditionally used for managing skin infections, pain, fever, sore throat, and cough. The present study aimed to characterize the essential oil composition and evaluate its anticancer and antidiabetic activities using in-vitro models. The essential oil of *E. Camaldulensis* was analyzed by gas chromatography-mass spectrometry (GC-MS). Its anticancer activity was evaluated using the MTT assay against MDA-MB-231 breast cancer cells, while antidiabetic activity was assessed using an α-amylase enzyme inhibition assay. GC-MS analysis identified 38 compounds, with 1,8-cineole (23.82%), α-phellandrene (17.22%), α-eudesmol (15.37%), and α-terpinene (7.24%) as the major constituents. The essential oil suppressed the viability of MDA-MB-231 cells in a concentration- and time-dependent manner, with an IC_{50} value of 40.81 µL/mL. It also inhibited α-amylase activity in a dose-dependent manner, with an IC_{50} value of 125.09 µL/mL. These findings demonstrate the chemical composition and in-vitro anticancer and antidiabetic potential of *E. Camaldulensis* essential oil and provide a basis for further investigation of its bioactive constituents and therapeutic potential.

Keywords

Breast Cancer, TNBC, Diabetes, PPHG, GC-MS



PROCEEDING
ACSTM2026

SLC7 Proteins and Their Emerging Therapeutic Potential in Thyroid Cancer

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Presenter
Muhammad Naeem

Type
Oral Presentation

Track
Medical & health Sciences

Abstract

Thyroid cancer arises primarily from genetic alterations and environmental factors such as radiation exposure, leading to uncontrolled proliferation and progression of thyroid cells. Lymph-node metastasis, rapid tumour growth, and limited responses to conventional therapies further contribute to poor clinical outcomes. Current diagnostic approaches, including computed tomography, ultrasonography, and biopsy, have limitations related to radiation exposure, invasiveness, and limited specificity. This review aims to examine the emerging role of solute carrier family 7 (SLC7) proteins in thyroid cancer, with particular emphasis on their diagnostic potential, involvement in tumour metabolism and immune regulation, and therapeutic applications. The SLC7 family comprises 12 members (SLC7A1–SLC7A12), among which SLC7A3, SLC7A5, and SLC7A11 have been reported to be upregulated in thyroid cancer. These transporters regulate the uptake or exchange of amino acids, including leucine, isoleucine, valine, phenylalanine, tyrosine, glutamate, cystine, and tryptophan, thereby supporting tumour-cell proliferation, metabolic adaptation, and survival. Their elevated expression in thyroid cancer tissues compared with normal tissues highlights their potential as biomarkers for disease detection and progression. Furthermore, increased amino acid consumption by tumour cells can alter nutrient availability within the tumour microenvironment, impairing the metabolic function of tumour-infiltrating T cells and contributing to T-cell exhaustion. Overall, SLC7 transporters represent promising molecular targets for thyroid cancer diagnosis and treatment. Targeting SLC7-mediated amino acid transport may disrupt tumour metabolism, improve the tumour immune microenvironment, and potentially enhance antitumour responses. Further investigations are required to validate their clinical utility and develop SLC7-targeted therapeutic strategies.

Keywords

SLC7, Tumour-Infiltrating T Cells, Diagnosis, Thyroid Cancer, Treatment



PROCEEDING
ACSTM2026

Comparative Analysis of Cancer Burden Across Selected Arab Countries: An Exploratory Epidemiological Study

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Presenter
Hamza Saad

Type
Oral Presentation

Track
Medical & health Sciences

Abstract

The incidence of cancer varies across Arab countries, where there is similarity in language and culture but differences in geography, population structure, and health systems. Geographical and demographic differences may contribute to variations in cancer incidence, mortality, and cancer-type distribution across Arab countries. This study aimed to comparatively evaluate the burden and patterns of cancer incidence and mortality in Libya and Tunisia in North Africa and the United Arab Emirates (UAE) and Saudi Arabia in the Arabian Peninsula, considering the geographical dissimilarity among Arab countries. A systematic evaluation of the burden of cancer was performed using published data from the International Agency for Research on Cancer (IARC) and the World Health Organization Global Cancer Observatory (GLOBOCAN). Age-standardized rates of cancer incidence and mortality were compared among the four countries, as were the distributions of cancer cases and deaths across the most common cancer types among males and females. The analysis showed differences in the patterns and occurrence of cancer between the two geographical regions. Tunisia and Libya showed higher overall cancer incidence than Saudi Arabia and the UAE, according to available GLOBOCAN estimates. Mortality patterns also showed differences among the four countries. Breast cancer was one of the leading cancers in all four countries, whereas colorectal cancer, lung cancer, thyroid cancer, and other cancers differed in their contribution to the national cancer profiles. Gender-specific patterns showed further differences, with cancer incidence and mortality varying from country to country. The comparison of Libya, Tunisia, the UAE, and Saudi Arabia highlights differences in the cancer burden between North African and Arabian Peninsula countries despite their shared Arab identity and provides a useful epidemiological basis for understanding regional variations in cancer incidence and mortality.

Keywords

Cancer Burden, Comparative Analysis, Epidemiology, Arab Counties, Population



PROCEEDING
ACSTM2026

Tumour Microenvironment as an Actionable Therapeutic Target

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Presenter
Kaiser Jamil

Type
Oral Presentation

Track
Medical & health Sciences

Abstract

The tumour microenvironment (TME) has emerged as a critical determinant of tumour initiation, progression, metastasis, therapeutic resistance, and patient outcome across solid cancers. Cancer cells do not function in isolation; they interact dynamically with immune cells, cancer-associated fibroblasts (CAFs), endothelial cells, pericytes, extracellular matrix (ECM) components, and metabolic and neural networks within the broader tumour ecosystem. The objective of this study was to review the current understanding of TME biology and highlight emerging strategies for translating these discoveries into precision therapies for solid tumours, with emphasis on TME-driven resistance mechanisms, druggable pathways, biomarker discovery, and next-generation profiling technologies. Recent literature on tumour–stroma crosstalk, immune evasion mechanisms, and therapeutic resistance across multiple solid tumour types was synthesized, integrating findings from mechanistic studies, clinical biomarker research, and emerging spatial multi-omic and AI-based profiling platforms. Cancer cell interactions with stromal and immune components create an immunosuppressive, hypoxic, metabolically altered, and mechanically constrained niche that favors tumour survival and treatment resistance. Tumour-associated macrophages and myeloid cells are central drivers of immune suppression and represent actionable therapeutic targets beyond classical checkpoint blockade. CAFs promote tumour progression and immunotherapy resistance, including through fibroblast–tumour signaling axes such as SPP1–CXCL12. Response to checkpoint blockade is shaped by TME composition, with distinct TME features driving resistance in NSCLC, glioblastoma, ovarian, and pancreatic cancers. Multi-omic profiling has identified TME-associated determinants of immuno-chemotherapy resistance in NSCLC. Druggable pathways in the TME include immune checkpoints beyond PD-1/PD-L1, macrophage and myeloid-cell pathways, fibroblast–tumour signaling axes, TGF-β signalling, and extracellular matrix regulators. Advances in understanding TME complexity, spanning immune, stromal, metabolic, and mechanical dimensions, are forming a new generation of precision therapies for solid tumours. Integration of spatial multi-omics, AI-driven liquid biopsy platforms, and biologically representative preclinical models is accelerating biomarker discovery and rational design of combination strategies to overcome TME-driven therapeutic resistance.

Keywords

Tumour Microenvironment, Solid Tumours, Tumour–Stroma Crosstalk, Therapeutic Resistance, Cancer-Associated Fibroblasts, Immune Evasion, Spatial Multi-Omics, Artificial Intelligence



PROCEEDING
ACSTM2026

Voltage-Gated Calcium Channel–PKC Isozyme Crosstalk in the Regulation of Pancreatic Insulin Secretion

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Presenter
Senthilkumar Rajagopal

Type
Oral Presentation

Track
Medical & health Sciences

Abstract

Voltage-gated calcium channels (CaV) regulate calcium flux into cells and are important for many physiological processes in excitable and non-excitable cells. The CaVβ subunits contribute to the regulation of insulin release, while Protein kinase C (PKC), a family of serine/threonine kinases activated by calcium, diacylglycerol, and phorbol esters, also regulates insulin secretion. In glucose-stimulated insulin secretion (GSIS), elevated glucose depolarizes the β-cell membrane, driving Ca^{2+} influx through Cav channels and activating PKC isozymes, which potentiate Cav currents and further amplify insulin release. However, the functional interplay between CaV subunits and PKC signaling in insulin secretion remains incompletely understood. Aim: To elucidate the functional interplay between calcium channels, their β-subunits, and PKC isozymes in regulating insulin secretion using in vitro studies. Materials and methods: RIN-5F cells were used for the study. For functional analysis, cells were transfected with siRNAs targeting CACNB3 and CACNA1E, individually and in combination. Following transfection, cells were exposed to low (3.3 mM) and high (11.1 mM) glucose concentrations, and glucose-stimulated insulin secretion (GSIS) was quantified from culture supernatants. Potential PKC phosphorylation sites on CACNA1E were predicted using NetPhos 3.1, with residues scoring >0.5 considered candidate phosphorylation sites. Structural visualization and mapping of phosphorylation sites were performed using PyMOL, while protein–protein docking of CACNA1E–CACNB3 was performed using HADDOCK 2.4. Results: In RIN-5F cells, expression profiling showed that CACNB3 was the predominant CaV β-subunit. siRNA-mediated knockdown of CACNB3 and CACNA1E altered glucose-stimulated insulin secretion, with CACNA1E silencing producing a pronounced reduction under high-glucose conditions. In silico analysis identified six potential PKC phosphorylation sites on CACNA1E. Molecular docking demonstrated a favorable interaction between CACNA1E and CACNB3, supported by electrostatic, hydrophobic, hydrogen-bonding, and salt-bridge interactions. Conclusion: These findings suggest that the CACNA1E–CACNB3 complex may participate in calcium-dependent insulin secretion and provide a potential regulatory interface for PKC-mediated signaling.

Keywords

Cav Subunits; Molecular Simulation; Phosphorylation Sites; PKC Isozymes; SiRNA; Translocation



Beyond the Pill: Can Generative AI and Virtual Coaching Reverse Type 2 Diabetes?

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Presenter
Shireen Adeeb Mujtaba Ali

Type
Oral Presentation

Track
Medical & health Sciences

Abstract

More than 40% of the global diabetes population lacks a formal diagnosis, largely because Type 2 diabetes (T2D) develops gradually with few to no noticeable early symptoms. In alignment with the 2026 theme "Early action on diabetes," WHO is prioritizing closing this diagnostic gap with a goal of diagnosing 80% of living cases by 2030. Traditional human-led coaching successfully drives T2D remission but faces immense scalability and cost barriers. Type 2 diabetes (T2D) management is shifting from purely pharmacological treatments to sustainable lifestyle modification. Generative Artificial Intelligence (AI) and Large Language Models (LLMs) offer a solution by providing scalable, hyper-personalized, 24/7 metabolic health coaching. This presentation reviews research studies that demonstrated how generative AI-driven virtual coaching can effectively guide patients toward T2D management or remission. AI-guided lifestyle protocols are redefining the management of chronic conditions through aggressive de-prescribing, systematically reducing pharmacological dependence rather than expanding it. Based on published data, this proactive approach achieves rapid deflection, enabling 100% of baseline insulin-using patients to completely discontinue insulin therapy within the first 90 days of intervention. The sustainability of this model is further validated by long-term comparative 12-month data, which demonstrates a significant, lasting reduction in the median number of total required medications for patients receiving interventional care compared with those receiving standard treatment. Generative AI-powered virtual coaching marks a new era in digital therapeutics for not only diabetes management but also early action on diabetes. By democratizing access to continuous, personalized metabolic support, this technology moves healthcare away from lifetime disease management toward true, large-scale diabetes management.

Keywords

Precision Medicine, Artificial Intelligence, Diabetes



PROCEEDING
ACSTM2026

Childhood Malnutrition and Therapeutic Nutrition in Hadhramout, Yemen: Evidence, Challenges, and Community-Based Solutions

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Presenter
Hassan Pyar Ali Hassan

Type
Oral Presentation

Track
Medical & health Sciences

Abstract

Childhood malnutrition remains a public health challenge in Yemen, driven by food insecurity, inadequate dietary diversity, recurrent infectious diseases, and limited access to nutrition services. Severe acute malnutrition (SAM) requires timely therapeutic intervention to prevent complications and mortality. This study aimed to synthesize evidence on childhood malnutrition in Yemen, with emphasis on Hadhramout Governorate, and to examine nutritional, infectious, socioeconomic, and health-system factors contributing to malnutrition and the role of therapeutic interventions. Methods: An evidence-based secondary analysis was conducted using nutrition reports from the Integrated Food Security Phase Classification (IPC), UNICEF, WHO, and relevant sources. Data on global acute malnutrition (GAM), moderate acute malnutrition (MAM), SAM, food insecurity, infant and young child feeding, infectious diseases, and risk factors were reviewed, focusing on Hadhramout Coastal and Valleys and Desert areas. Results: For November 2023–October 2024, GAM among children under five was estimated at 11.5% in Hadhramout Coastal areas, including 11.0% MAM and 0.5% SAM. In Hadhramout Valleys and Desert areas, GAM was 9.7%, comprising 8.5% MAM and 1.2% SAM. Nationally, approximately 609,808 children were estimated to experience acute malnutrition in 2024, including 118,570 with SAM. Contributing factors included food insecurity, poor dietary quality and diversity, suboptimal infant and young child feeding, recurrent diarrhea and other infections, inadequate water, sanitation and hygiene, and limited access to nutrition services. Therapeutic approaches, including ready-to-use therapeutic food (RUTF), therapeutic milk, community screening, outpatient treatment, and caregiver counselling, are critical components of management. Conclusion: Childhood malnutrition in Hadhramout is a multifactorial public health challenge requiring integrated nutritional, medical, and community-based responses. Strengthening early detection, therapeutic nutrition, feeding practices, infection prevention, WASH interventions, nutrition education, and community-based management could reduce progression to severe malnutrition and improve outcomes.

Keywords

Childhood Malnutrition; Therapeutic Nutrition; Severe Acute Malnutrition; Wasting; Hadhramout; Public Health; Community-Based Management.



PROCEEDING
ACSTM2026

Synergistic Performance of a Polyferric Sulphate–Bentonite Hybrid Coagulant for Landfill Leachate Treatment

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Presenter
Sofiah Binti Hamzah

Type
Oral Presentation

Track
Physical Sciences and Engineering

Abstract

Landfill leachate poses significant environmental challenges because of its high organic load and complex chemical composition, necessitating efficient and cost-effective pretreatment strategies. This study investigated the formulation, optimization, and characterization of a hybrid coagulant comprising polyferric sulphate (PFS) and bentonite clay (aluminium phyllosilicate) for landfill leachate treatment. The hybrid system combines the charge neutralization and sweep flocculation mechanisms of PFS with the surface complexation, ion exchange, and adsorption properties of bentonite. Initial screening identified a 1:1 mass ratio of PFS to bentonite as the baseline formulation. Process optimization was subsequently performed using Response Surface Methodology (RSM) based on a Central Composite Design (CCD), with pH, coagulant dosage, and mixing conditions evaluated as key operational variables. Quadratic regression models and three-dimensional response surface plots indicated significant interactions among the process variables, particularly between coagulant dosage and pH. Coagulant dosage was identified as the primary factor influencing treatment performance, while pH played an important role in floc formation and stability. Under optimized conditions, the PFS–bentonite hybrid achieved removal efficiencies of 87% for chemical oxygen demand (COD), 84% for turbidity, 94% for total suspended solids (TSS), and 96% for color. The findings demonstrate that integrating polyferric sulphate with bentonite can enhance coagulation–flocculation performance compared with conventional single-coagulant systems. The PFS bentonite hybrid therefore shows potential as an efficient pretreatment option for raw landfill leachate before subsequent biological or membrane treatment.

Keywords

Bentonite Clay, Polyferric Sulphate, Landfill Leachate Treatment, Landfill Leachate



Navigating the Complexities of Bedding Dip Classification

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Presenter
Zohreh Movahed

Type
Oral Presentation

Track
Physical Sciences and Engineering

Abstract

Dip picking and analysis performed on high-resolution geological image logs, such as Formation MicroImager (FMI) and oil-based mud (OBM) image logs, form the basis for subsurface geological interpretations and reservoir evaluations. However, traditional manual or semi-automated dip-picking methodologies often suffer from interpretive subjectivity, guesswork, uncertainty, and non-unique interpretations. Because inaccurate initial dip selection can affect subsequent workflows and downstream analyses, establishing a rigorous and standardized interpretation framework is critical, especially in complex carbonate reservoirs where clearly defined bedding surfaces are frequently absent. To address these challenges, this study reviews current dip classification systems and proposes a comprehensive origin-based classification framework to enhance consistency and accuracy in complex formations. The workflow utilizes geological image log datasets with standard preprocessing procedures, including environmental adjustments, speed corrections, depth matching, and calibration against shallow resistivity logs such as RLAZ, supported by dynamic normalization. Following image conditioning, interactive interpretation and sinusoid-fitting techniques are applied to identify and extract planar features. These features are classified using geological logic, interpretation experience, and the proposed framework into four primary categories: structural bedding, stratigraphic bedding, sedimentary bedding or dips, and diagenetic bedding or dips. The classification helped resolve ambiguous patterns, isolate true structural trends from secondary sedimentary and diagenetic variations, and reduce interpretation subjectivity across clastic and carbonate case studies. A systematic geological dip classification framework provides a robust and reliable description of the subsurface dip profile, supporting more consistent structural and stratigraphic interpretations and improving the evaluation of complex carbonate and clastic reservoirs.

Keywords

Geological Image Logs, Dip Classification, Structural Bedding, Stratigraphic Bedding, Sedimentary Bedding, Diagenetic Bedding, Borehole Imaging, Carbonate Reservoirs, Dip Picking Workflow



PROCEEDING
ACSTM2026

Nanoparticle-Enhanced PDLC Films for Low-Voltage Multizone Electro-Optical Displays

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Presenter
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Type
Oral Presentation

Track
Physical Sciences and Engineering

Abstract

Polymer-dispersed liquid crystal (PDLC) films are promising materials for smart windows, adaptive displays, and electro-optical devices because their optical transmission can be controlled by an applied electric field. However, conventional PDLC devices often face limitations in achieving localized optical modulation because of uniform electric-field distribution, relatively high operating voltages, and the need for complex electrode patterning. This study presents a heat-curing-assisted strategy for achieving spatially selective electro-optical modulation in nanoparticle-doped PDLC films using a polymerization-induced phase separation (PIPS) approach. Epoxy resin monomers, hardeners, cholesteric liquid crystals (CLCs), and aluminum oxide (A_2O_3 and silver (Ag) nanoparticles were incorporated into the composite system to regulate polymer morphology and liquid crystal domain formation during curing. A_2O_3 nanoparticles were synthesized using the sol–gel method, whereas Ag nanoparticles were prepared using a solution-based method. The synthesized nanoparticles were characterized by X-ray diffraction (XRD) to determine their crystal structure, crystallite size, and microstrain. The morphology and liquid crystal domain dispersion of the PDLC films were examined using scanning electron microscopy (SEM), while electro-optical properties were evaluated using LCD parameter measurements. The effects of resin, hardener, catalyst, CLC, and nanoparticle feed ratios on the electro-optical performance of the composite films were investigated. Heat-curing-induced spatial variations in the composite resulted in localized differences in polymer morphology and liquid crystal domain alignment. Under a uniform electric field, the optimized films exhibited spatially tunable transmittance, enabling multizone optical modulation at reduced operating voltages. The nanoparticle incorporation also improved the thermal and humidity stability of the composite films. Overall, the proposed PIPS-based heat-curing strategy provides a promising approach for fabricating low-voltage, spatially controllable PDLC devices for smart glass, adaptive displays, and advanced electro-optical applications.

Keywords

Metallotropic Phase, Intelligent PDLC Films, Monomers, Aluminium Oxide Nanoparticles, Silver Nanoparticles (AgNPs), Visible Light Display



PROCEEDING
ACSTM2026

Development and Heat-Treatment Response of Multi-Component Al–Mg Aluminium Alloys

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Presenter
Sonam Mukeshkumar Patel

Type
Oral Presentation

Track
Physical Sciences and Engineering

Abstract
The demand for lightweight materials with enhanced mechanical performance has increased interest in Al–Mg-based aluminium alloys for aerospace, automotive, marine, and structural applications. Although the effects of individual alloying elements such as Cu, Mn, and Co have been widely investigated, their combined influence on Al–Mg-based alloys under different heat-treatment conditions remains insufficiently explored. In this study, four multi-component Al–Mg-based aluminium alloys, namely Al–5Mg–0.1Mn–0.4Co, Al–4Mg–1Mn–0.5Co, Al–5Mg–1Cu–0.4Mn, and Al–5Mg–1Cu–1Mn–0.3Co, were produced by casting using an electrical resistance crucible furnace. The chemical compositions of the alloys were verified by spectroscopic analysis. The cast specimens were solution treated at 480°C for 2 h, water quenched, and artificially aged at 160 degree celsius for 2, 4, 6, and 8 h. The effects of alloy composition and ageing duration on hardness and microstructural evolution were evaluated using Brinell hardness testing and optical microscopy. Both alloy composition and heat treatment markedly affected the hardness and microstructural characteristics of the alloys. The Al–5Mg–1Cu–1Mn–0.3Co alloy exhibited the highest hardness of 84 BHN after 6 h of ageing. Optical micrographs indicated improved homogenization following solution treatment and a more uniform distribution of strengthening phases after ageing, consistent with the observed hardness evolution. These findings demonstrate that the combined addition of Cu, Mn, and Co, coupled with appropriate solution treatment and artificial ageing, can enhance the hardness and microstructural characteristics of Al–Mg-based aluminium alloys for lightweight engineering applications.

Keywords
Aluminium Alloy, Heat Treatment, Artificial Ageing, Microstructural Evolution, Hardness



PROCEEDING
ACSTM2026

Design, Synthesis, Characterization, Antimicrobial, In-Silico Assessment of Bipyrimidine Derivatives Bearing Indole Nucleus

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Presenter
Mohammad Arshad

Type
Oral Presentation

Track
Physical Sciences and Engineering

Abstract

Adequate enhancement of resistance in microbial pathogens to available chemotherapeutic agents prompted us to identify new chemotherapeutic agents with significant antimicrobial activity. This study reported the design of 6-(1H-indol-3-yl)-4,5′-bipyrimidine-2-amine and its Schiff's bases. The computational studies were performed to assess their properties (drug-likeness and physicochemical properties). The computationally bioactive compounds (1–12) were then followed for synthesis, characterization, antimicrobial therapeutic effect, and percent viability of cells. The antimicrobial therapeutic effect was obtained by the disk diffusion method, in terms of zone of inhibition and minimum inhibitory concentration against the Gram-positive and Gram-negative bacteria [S. aureus (ATCC-25923), S. epidermidis (ATCC-29887)], [E. coli (ATCC-25922), P. mirabilis (ATCC-25933)]. The antimicrobial screening findings revealed that all the compounds (1–12) possessed very good activity and strongly supported the computational results. The antibiotic ciprofloxacin and the solvent DMSO were used as positive and negative controls in the study. The percent viability of the cells was observed using HepG2 cells by MTT assay, and noticed that the percent viability of the cells was found in the range 93–97% at the lowest concentration, 3.125 µM, while 73–77% at the highest concentration, 100 µM. All the compounds (1–12) and ciprofloxacin were then applied for molecular docking assessment to estimate H-bonding with the residues of GlcN-6-P synthase, and the findings revealed that significant H-bonding was observed, with binding affinities in the range of − 8.4 to 6.7 kcal/mol and − 7.6 to 6.0 kcal/mol, respectively.

Keywords

Pyrimidine, Synthesis, Characterization, Molecular Docking, Biological Studies



Manufacturing Silicon by Environmentally Friendly Process

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Presenter
Shashi Paul

Type
Oral Presentation

Track
Physical Sciences and Engineering

Abstract

Silicon, as an electronic material, has changed the world we live in. Silicon is currently used in electronic industries in three different forms, namely amorphous, polycrystalline, and single crystals. The production of these different forms is done using different methods and uses different amounts of energy. The manufacturing of poly and single-crystalline silicon is a very energy-intensive process. We have invented a process that can use only one third of the energy compared to other industrial processes to produce polysilicon. The objective of this study is to present an environmentally friendly process for manufacturing silicon and explore its potential application in photovoltaic (PV) solar cells. A brief overview of the current processes and issues related to making silicon is provided. A detailed procedure for making silicon using our method, which we named after the ancient Egyptian Sun god Ra, will be presented. Silicon manufactured by this method will be analysed using Raman spectroscopy, UV-VIS, Scanning Electron Microscopy (SEM), Fourier Transform Infrared (FTIR) spectroscopy, and electrical measurements. The possibility of using silicon made by our method in photovoltaic solar cells has also been explored. The initial results are very encouraging and show a huge possibility that the PV solar cells made by our method will reduce the cost and energy needed to produce them. A detailed study on this application includes the stability of the material, the use of transparent conductive oxide under plasma conditions, and possible structures that can be used to make solar cells. The environmentally friendly silicon manufacturing process has the potential to significantly reduce the energy required for polysilicon production and may also reduce the cost and energy needed to produce photovoltaic solar cells.

Keywords

Silicon, CVD, Low Temperature, Carbon Footprint, Solar Cells, Batteries, Thermoelectric Generator



PROCEEDING
ACSTM2026

PILoN-DT: A Drift-Aware Physics-Informed Digital Twin for Photovoltaic Health Monitoring

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Presenter

Wulfran Fendzi Mbasso

Type

Oral Presentation

Track

Physical Sciences and Engineering

Abstract

Photovoltaic systems operating in tropical and emerging regions experience substantial variations in solar irradiance, temperature, humidity, dust accumulation, partial shading, and component ageing, making it challenging to distinguish temporary environmental disturbances from genuine degradation. Conventional monitoring methods and purely data-driven artificial intelligence models may also require extensive labelled datasets and produce physically inconsistent predictions under unseen operating conditions. This study proposes PILoN-DT, a drift-aware physics-informed digital twin for continuous photovoltaic system health monitoring in data-scarce tropical environments. The framework integrates a single-diode photovoltaic model, a physics-informed logistic learning network, adaptive concept-drift detection, and uncertainty-aware health assessment. Environmental and electrical operating variables are used to reconstruct maximum-power voltage, current, power, and fill factor. Differences between measured and reconstructed characteristics are analysed to distinguish short-term environmental fluctuations from persistent degradation associated with series resistance, shunt resistance, soiling, mismatch, and sensor drift. The framework is evaluated across 10,360 operating conditions covering broad irradiance and temperature ranges and progressive electrical degradation scenarios. PILoN-DT maintains physically consistent relationships among irradiance, temperature, voltage, current, and conversion efficiency while adapting to changes in system behaviour. An interpretable health index and confidence interval further provide diagnostic status and associated uncertainty. The proposed framework offers a computationally efficient and transferable approach for preventive maintenance and reliable photovoltaic health monitoring without requiring extensive fault-labelled datasets, supporting improved reliability and longer service life of photovoltaic systems in data-scarce tropical environments.

Keywords

Photovoltaic Systems, Physics-Informed Artificial Intelligence, Digital Twin, Degradation Detection, Concept Drift, Health Monitoring, Tropical Climate, Renewable Energy



PROCEEDING
ACSTM2026

A Vertical Startup Framework for Manufacturing Agility

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Presenter
Bhairavi (Meera) Modak

Type
Oral Presentation

Track
Physical Sciences and Engineering

Abstract

In the Industry 5.0 era, the startup of a new operations site requires a dynamic methodology that connects planning to production-floor execution while enabling an organization to ramp up or ramp down as market demands shift rapidly. Today, instant messaging and increasingly responsive supply chains also create an expectation for manufacturing and production planning to respond with greater speed. Traditionally, when a workforce is hired to bring a new plant to life, a few experienced experts may be transferred from another site, bringing established knowledge of what is critical to product quality and safety. However, if an enterprise experiences double-digit revenue growth in a new or unpredictable market, it needs to prepare a new site, workforce, and supply chain that can ramp up rapidly and become self-sustaining. At the same time, if the enterprise operates in a capital-intensive industry and market demand shifts downward, it needs to respond to a rapid reduction in planned production volumes. Vertical Startup is a specific methodology that creates a framework for scaling manufacturing operations up or down by systematically testing and preparing machines, materials, human capital, and methodologies. The framework is intended to support what is required when a large enterprise enters a new market, starts a new facility, or executes an expansion project under unpredictable market dynamics. A systematic, step-by-step Vertical Startup framework connects S&OP (Sales and Operations Planning) plans with production-floor readiness, with the objective of reducing unplanned downtime and rigorously conducting user acceptance testing (UAT) across machines and IT/OT systems. Rather than preparing these elements independently, the methodology prepares them to operate together as one cohesive manufacturing orchestrator. This paper discusses a Vertical Startup methodology and framework that connects organizational design, S&OP planning, and startup execution. It explores how systematic readiness can reduce production losses during startups, enable a steeper and more controlled ramp-up curve when entering or expanding in a market, and provide the flexibility to ramp production down, including transitioning to more manual operating processes when required by changing market conditions.

Keywords

Vertical Startup, Production Ramp-Up, Operational Readiness, Industry 5.0, Manufacturing Flexibility



PROCEEDING
ACSTM2026

CO_2 Separation from Flue Gas Using Piperazine-Promoted AMP-Impregnated PVA Gel Membranes

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Presenter
Asit Kumar Saha

Type
Oral Presentation

Track
Physical Sciences and Engineering

Abstract

The increasing atmospheric concentration of CO_2 from industrial activities and fossil-fuel combustion has intensified the need for efficient post-combustion carbon capture technologies. Membrane-based separation has attracted considerable attention because of its low energy requirements, compact configuration, operational simplicity, and environmental compatibility. This study investigated a facilitated transport membrane consisting of a polyvinyl alcohol (PVA) gel matrix impregnated with 2-amino-2-methyl-1-propanol (AMP) and promoted with piperazine (PZ) for selective CO_2 separation from simulated flue gas. The hydrophilic PVA gel provided a stable medium for the amine carriers and facilitated CO_2 transport through reversible reactions in the presence of water. AMP served as the primary CO_2 carrier, while PZ acted as a promoter to enhance reaction kinetics and facilitate CO_2 absorption and desorption through a shuttle mechanism. The incorporation of PZ reduced mass-transfer limitations and enhanced CO_2 transport through the membrane. The resulting membrane achieved a CO_2 permeance of 2735 GPU and a CO_2 selectivity greater than 100. These results demonstrate that combining AMP and PZ within a PVA gel matrix can provide an effective facilitated transport membrane for selective CO_2 separation. The developed membrane shows potential for efficient post-combustion CO_2 capture from flue gas.

Keywords

CO_2 Separation, Facilitated Transport Membrane, PVA Gel, AMP, Piperazine Promoter



PROCEEDING
ACSTM2026

Artificial Intelligence of Things -Driven Remote Patient Monitoring for Early detection in Smart Healthcare

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Presenter
Tahniyat Aslam

Type
Oral Presentation

Track
Physical Sciences and Engineering

Abstract

Nowadays, the healthcare system is facing major challenges that require significant transformation, including increasing healthcare demands due to aging populations and limited medical resources, which contribute to substantial inequalities in health outcomes. In recent years, the interaction between the Internet of Things (IoT) and Artificial Intelligence (AI) has become increasingly prominent. AI requires access to massive datasets to generate meaningful findings and facilitate effective decision-making, while IoT requires intelligent techniques to extract meaningful information from the large amounts of data it generates from sensors and wearable devices, etc. This convergence has driven the development of Artificial Intelligence of Things (AIoT), which represents an innovative approach in which AI-enabled IoT systems are driving a shift in paradigm in Healthcare from 4.0 to Healthcare 5.0. The Healthcare 4.0 era depends on extremely interconnected, patient focused care that was greatly reliant on IoT; nevertheless, the said healthcare infrastructure didn't offer intelligent healthcare management and remote personalized care. Healthcare 5.0 incorporates advanced AIoT-enabled technologies to provide pervasive and patient-centered care through smart remote monitoring, intelligent self-management, and personalized telemedicine. AIoT integrates real-time data from connected wearable devices with AI algorithms to facilitate real-time monitoring and predictive healthcare. It enhances remote patient monitoring through early detection, timely intervention, dynamically personalized care, and improved patient outcomes.

Keywords

Artificial Intelligence of Things, Healthcare 5.0, Remote Patient Monitoring, Smart Healthcare, Telemedicine, Wearable Devices



Sustainable Protection and Production of Legumes through Intercropping with Forage Crops

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Presenter

Bita Naseri

Type

Oral Presentation

Track

Agricultural & Biological Sciences

Abstract

Sustainable protection and production of legumes and cereals require reduced dependence on agrochemicals and greater use of sustainable farming practices. The increasing use of pesticides, fungicides, herbicides, and fertilizers may pose critical hazards to consumers and ecosystems, highlighting the need for sustainable alternatives. This study evaluated the efficiency of legume–cereal intercropping under Iranian farming conditions for sustainable forage production and control of diseases, pests, and weeds. The performance of the native Iranian clover population was evaluated when intercropped with alfalfa, sainfoin, or barley in Lorestan and Kermanshah provinces. The effectiveness of these intercropping systems in controlling widespread fungal diseases, pests, and weeds was assessed, along with their effects on forage yield and feed value. Widespread diseases, including rust, black spot, false white clover, powdery mildew of barley and spruce, and barley eyespot, as well as major pests and weeds, were identified and evaluated among the experimental treatments. The intercropping systems showed differences in disease, pest, and weed contamination across the tested treatments and provinces. Legume–cereal intercropping may provide a sustainable approach for improving forage production while reducing the pressure of diseases, pests, and weeds. The best mixed-cropping treatment with the least contamination in each province was identified based on the experimental findings.

Keywords

Sustainability, Agriculture, Forest, Horticulture, Production



PROCEEDING
ACSTM2026

Antibacterial Potential of Phenolics and Flavonoids in Tecomella Undulata Extract Against Pseudomonas Aeruginosa

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Presenter
Sharad Vats

Type
Oral Presentation

Track
Agricultural & Biological Sciences

Abstract

Rohida (Tecomella undulata (Sm.) Seem.) is an endangered medicinal tree traditionally used in India and Pakistan to treat various disorders, including leucorrhoea, fever, cough, digestive disorders, skin infections, and pain. In the present investigation, hydromethanolic extracts of different plant parts were evaluated for their antibacterial, anti-quorum-sensing, and biofilm-inhibitory potential against Pseudomonas aeruginosa. The test extracts exhibited strong anti-quorum-sensing and biofilm-inhibitory activities, indicating their ability to interfere with microbial communication and pathogenicity. These activities were further confirmed through pyocyanin inhibition and the crystal violet assay. The minimum inhibitory concentration (MIC) of all plant parts against P. aeruginosa was found to be less than 100 µg/mL, indicating strong antimicrobial activity. HPLC analysis of the hydromethanolic extracts of the plant parts revealed the presence of therapeutically important phenolic and flavonoid compounds. Molecular docking analysis further revealed strong interactions between key bioactive compounds and microbial target proteins, supporting their potential role in inhibiting bacterial virulence mechanisms. The findings provide evidence supporting the ethnomedicinal use of T. undulata as a remedy for microbial-associated infections. Moreover, the MIC values below 100 µg/mL observed for the plant extracts indicate considerable antibacterial potency and suggest their potential as a source of bioactive compounds for the development of antimicrobial agents.

Keywords

Tecomella Undulata, Phenolics, Flavonoids, Pseudomonas Aeruginosa, Antibacterial Activity



PROCEEDING
ACSTM2026

Next-Generation Aeroponic and ARC Technologies for Sustainable Production of Disease-Free Potato Seed in India

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Bihar Agricultural University, Bihar, India

Presenter
Shashank Shekhar Solankey

Type
Oral Presentation

Track
Agricultural & Biological Sciences

Abstract

Potato (Solanum tuberosum L.) is an important vegetable crop in India and contributes significantly to food security, rural employment, and farmers' income. Bihar is a major potato-producing state; however, cultivation is constrained by limited availability of quality, disease-free seed tubers. High seed costs, repeated use of infected seed material, low multiplication rates, and dependence on seed procurement from other states increase production costs and disease risks. Therefore, this study highlights the potential of Aeroponics and Apical Rooted Cutting (ARC) technologies for rapid, decentralized production of healthy potato seed in Bihar. Virus-indexed mother plants were maintained under insect-proof conditions for repeated harvesting of apical shoots. The cuttings were rooted in sterile cocopeat media and subsequently transferred to automated aeroponic units, where roots received nutrient-rich mist under controlled conditions. Seed production performance, rooted-cutting survival, mini-tuber production, disease incidence, and resource-use efficiency were assessed in comparison with conventional seed multiplication systems. Aeroponic cultivation produced approximately 40–60 mini-tubers (G_0) per plant per cycle, compared with 8–10 tubers under conventional systems. Rooted cuttings showed more than 92% survival, while harvested mini-tubers exhibited improved vigour and uniformity with negligible viral, fungal, and bacterial disease incidence. Nutrient recirculation reduced water use by approximately 85–90%, while controlled production conditions minimized exposure to soil-borne diseases. Aeroponic and ARC technologies offer an efficient approach for rapid multiplication of quality, disease-free potato seed. Their adoption can support decentralized seed production in Bihar, reduce dependence on seed tubers procured from other states, lower production and transportation costs, and improve the availability of healthy planting material and farmer profitability.

Keywords

Potato, Aeroponics, Apical Rooted Cuttings (ARC), Disease-Free Seed, Mini-Tubers (G_0), Bihar, Protected Cultivation, Sustainable Agriculture.



PROCEEDING
ACSTM2026

A Promising Solution For Increasing Sustainable Biotechnological Product Yield: Porphyrium cruentum (Rhodophyta)

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Presenter
Seher Dirican

Type
Oral Presentation

Track
Agricultural & Biological Sciences

Abstract

Aquatic ecosystems are invaluable reserves of biodiversity. Algae are the primary producers in aquatic ecosystems and form a crucial link in the food chain. They are among the most important biological resources, containing a large number of bioactive compounds. Algae are found naturally in aquatic ecosystems and can also be cultivated in culture media. Algal cultivation is the most efficient and economical way to prevent eutrophication, purify polluted water, and convert sunlight into biomass. Algae maintain the physicochemical balance of water. In addition, algae significantly contribute to the control and regulation of water quality by removing excess nutrients and toxic substances from aquatic ecosystems. Algal biotechnology has been developing rapidly in recent times. Algae, one of the most important biological resources, are utilized in various industrial fields such as food, agriculture, medicine, pharmaceuticals, cosmetics, and aquaculture. This study focuses on Porphyridium cruentum, a species with significant potential for further expansion in its applications in the future. Porphyridium cruentum, a species of red marine phytoplankton belonging to the phylum Rhodophyta, is found in the order Porphyridiales. It is a single-celled organism, generally found in marine ecosystems. Porphyridium cruentum is circular in shape. It possesses numerous biochemical substances and high nutritional value. Porphyridium cruentum contains a significant amount of protein, carbohydrates, and unsaturated fatty acids. Exhibiting rapid biomass growth, Porphyridium cruentum has a wide range of applications in health and biotechnology, particularly due to its polysaccharides. Porphyridium cruentum holds promise for the future in health and biotechnology applications. This is leading to its increasing importance. However, challenges remain for Porphyridium cruentum. There is a need for further research and development of new biotechnologies related to Porphyridium cruentum. Researching and developing sustainable cultivation areas for Porphyridium cruentum is crucial for future generations, as sustainable cultivation areas offer new solutions to various challenges.

Keywords

Algal Biotechnology, Phytoplankton, Porphyridium Cruentum, Water Quality



Efficacy of Gluconate-Capped Silver Nanoparticles Against Post-Harvest Pathogens

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Presenter
Devanushi Dutta

Type
Oral Presentation

Track
Agricultural & Biological Sciences

Abstract

The potent antimicrobial activity of silver nanoparticles is a well-established phenomenon against various plant pathogens. Gluconate and its salts are widely used in medical sciences for their antimicrobial efficacy. The combined antimicrobial effect of gluconate and silver nanoparticles was evaluated against post-harvest pathogens and showed promising activity against the potent post-harvest pathogen Penicillium italicum, with the highest mycelial growth inhibition of 58.23% at 250 ppm, as determined by disc diffusion and agar well assays. Biochemical parameters, such as ascorbic acid content, decreased in uncoated fruits compared with nanocoated fruits, whereas the browning index increased in uncoated fruits compared with nanocoated fruits. Evaluation of the shelf life of Khasi mandarin treated with the novel gluconate-capped silver nanoparticles showed that the shelf life increased to 32 days under ambient conditions and 45 days under refrigerated conditions while retaining its organoleptic characteristics. The penetrability of the nanoparticles was also investigated in nanocoated and uncoated fruits. Gluconate-capped silver nanoparticles were not detected within the fruit pulp, as confirmed by FTIR analysis, in which the functional groups remained unchanged in the pulp of nanocoated fruits compared with uncoated fruits. Thus, the present investigation provides insights into the potential of gluconate-capped silver nanoparticles for controlling the potent post-harvest pathogen Penicillium italicum, which causes blue mold in Khasi mandarin.

Keywords

Gluconate, Growth Inhibition, Silver Nanoparticle, Shelf Life



PROCEEDING
ACSTM2026

Data-Limited Stock Assessment of Benthic Fish in the Central Mediterranean

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Presenter
Sami Mili

Type
Oral Presentation

Track
Agricultural & Biological Sciences

Abstract

The overexploitation of marine resources is a major concern in the Mediterranean, including in Tunisian waters. The northern Tunisian region (GFCM, GSA 12) is home to commercially valuable benthic species, including European hake *Merluccius merluccius,* red mullet *Mullus barb*atus, and striped red mullet *Mullus surmuletus*. However, the status of these stocks remains poorly documented. This study aims to evaluate the current status of these three species to inform science-based fisheries management. Length data were collected from landings at Zarzouna (Bizerte) fishing port in northern Tunisia in 2024 (3,718 hake, 2,261 red mullet, and 3,185 striped red mullet). Catch time series (2006–2024) were obtained from the Directorate General of Fisheries and Aquaculture (DGPA). Two complementary stock assessment models were applied: CMSY++ (a catch-based model that estimates MSY, B/BMSY, and F/FMSY) and LBB (a length-based Bayesian model that estimates B/B0, F/M, and Lc/Lcopt). CMSY++ analysis revealed that the hake stock is recovering (B/BMSY = 0.99; F/FMSY = 0.88), whereas the red mullet (B/BMSY = 0.74; F/FMSY = 0.996) and striped red mullet (B/BMSY = 0.97; F/FMSY = 1.12) stocks are overexploited. However, the LBB analysis for 2023–2024 showed contrasting trends: red mullet biomass has improved (B/B0 = 0.91, B/BMSY = 2.3, F/M = 0.065), indicating a recent recovery. In contrast, striped red mullet remains overexploited (B/B0 = 0.34, B/BMSY = 0.84, F/M = 1.23). Hake showed low fishing pressure (F/M = 0.4), but small individuals are still being targeted (Lc = 18 cm, Lcopt = 44 cm). Significant seasonal differences in length frequencies were observed for all species (t-test, $p < 0.05$). The combined CMSY++ and LBB approach provides a robust assessment despite limited data. Red mullet shows encouraging signs of recovery, possibly due to reduced fishing effort during the lockdowns imposed due to SARS-CoV-2 and stock regeneration. Striped red mullet, however, remains critically overexploited and requires immediate management measures, such as enforcing minimum landing sizes and mesh regulations. Hake is on a rebuilding path, but juvenile catches must be reduced. These findings emphasise the necessity of adaptive, species-specific management in northern Tunisia (GSA 12).

Keywords

Stock Assessment, CMSY++, LBB, Data-limited Models, *Merluccius Merluccius, Mullus Barbatus, Mullus Surmuletus*, Mediterranean Fisheries



PROCEEDING
ACSTM2026

Enhancing Climate Resilience and Food Security Through Spate Irrigation in Sustainable Agriculture Systems

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Presenter
Iqtidar Hussain

Type
Oral Presentation

Track
Agricultural & Biological Science

Abstract

Climate change has increased the frequency and intensity of flooding, which is often perceived solely as a destructive phenomenon. However, seasonal floodwaters originating from arid mountainous regions can serve as a valuable resource when effectively managed. This study aims to assess the potential of spate irrigation as a strategic tool for enhancing climate resilience and food security in Pakistan and to identify key requirements for its sustainable implementation. Spate irrigation, defined as the diversion of high-velocity hill-torrent (Rod Kohi) floodwater through gravity-based regulatory structures to irrigate low-lying agricultural lands, offers significant potential for enhancing climate resilience and food security. In Pakistan, approximately 9% of the irrigated area currently depends on hill-torrent systems, covering nearly 1.4 million hectares. Nevertheless, estimates suggest that the potential area suitable for spate irrigation could expand to nearly 7 million hectares, representing up to 34% of irrigated land. Realizing this potential requires the construction of efficient diversion and control structures, systematic canal maintenance, and effective management of command areas. Despite its importance, spate irrigation remains under-researched, highlighting the need for a comprehensive national database and stronger integration into academic and policy frameworks. Future research should focus on breeding crop varieties capable of extracting moisture from deeper soil profiles, developing drought-tolerant cultivars and fruit species such as ber and date palm, and promoting afforestation to enhance groundwater recharge and mitigate land degradation. Institutional strengthening through dedicated provincial development authorities and the inclusion of spate irrigation in university curricula are essential for sustainable implementation. An integrated, multidisciplinary approach can transform hill-torrent systems into a strategic tool for improving rural livelihoods, strengthening food security, and building long-term climate resilience in vulnerable regions.

Keywords

Spate irrigation, Climate change adaptation, Food security, Drought tolerance, Sustainable agriculture, Groundwater recharge



Removal of Lead, Cadmium, Nickel, and Chromium from Wastewater Using a Walnut and Almond Shell-Based Adsorbent

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Presenter

Fatemehsadat Mirmohammadmakki

Type

Oral Presentation

Track

Agricultural & Biological Sciences

Abstract

Heavy metal contamination of water resources is a major environmental concern because heavy metals are persistent, non-biodegradable, and capable of accumulating in living organisms. This study evaluated the potential of a low-cost biosorbent prepared from a mixture of walnut and almond shells for removing lead, cadmium, nickel, and chromium from wastewater. The walnut and almond shells were washed, dried, ground, sieved, and chemically modified with phosphoric acid before being used as biosorbents in a batch adsorption system. The effects of contact time, solution pH, initial metal concentration, adsorbent dosage, temperature, and particle size on heavy metal removal were investigated. Heavy metal concentrations before and after treatment were determined using inductively coupled plasma–atomic emission spectrometry (ICP-AES). The removal of heavy metals was significantly influenced by solution pH, contact time, and adsorbent dosage. Increasing the biosorbent dosage and extending the contact time enhanced heavy metal removal. The highest removal efficiency was observed under acidic conditions at approximately pH 3.2, while a contact time of 48 h was identified as optimal. The walnut and almond shell mixture exhibited greater removal efficiency for chromium and lead than for nickel, while a considerable reduction in cadmium concentration was also observed. The mixture of walnut and almond shells has potential as a natural, inexpensive, readily available, and environmentally friendly biosorbent for reducing heavy metal contamination in wastewater. However, further studies are required to optimize the walnut-to-almond shell mixing ratio and evaluate the biosorbent's performance under industrial wastewater treatment conditions.

Keywords

Walnut Shell, Almond Shell, Biosorption, Wastewater Treatment, Heavy Metals, Lead, Cadmium, Nickel, Chromium



PROCEEDING
ACSTM2026

PCR-Based cry Gene Profiling and Insecticidal Activity of Native Bacillus thuringiensis Isolates Against Spodoptera frugiperda

Devendra Jain and Sushant Kumar
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Presenter
Devendra Jain

Type
Oral Presentation

Track
Agricultural & Biological Sciences

Abstract

Fall armyworm (Spodoptera frugiperda) is a major phytophagous insect that causes extensive crop damage and yield losses. The environmental risks associated with hazardous chemical pesticides have increased interest in eco-friendly biocontrol agents. Bacillus thuringiensis (Bt), which produces insecticidal crystal proteins, is widely used to control insect pests. This study evaluated the insecticidal potential of indigenous Bt strains against fall armyworm (FAW). A total of 24 uncharacterized Bt strains collected from distinct soil sampling locations in Jorhat, Lakhimpur, and Sibasagar districts of Assam, India, were investigated against FAW. Bacterial sporulation and vegetative cell morphology were examined using Gram staining and scanning electron microscopy. PCR screening was performed using primers targeting 14 cry genes associated with activity against FAW. Larvicidal activity was evaluated against neonate FAW larvae using a diet surface contamination method in triplicate under a completely randomized design. Seven concentrations of Bt spore–crystal mixture were applied to an artificial maize-based diet in 24-well plates, and cumulative mortality and larval weight were recorded for up to 10 days. The most potent isolates were molecularly identified by amplification and sequencing of the 16S rRNA gene (~1465 bp). All Bt strains were endospore-forming, rod-shaped, and Gram-positive. Twenty strains possessed insecticidal cry genes, with cry1F detected in 14 strains (58.33%) and cry1D in 11 strains (45.83%). The spore–crystal mixtures exhibited dose- and time-dependent toxicity against FAW, with final cumulative mortality ranging from 54.2% to 87.5%. The most potent strains, L52CL, L13C1, S9C1, and J11C5, showed 99.05–99.79% sequence similarity with B. thuringiensis strains in the NCBI GenBank database and were assigned accession numbers PZ457896, PZ567272, PZ567273, and PZ567274, respectively. The identified indigenous Bt strains demonstrated promising larvicidal activity against FAW and represent potential eco-friendly biocontrol agents. Further toxicological characterization of the full-length cry genes from the potent strains may support their application in biopesticide development and transgenic technology for FAW resistance management.

Keywords

FAW, Bacillus thuringiensis, Cry Protein, Bioassay



Phytotherapeutic Effects of Syzygium aromaticum Essential Oil on Testosterone-Induced BPH in Rats

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Presenter
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Type
Oral Presentation

Track
Agricultural & Biological Sciences

Abstract

Testosterone propionate exposure induces testicular dysfunction and benign prostatic hyperplasia (BPH) through oxidative stress and structural abnormalities. Natural phytoconstituents may provide therapeutic benefits through antioxidant activity. This study evaluated the antimicrobial, antibiofilm, and growth-inhibitory activities of Syzygium aromaticum (clove) essential oil against foodborne pathogens and its protective effects against BPH and reproductive toxicity in male rats. Clove essential oil was extracted and characterized using Gas Chromatography-Mass Spectrometry (GC-MS), followed by determination of total phenolic and flavonoid contents and antioxidant capacity. Antimicrobial, antibiofilm, and time-kill assays were performed against bacterial and fungal strains. For the in vivo study, 42 male rats were divided into seven groups, and testicular and prostate weights, sperm parameters, testosterone, malondialdehyde (MDA), glutathione (GSH), and antioxidant enzyme activities were assessed. GC-MS identified 11 volatile compounds accounting for >97.69% of the oil. The oil exhibited broad-spectrum antimicrobial activity, with inhibition zones of 4–23 mm and MIC values of 16.9–71.5 µL/mL. Fungi showed greater susceptibility, while Salmonella typhimurium was the most sensitive bacterium. At MIC, biofilm biomass of S. typhimurium, Escherichia coli, and Staphylococcus aureus decreased by 54.31%, 68.51%, and 60.80%, respectively, with sustained growth suppression over 24 h. Testosterone propionate-induced BPH significantly ($P<0.05$) increased MDA levels and sperm morphological abnormalities while decreasing sperm count, motility, viability, pH, testosterone, GSH, SOD, CAT, and GPx activities. Treatment with clove oil at 100 and 200 mg/kg significantly ($P<0.05$) reversed these alterations, reducing oxidative damage and restoring hormonal balance, sperm quality, and antioxidant defenses. In conclusion, S. aromaticum essential oil exhibits potent antimicrobial and antibiofilm activities and mitigates testosterone propionate-induced BPH and testicular dysfunction, potentially through hormonal regulation and suppression of oxidative stress.

Keywords

Antimicrobial Activity, Benign Prostatic Hyperplasia (BPH), Essential Oil, Oxidative Stress, Syzygium aromaticum (Clove), Testicular Dysfunction



Metagenomic Profiling Reveals Diverse Microbial Communities and Potential Public Health Risks Associated with Retail Chicken Meat Sold in Indian Markets

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Presenter
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Type
Oral Presentation

Track
Agricultural & Biological Sciences

Abstract

Chicken meat can become contaminated by diverse microorganisms during slaughter, processing, transportation, and retail handling. Culture-dependent methods detect only a limited proportion of these organisms and may therefore underestimate the microbial complexity of meat. This study investigated the bacterial communities present on retail chicken meat using a culture-independent metagenomic approach and evaluated their relevance to food safety and public health. Ten chicken meat samples were collected from retail markets. Bacterial DNA was extracted directly from the samples, and the V3–V4 region of the 16S rRNA gene was amplified. The resulting amplicons were sequenced using the Illumina MiSeq platform. Sequence data were processed through the DADA2 pipeline to identify amplicon sequence variants and determine the taxonomic composition of the bacterial communities. The analysis detected 273 unique amplicon sequence variants representing five phyla, seven classes, 16 orders, 33 families, and 59 genera. Flavobacteriaceae was the most abundant bacterial family, accounting for 27.03% of the identified sequences, followed by Moraxellaceae (22.04%), Enterobacteriaceae (15.67%), Wohlfahrtiimonadaceae (9.40%), Morganellaceae (7.92%), and Pseudomonadaceae (5.02%). The occurrence of bacterial groups associated with spoilage, environmental contamination, and opportunistic infections demonstrated the complex microbial landscape of retail chicken meat. The findings show that culture-independent sequencing can provide a more comprehensive understanding of meat-associated microbiota than conventional culture methods. The detection of diverse bacterial communities, including families containing potentially pathogenic and spoilage-associated organisms, highlights the need for improved hygienic practices during poultry slaughter, processing, and retail handling. Metagenomic surveillance could complement routine microbiological testing and strengthen risk-based monitoring of poultry meat within an integrated food-safety framework.

Keywords

Chicken Meat, Food Safety, Metagenomics, Microbial Diversity, 16S rRNA Sequencing, Public Health



Alleviation of Lead Acetate-Induced Toxicity in Mungbean Through Magnesium Sulphate Seed Priming

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Presenter
Sananda Mondal

Type
Oral Presentation

Track
Agricultural & Biological Sciences

Abstract

Lead (Pb) contamination in soil acts as a major constraint for mungbean (Vigna radiata L.), impairing seed germination, seedling establishment, and photosynthetic efficiency through oxidative stress. To address this, a two-phase experiment was conducted to assess the efficacy of magnesium sulfate ($MgSO_4 \cdot 7H_2O$) seed priming in mitigating Pb acetate-induced toxicity in mungbean variety Samrat. Seeds primed with 5 mM and 10 mM $MgSO_4$ were evaluated against unprimed controls under Pb concentrations ranging from 0–2000 mg L^{-1}. Exposure to Pb markedly reduced germination percentage, plumule and radicle length, root number, biomass, chlorophyll content, and plant height, while elevating proline and sugar levels. $MgSO_4$ priming alleviated these detrimental effects, with 5 mM treatment consistently outperforming 10 mM by sustaining higher germination (68–71% under severe stress), seedling vigor, leaf area, root volume, and chlorophyll retention. Primed seedlings also exhibited enhanced osmolyte accumulation and antioxidant activity, indicating improved osmotic regulation and stress tolerance. Statistical analyses revealed significant improvements across morpho-physiological and biochemical parameters. Overall, $MgSO_4$ seed priming, particularly at 5 mM, emerges as a cost-effective approach to strengthen mungbean resilience against Pb stress, supporting sustainable cultivation in contaminated soils. Furthermore, the study identifies ~1000 mg L^{-1} Pb as the tolerance threshold for optimal growth and development of variety Samrat.

Keywords

Mungbean, Seed Priming, Magnesium Sulfate, Lead Acetate, Osmolytes



PROCEEDING
ACSTM2026

Transforming Dryland Food Systems Through Conservation Agriculture

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Presenter
Rachid Mrabet

Type
Oral Presentation

Track
Agricultural & Biological Sciences

Abstract

Global food systems are at a critical juncture, as diverging development pathways intensify land–climate interactions, deepen food insecurity, and threaten vulnerable livelihoods. Conventional agri-food practices contribute nearly one-third of global greenhouse gas emissions and have degraded more than one billion hectares of agricultural land, with fragile drylands among the most affected. This study aimed to assess the current status, opportunities, and barriers to Conservation Agriculture (CA) adoption and develop a roadmap for its large-scale implementation in dryland food systems. The study synthesized published evidence on global CA adoption, its environmental and socioeconomic benefits, regional adoption patterns, and major implementation constraints, using Water–Energy–Food–Ecosystems (WEFE) nexus and Circular Economy principles as guiding frameworks. The synthesis showed that CA is practiced on approximately 205–250 million hectares, representing 15–16% of global cropland. Adoption is highest in South America (>70%; 83 Mha), North America (66 Mha), and Australia (23 Mha), but remains limited in Asia (15 Mha), Europe (7–10 Mha), and Sub-Saharan Africa (3–4 Mha). Major barriers include machinery costs, land fragmentation, transitional yield gaps, and competing demands for crop residues and biomass. A five-pillar roadmap was developed encompassing policy reform and incentives, mechanization and infrastructure access, biomass and residue management, capacity development and extension, and institutional alignment with long-term investment. Scaling these pillars toward 50% global cropland adoption by 2050 could strengthen food security, climate resilience, resource-use efficiency, and ecosystem restoration. CA therefore provides a strategic pathway for transforming vulnerable dryland food systems while supporting international commitments under the UNFCCC, UNCCD, and CBD.

Keywords

Conservation Agriculture, Climate Resilience, Sustainability, Food Security



PROCEEDING
ACSTM2026

Isolation, Screening, and Optimization of Bacterial Strains for Protease Production

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Presenter
Sana Zahoor

Type
Oral Presentation

Track
Agricultural & Biological Sciences

Abstract
Proteases are hydrolytic enzymes that cleave peptide bonds in proteins, producing shorter peptides or amino acids. They have wide applications in the food, pharmaceutical, detergent, leather, and textile industries. This study aimed to isolate indigenous protease-producing bacteria and optimize the conditions for protease production. Bacterial isolates were obtained from various sources, including milk, yogurt, meat, soy sauce, soybean, compost, sweet lime, wheat flour, gram flour, soil, rice, and tomato, using skim milk agar as a screening medium. A total of 34 protease-producing isolates were obtained using the spread plate method. Among these, isolate W2 exhibited the largest zone of hydrolysis on skim milk agar and was selected for further optimization studies. Isolate W2 was characterized using morphological, biochemical, and molecular methods and was identified as belonging to the genus Micrococcus based on 16S rRNA gene sequencing. Protease production by Micrococcus sp. W2 was optimized under submerged fermentation by evaluating the effects of different media, carbon sources, pH, temperature, and incubation time. The highest protease activity (1.39 U/mL/min) was achieved in medium M2 at pH 7.5 and 37°C after 48 h of incubation. The findings demonstrate that the indigenous Micrococcus sp. W2 is a promising source of protease production and may provide a cost-effective alternative for enzyme production with potential industrial applications.

Keywords
Protease, Optimization, Skim Milk Agar, Screening, Submerged Fermentation



PROCEEDING
ACSTM2026

Copper–Chitosan Nanoparticle Seed Priming Enhances Foxtail Millet Growth under Drought Stress

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Presenter
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Type
Oral Presentation

Track
Agricultural & Biological Sciences

Abstract

Drought stress adversely affects plant growth and development, resulting in significant losses in crop yield and quality. Nanoparticle-mediated seed priming has emerged as a promising strategy for mitigating drought stress and enhancing plant resilience under water-limited conditions. This study investigated the effects of copper–chitosan nanoparticles (Cu–CNPs) on seed germination, physiological growth, and antioxidant responses in foxtail millet under drought stress. Cu–CNPs were synthesized using a green approach with chitosan as a stabilizing agent and characterized by UV–Vis spectroscopy and dynamic light scattering (DLS), confirming their nanoscale size and stability. Foxtail millet seeds were primed with different concentrations of Cu–CNPs (0%, 5%, 10%, and 20%) and evaluated for germination traits, physiological parameters, and enzymatic activities. Moderate Cu–CNP concentrations (5–10%) significantly enhanced germination percentage, seedling vigor index, root and shoot elongation, and leaf area index (LAI) under both normal and drought conditions. Cu–CNP priming also improved chlorophyll and protein contents, relative water content (RWC), and total water content (TWC), indicating improved photosynthetic performance and water regulation. Biochemical analysis showed that Cu–CNPs modulated antioxidant enzyme activities in a concentration-dependent manner. Under drought stress, the 5% Cu–CNP treatment resulted in the highest superoxide dismutase (SOD) and catalase (CAT) activities, indicating enhanced antioxidant defense and oxidative stress tolerance. However, higher Cu–CNP concentrations (≥20%) exhibited inhibitory effects, suggesting potential phytotoxicity associated with excessive copper exposure. The study concludes that Cu–CNP seed priming at 5–10% effectively enhances drought tolerance, antioxidant activity, and early seedling performance in foxtail millet. These findings highlight the potential of Cu–CNPs as eco-friendly biostimulants for improving crop resilience under abiotic stress and supporting sustainable agriculture in dryland regions.

Keywords

Foxtail Millet, Copper–Chitosan Nanoparticles, Seed Priming, Antioxidant Enzymes, Sustainable Agriculture, Nanopriming, Oxidative Stress Tolerance



PROCEEDING
ACSTM2026

Optimization of an Eco-Friendly Approach for the Green Synthesis of CuAg–TiO_2 Nanocomposites Using Endophytic Fungal Filtrates

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Presenter
Hafiza Farhat

Type
Oral Presentation

Track
Agricultural & Biological Sciences

Abstract

The increasing prevalence of pathogenic microorganisms and oxidative stress has created a need for effective and eco-friendly nanomaterials with potential biomedical applications. Microbial-mediated synthesis offers a sustainable approach for developing nanocomposites with enhanced antimicrobial and antioxidant properties. The study was designed to synthesize CuAg/TiO2 nanocomposite by using microbial inoculum. The microbes used in the study is endophytic fungi (Penicillium albicans). The fungal culture was isolated from the healthy plant samples collected from the agriculture field. To prepare the broth of Penicillium albicans and then used for the synthesis of CuAg/TiO2 nanocomposite. Adding the extract of Penicillium albicans in to the salt solution containing the salt of Titanium, Copper and Silver, constant stirring was performed until the reaction is finished, centrifuge and then dry the nanomaterials. The synthesized nanomaterials is characterized by using of UV–visible spectrum, Fourier transform infrared spectroscopy (FTIR), X-ray diffraction analysis (XRD), Scanning electron microscope (SEM) and Thermogravimetric analysis (TGA). The synthesized CuAg/TiO2 nonmaterial were further evaluated for biomedical application by checking the fungicidal, bacteriostatic properties and their scavenging properties against oxidative stress level. Disc diffusion method was used for fungicidal properties including Fusarium solani, F. oxysporum, Aspergillus flavus, Alternaria alternata and Macrophomina phaseolina, while, bactericidal activity were checked against Escherichia coli, Salmonella typhi, Bacillus subtilis and Staphylococcus aureus. CuAg/TiO2 nanocomposite showed more potential in terms of biomedical application by forming the increased zone of inhibition against pathogens and also better results for oxide radicle scavenging activity.

Keywords

Penicillium Albicans, CuAg/TiO_2 Nanocomposite, Green Synthesis, Characterization, Biomedical Applications, Oxidative Stress



PROCEEDING
ACSTM2026

Microbial Based Restoration of Coal Mine-Degraded Lands Using Native Microbial Strains

Darshan K, Avinash Jain, Komal Rani and Sourabh Dubey
ICFRE-Tropical Forest Research Institute, Jabalpur, Madhya Pradesh

Presenter
Darshan K

Type
Oral Presentation

Track
Agricultural & Biological Sciences

Abstract

Coal mine extraction and processing cause severe land degradation, including soil loss, nutrient depletion, compaction, salinity, drought stress, reduced organic matter, and loss of native biodiversity in mining and surrounding area. Establishing self-sustaining vegetation in these areas is difficult because conventional reclamation often emphasizes physical stabilization and planting, while overlooking the biological processes essential for soil recovery and plant–microbe interactions. Poor rhizosphere development and diminished microbial communities further limit nutrient cycling, plant growth, stress tolerance, and long-term ecosystem recovery. The study aims to integrative rhizosphere engineering as a regenerative approach for restoring degraded coal-mining landscapes. A total of 750 bacterial isolates were obtained from rhizosphere and non-rhizosphere soil samples collected from different coal mining sites using serial dilution and spread plate isolation on a range of general and specific culture media. The bacterial isolates were initially screened qualitatively for their ability to solubilize phosphorus (P), potassium (K), and zinc (Zn) using appropriate selective media. Isolates showing a solubilization index greater than 3 were considered highly promising and were selected for further screening. In comparison, ZSB showed considerably greater solubilization potential, with 333 isolates (31.5%) showing moderate activity and 135 isolates (12.8%) showing high activity, while 432 isolates (50.8%) showed no solubilization. The isolates were compared based on their quantitative performance and were subsequently tested against four selected fungal pathogens. Based on the percentage inhibition of fungal growth, isolates showing more than 50% inhibition were considered effective antagonistic strains . Based on the combined results of the quantitative assays and multiple screening parameters, the best-performing isolates were selected for detailed characterization. 12 elite strains are selected for further biochemical characterization. The selected strains will be tested in overdamped sites to transform degraded mine lands into resilient, biodiverse ecosystems, supporting sustainable land regeneration and land degradation neutrality.

Keywords

Native PGPR; Coal Mine-Degraded Lands; Microbial Restoration; Plant Growth Promotion; Sustainable Land Rehabilitation



PROCEEDING
ACSTM2026

Emotional Neglect Experiences and Bulimic Symptomatology in Pakistani Adolescents: Role of Executive Functioning

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Presenter
Shafaq Iqbal

Type
Poster Presentation

Track
Social Sciences and Humanities

Abstract

Childhood emotional neglect is increasingly recognized as an important risk factor for maladaptive eating behaviors during adolescence. Executive functioning, including the capacity to regulate behavior, inhibit responses, and manage cognitive demands, may represent an important mechanism linking adverse childhood experiences with bulimic symptomatology. This pathway is particularly important in Pakistan, where research examining childhood adversity, executive functioning, and adolescent eating disturbances remains limited. The present study examined the association between emotional neglect and bulimic symptomatology, the relationship between emotional neglect and executive functioning, and whether executive functioning mediates the relationship between emotional neglect and bulimic symptomatology. Gender differences were also examined. A cross-sectional correlational design was employed with 464 Pakistani adolescents aged 15–18 years, including 225 boys and 239 girls, recruited from schools and colleges. Participants completed the Urdu versions of the Eating Attitudes Test–26, Childhood Trauma Questionnaire–Short Form, and Short Executive Function Scale. Pearson correlations were conducted separately by gender, while mediation analysis included gender as a covariate and independent-samples t tests examined gender differences. Among boys, emotional neglect was positively associated with bulimic symptomatology, whereas its association with executive functioning was non-significant. Among girls, emotional neglect was negatively associated with executive functioning, while its association with bulimic symptomatology was non-significant. Executive functioning was negatively associated with bulimic symptomatology in both genders. Mediation analysis showed that executive functioning significantly partially mediated the relationship between emotional neglect and bulimic symptomatology. Boys also reported significantly higher levels of emotional neglect and bulimic symptomatology than girls. Findings identify executive functioning as a potential mechanism linking emotional neglect with bulimic symptomatology and highlight gender-related patterns. The findings support culturally sensitive, gender-responsive prevention and early-intervention strategies targeting childhood adversity, executive functioning, and disordered eating among Pakistani adolescents.

Keywords

Emotional Neglect, Bulimic Symptomatology, Executive Functioning, Adolescents, Gender Differences, Mediation Analysis, Pakistan



PROCEEDING
ACSTM2026

AI-Powered Multi-Modal Sensor Fusion for Predictive Poultry Health Management in Smart Farms

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[2]Software Engineering and Digital Innovation Centre, Management and Science University, Shah Alam, Malaysia
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Presenter
Asif Iqbal Hajamydeen

Type
Oral Presentation

Track
Social Sciences and Humanities

Abstract

Poultry farming is an influential part of global food production and rural livelihoods, but outbreaks of poultry diseases remain a significant cause of economic losses, animal welfare concerns, and production inefficiency. Traditional poultry disease management is based on general observation and treatment in response to symptoms, potentially leading to late disease detection and disease progression before clinical symptoms occur. While smart farming technologies have introduced environmental sensors, acoustic monitoring, poultry health management, and computer vision for automated surveillance, current solutions are often deployed as standalone systems. This fragmentation of environmental, behavioural, and visual information makes comprehensive analysis difficult and hinders the detection of subtle patterns associated with emerging health issues. Moreover, most available methods focus on symptom detection rather than predicting disease risks, while high implementation costs and complex integration requirements hinder their adoption. This research proposes a novel multi-modal sensor integration framework using artificial intelligence (AI) for poultry health monitoring in smart farms. The proposed architecture comprises an environmental sensing system to collect temperature, humidity, and air quality measurements, together with behavioural and video monitoring to provide a unified multi-modal representation of bird condition and farm environment. Deep learning methods are designed to detect behavioural, environmental, temporal, and spatial patterns related to developing health risks and provide early warning signs before the onset of clinical symptoms. The research adopts an experimental, mixed laboratory- and field-based approach for framework development, training, and validation. Historical health and outbreak data are combined with continuously collected sensor and video data. The proposed approach is evaluated using detection accuracy, prediction lead time, false-alarm rates, computational demands, scalability, and cost. The framework is expected to provide a scalable and cost-effective system for intelligent poultry health management, supporting animal welfare, production efficiency, disease prevention, and economic sustainability in poultry farming systems.

Keywords

Sensor Analytics, Deep Learning, Temperature and Humidity Monitoring, Early Disease Detection, Intelligent Management, Image Processing



PROCEEDING
ACSTM2026

Genomic Biomarkers and Phylogenetic Insights into Drug-Susceptible and Drug-Resistant Mycobacterium Tuberculosis Strains: Bioinformatics Study Using NCBI,BV-BRC (PATRIC) Databases with TB-Profiler

Presenter

Mekkanti Manasa Rekha

Dr Mekkanti Manasa Rekha, Jegashree V and Subikshya Karki

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Type

Poster Presentation

Track

Medical & health Sciences

Abstract

Background and Objective Tuberculosis (TB), caused by Mycobacterium tuberculosis (MTB), remains a major cause of death. MDR-TB, pre-XDR-TB, and XDR-TB challenge conventional susceptibility testing due to its time-consuming and technical nature. Whole-genome sequencing (WGS) enables rapid resistance prediction and genomic surveillance. This study analyzed publicly available MTB WGS data to identify resistance mechanisms, biomarkers, lineages, and phylogenetic relationships. Methods A retrospective in silico study was conducted from February–July 2026 using MTB genomes from NCBI GenBank/Assembly and BV-BRC. Genomes were filtered by size (4.0–4.6 Mbp), host, and duplication. Snippy v4.0.2, SNP-sites v2.5.1, TB-Profiler v6.3.0, and IQ-TREE v3.1.1 were used for SNP analysis, resistance prediction, lineage assignment, and phylogenetic reconstruction. Statistical analyses included Fisher's Exact Test with Benjamini-Hochberg correction, chi-square, Mann-Whitney U, and L2-regularized logistic regression. Results Of 1,783 genomes, 1,308 non-redundant genomes were retained. Resistance profiling of 1,307 genomes identified 63,809 variants, including 3,884 resistance variants across 73 genes. Resistance occurred in 60.4% of genomes, including 22.0% MDR-TB, 17.0% pre-XDR-TB, and 1.0% XDR-TB. Common mutations included katG p.Ser315Thr (31.8%) and rpoB p.Ser450Leu (30.0%). Lineage 4 predominated (51.7%), followed by Lineage 2 (20.1%). MDR/pre-XDR Lineage 2 strains formed tight sub-clades suggestive of clonal transmission. Lineage and resistance were significantly associated ($p = 1.14 \times 10^{-5}$). A total of 104 biomarkers were validated. L2-regularized regression achieved AUC-ROC 0.932 ± 0.017, with 100% specificity and 83.3% sensitivity. Conclusion Distinct resistance-associated mutational and phylogenetic patterns were identified. The 104 biomarkers and proposed nine-mutation diagnostic panel may improve molecular resistance detection and genomic epidemiology.

Keywords

Mycobacterium Tuberculosis; Genomic Biomarkers; Drug Resistance; Whole-genome Sequencing; Phylogenetic Analysis; Comparative Bioinformatics; Multidrug-resistant Tuberculosis; TB-Profiler; lineage Classification; Genomic Surveillance.



Lady Health Workers and Primary Healthcare in Rural Punjab: Barriers, Enablers, and Outcomes

Presenter
Muntha Ashfaq

Muntha Ashfaq
The Islamia University of Bahawalpur, Bahawalpur, Pakistan

Type
Poster Presentation

Track
Medical & health Sciences

Abstract

One of the community-based healthcare programs in South Asia, Pakistan's Lady Health Worker (LHW) Program, started in 1994 and employed over 100,000 female health workers. They provided services such as family planning and health education to underprivileged communities. However, the program continued to face several obstacles. The objectives of this study were to identify major obstacles and facilitators that affected LHW performance and primary healthcare service delivery in rural Punjab; and produce evidence-based recommendations to strengthen the LHW program as a sustainable and scalable primary healthcare delivery model in LMIC settings. A mixed-methods study design was used in selected rural districts of Punjab. Structured questionnaires were used to collect quantitative data from LHWs, community members, and primary healthcare facility employees. Focus group discussions with local women and in-depth interviews with district health managers and LHW supervisors were conducted to collect qualitative data. The WHO Health Systems Framework guided the examination of supply-side and demand-side factors affecting program effectiveness. Data from both components were triangulated and interpreted using descriptive statistics and thematic analysis. Global evidence showed that community health worker programs worked best with effective supervision and community trust. Similar challenges were observed in Pakistan, where improved training and support for LHWs were needed. This study identified the obstacles and facilitators influencing the performance of Lady Health Workers in rural Punjab to enhance primary healthcare delivery and promote scalable and sustainable community health systems in LMICs.

Keywords

Lady Health Workers, Community Health Workers, Primary Healthcare, Rural Punjab, Pakistan, WHO Health Systems Framework, Maternal & Child Health, LMIC, Universal Health Coverage



PROCEEDING
ACSTM2026

The Hidden Biological Burden of Microplastics: Emerging Implications for Modern Human Health

Presenter
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Environmental Health Research Center, Lorestan University of Medical Sciences, Khorramabad, Iran

Type
Poster Presentation

Track
Medical & health Sciences

Abstract

Microplastics (MPs) are emerging as a major category of environmental pollution that has been detected across diverse matrices, including air, water, food, and consumer products. The increasing prevalence of these particles has raised significant concerns regarding their potential biological and toxicological impacts on human health. This literature-based review aims to examine the hidden biological burden of microplastic exposure and to highlight its emerging implications for human health. Relevant literature on microplastic exposure, oxidative stress, inflammation, endocrine disruption, reproductive toxicity, and other biological effects was reviewed to assess the current evidence regarding their potential impacts on human health. The growing body of research indicates that MPs may interfere with multiple physiological systems, including reproductive health, dermatological integrity, and metabolic regulation, primarily through disruption of key cellular and molecular pathways. Particular attention has been given to their potential role in hormonal imbalance and reproductive aging, which represents a growing concern in environmental health sciences. In addition to their intrinsic toxicity, MPs may function as carriers or vectors for environmental contaminants and hazardous chemical substances, thereby amplifying their overall biological impact. Although recent studies have provided important insights into endocrine disruption and reproductive toxicity, significant knowledge gaps remain regarding the underlying mechanisms of action and the long-term consequences of sustained exposure to microplastics in human populations. Overall, the available evidence highlights the potential health implications of chronic microplastic exposure and the need for further research to clarify its long-term biological effects.

Keywords

Microplastics, Oxidative Stress, Endocrine Disruption, Environmental Toxicology, Inflammation



PROCEEDING
ACSTM2026

Resveratrol-Containing Spanlastics as a Novel Strategy for Preventing UV-Induced Skin Damage

Presenter
Rabab Kamel

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Type
Poster Presentation

Track
Medical & health Sciences

Abstract

Aging is a natural biological process that increases the risk of various diseases, and the skin is particularly vulnerable to damage by unprotected exposure to ultraviolet radiation. This study developed Spanlastics, which are surfactant-based elastic vesicles, to enhance the delivery and efficacy of the water-insoluble drug, resveratrol. The elastic nanovesicles were prepared using the thin-film hydration method. The selected formulation demonstrated superior properties, including the highest drug entrapment efficiency, the smallest particle size, enhanced invitro antioxidant effect, and the most rapid drug release ($p < 0.05$). Safety evaluation via the Draize test confirmed that both the selected formulation and the free drug suspension were safe for skin application (PII < 2). In vivo studies assessed the photoprotective effect against UVB-induced damage by comparing the designed formulation with the drug suspension. Evaluation included visual examination and analysis of key biomarkers: antioxidant (CAT, GSH, and SOD), anti-inflammatory (IL-6, IL-8, and NF-κB), and anti-wrinkling (MMP-1 and GM-CSF) markers. While the free drug showed a prophylactic effect, the nanovesicles were significantly superior across all biochemical markers ($p < 0.05$). These results were corroborated by histopathological examination. Ultimately, this work demonstrates that elastic nanovesicles are a promising strategy for overcoming the poor solubility of resveratrol and improving its therapeutic efficacy.

Keywords

Vesicles, Aging, Skin, Photo-protection, Nanoformulation



PROCEEDING
ACSTM2026

Personalized Cancer Therapy: Reviewing Precision-Driven Innovations in Physical and Mechanical Approaches

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Presenter

Asma Arshad

Type

Poster Presentation

Track

Medical & health Sciences

Abstract

The ongoing challenge of combating cancer has driven the development of increasingly targeted and personalized therapeutic approaches. Cancer still affects millions of people worldwide each year, despite advances in conventional cancer therapies such as radiation, chemotherapy, and surgery. Recently, the focus has shifted to tailored therapy, driven by advances in precision oncology that target specific biological pathways contributing to cancer development. This review highlights recent advances in mechanical and physical cancer therapies, emphasizing ultrasound-based techniques that efficiently target tumors while preserving healthy tissue, such as histotripsy and High-Intensity Focused Ultrasound (HIFU). Using sound waves to treat cancer has become a novel strategy, especially with the use of histotripsy. HIFU uses focused ultrasound waves to target and eliminate malignant tissues. It also explores techniques to reprogram cancer cells into stem cells for novel therapies and ways to use focused energy to cause rapid cancer cell death. Together with precision treatments such as immunotherapy and nanotechnology, these new techniques are contributing to advances in cancer treatment by increasing its efficacy and targeting. Future studies should focus on refining these customized methods and identifying more effective approaches for treating cancers in difficult-to-reach locations. Precision cancer therapy advancements bring us closer to significant advances in cancer care by offering the possibility of more efficient and less invasive solutions.

Keywords

Personalized Cancer Therapy, Precision Oncology, Histotripsy, HIFU, Mechanical Therapy, Nanotechnology



PROCEEDING
ACSTM2026

Modern IVF Workflow, PGT, Prenatal Testing, Emerging Technologies and AI in ART Laboratories

Presenter
Myra Sharma

Myra Sharma
Amity Institute of Microbial Technology, Amity University, Noida, India

Type
Poster Presentation

Track
Medical & health Sciences

Abstract

Total Fertility Rates (TFR) have been falling globally, with over half of all nations operating below the replacement level of 2.1. India's TFR has declined to 1.9 overall, with lower rates reported in some urban states, shifting clinical priorities from population control toward fertility management. Modern Assisted Reproductive Technology (ART) is increasingly important for fertility care, yet laboratories face persistent operational fragmentation. This paper presents a standardized, multi-tiered operational framework mapping the complete ART pipeline. The framework establishes standardized pre-IVF assessment protocols for female endocrine profiling, including AMH and FSH, and male gamete evaluation, including DFI and micro-TESE, with decision branches for ICSI, cryopreservation, and extended blastocyst culture. To support genetic screening, sampling strategies, including non-invasive PGT (niPGT) and trophectoderm biopsy, are evaluated alongside advanced genomic approaches. Whole-Genome Sequencing (WGS-PGT) is discussed as an integrated approach for assessing numerical aneuploidies (PGT-A), monogenic conditions (PGT-M), and structural rearrangements (PGT-SR). Within the bioinformatics pipeline, sequence alignment using BWA-MEM, variant calling using GATK, and copy-number evaluation through B-Allele Frequency and Log R Ratio metrics can support the interpretation of genomic findings and reduce potential false-positive mosaicism calls. To support implantation assessment, endometrial 16S rRNA metagenomics (EMMA) is considered for evaluating endometrial microbial profiles, particularly in recurrent implantation failure. Operational errors can be mitigated through smart benches and RFID-based sample tracking, while AI-based approaches may support gonadotropin dosing, sperm selection, dynamic media flow through biomimetic microfluidic chips, and time-lapse embryo grading. Following implantation, cell-free DNA testing or diagnostic procedures, including CVS and amniocentesis, can provide further fetal assessment. By integrating precision embryology, high-throughput genomics, and AI-assisted automation into a standardized workflow, this framework addresses key decision-making and operational bottlenecks across the ART pipeline and provides a structured approach for improving laboratory coordination, genetic assessment, and fertility care.

Keywords

Assisted Reproductive Technology (ART), Whole-Genome Sequencing (WGS-PGT), Preimplantation Genetic Testing, Bioinformatics, Embryo Selection, Biomimetic Microfluidics, Artificial Intelligence, Endometrial Metagenomics.



PROCEEDING
ACSTM2026

Artificial Intelligence of Things -Driven Remote Patient Monitoring for Early detection in Smart Healthcare

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Presenter
Seema Ansari

Type
Poster Presentation

Track
Physical Sciences and Engineering

Abstract

Nowadays, the healthcare system is facing major challenges that require significant transformation, including increasing healthcare demands due to aging populations and limited medical resources, which contribute to substantial inequalities in health outcomes. In recent years, the interaction between the Internet of Things (IoT) and Artificial Intelligence (AI) has become increasingly prominent. AI requires access to massive datasets to generate meaningful findings and facilitate effective decision-making, while IoT requires intelligent techniques to extract meaningful information from the large amounts of data it generates from sensors and wearable devices, etc. This convergence has driven the development of Artificial Intelligence of Things (AIoT), which represents an innovative approach in which AI-enabled IoT systems are driving a shift in paradigm in Healthcare from 4.0 to Healthcare 5.0. The Healthcare 4.0 era depends on extremely interconnected, patient focused care that was greatly reliant on IoT; nevertheless, the said healthcare infrastructure didn't offer intelligent healthcare management and remote personalized care. Healthcare 5.0 incorporates advanced AIoT-enabled technologies to provide pervasive and patient-centered care through smart remote monitoring, intelligent self-management, and personalized telemedicine. AIoT integrates real-time data from connected wearable devices with AI algorithms to facilitate real-time monitoring and predictive healthcare. It enhances remote patient monitoring through early detection, timely intervention, dynamically personalized care, and improved patient outcomes.

Keywords

Artificial Intelligence of Things, Healthcare 5.0, Remote Patient Monitoring, Smart Healthcare, Telemedicine, Wearable Devices



PROCEEDING
ACSTM2026

Advances in Biochemical Engineering Thermodynamics Using Equations of State

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Presenter
Arash Pakravesh

Type
Poster Presentation

Track
Physical Sciences and Engineering

Abstract

Biochemical engineering processes increasingly involve complex mixtures, high-value biomolecules, and non-ideal operating conditions that require accurate thermodynamic characterization for efficient design and optimization. Traditional activity coefficient models often have limitations when applied to systems containing proteins, biopolymers, electrolytes, and supercritical fluids. In recent years, equations of state (EOS) have emerged as powerful tools for modeling phase equilibria and thermodynamic properties in biochemical systems. This article reviews recent advances in EOS-based methodologies and their applications in biochemical engineering thermodynamics. Developments in cubic equations of state, statistical associating fluid theory (SAFT) variants, perturbed-chain models, and electrolyte equations of state are examined, with emphasis on their ability to describe complex molecular interactions, including association, hydrogen bonding, and ionic effects. Applications in bioproduct separation, fermentation, supercritical fluid extraction, protein precipitation, and biorefinery operations are discussed to demonstrate the practical significance of these models. The integration of EOS frameworks with molecular simulation techniques, advanced parameter estimation strategies, and data-driven approaches is also explored as a means of improving predictive capability. Despite challenges related to parameter availability and the representation of highly heterogeneous biological systems, EOS-based thermodynamic modeling continues to expand the scope and accuracy of biochemical process design. These advances provide a foundation for developing sustainable, energy-efficient, and economically viable bioprocesses.

Keywords

Equations of state, Thermodynamics, Biochemical engineering, SAFT



Grains of Identity: The Role of Couscous in North African Heritage and Cuisine

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Presenter

Noureddine Chaachouay

Type

Poster Presentation

Track

Agricultural & Biological Sciences

Abstract

Couscous plays a significant cultural role in the Maghreb region and is an essential element of people's day-to-day and celebratory meals. It is an ancient food made from steamed and crushed wheat called semolina, the coarse middling of durum wheat. The purpose of this study is to explore the cultural, historical, and culinary significance of couscous, particularly its methods of preparation, variations, and contribution to the formation of customs and traditions among groups and families of indigenous populations in Morocco. Data for this study were gathered through a semi-structured questionnaire and observations of local populations in Morocco between January 5, 2021, and May 16, 2023. The questionnaire included both quantitative and qualitative data collection methods. Researchers interacted with Moroccan kitchens and closely observed specific but different preparation methods, ingredients, and utensils used to prepare couscous. Randomly selected people with varied demographic characteristics (age, sex, and socioeconomic status) were identified using stratified sampling from 24 urban and 11 rural sites. Moroccan households consider couscous the second most favourite dish after tajine. Couscous mainly comprises durum wheat semolina, but other cereal grains are also used as substitutes, in accordance with regional preferences and traditions that influence cooking methods and food formulations. As a main pillar of Moroccan culture, couscous symbolises the integration of people and the collective practices that families share with one another and with the wider society. Couscous brings together Moroccan culture, maintaining traditional cultural practices while emphasising regional food culture. The nutrients in couscous demonstrate its potential as a versatile and healthy food suitable for various dietary needs. Further research on the nutritional composition of couscous is required to better understand its nutritional value for dietary assessment and health management. Collection schemes should record both traditional regional cooking methods and the cultural values associated with couscous to help preserve the traditions of this cuisine.

Keywords

Couscous, Food, North Africa, Wheat Semolina, Vegetables and Meats, Versatile Ingredient.



PROCEEDING
ACSTM2026

Green Synthesis of Silver Nanoparticles Using Clove Extract and Their Antifungal and Antibiofilm Activity

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Presenter
Nitika Anand

Type
Poster Presentation

Track
Agricultural & Biological Sciences

Abstract

Oral candidiasis and denture-associated biofilms caused by Candida albicans represent significant challenges in dental healthcare, necessitating the development of novel antimicrobial strategies. Antimicrobial resistance among fungi is on the rise, highlighting the need for alternative therapeutic approaches. The present study aimed to determine the antifungal and antibiofilm potential of silver nanoparticles (AgNPs) synthesized using clove extract through a green synthesis approach against C. albicans. Clove-mediated AgNPs were synthesized and characterized using UV–Visible spectroscopy, Dynamic Light Scattering (DLS), Transmission Electron Microscopy (TEM), and Fourier Transform Infrared (FTIR) spectroscopy. UV–Visible analysis confirmed nanoparticle formation, while TEM revealed predominantly spherical nanoparticles. DLS and FTIR analyses further demonstrated the particle size distribution and involvement of phytoconstituents in nanoparticle stabilization. Antifungal activity was assessed against C. albicans using the agar well diffusion method, along with determination of the minimum inhibitory concentration (MIC). The synthesized AgNPs exhibited significant antifungal activity, producing a measurable zone of inhibition against C. albicans. In addition, antibiofilm efficacy was evaluated using the crystal violet assay, demonstrating the ability of AgNPs to inhibit biofilm formation. These findings suggest that biogenic AgNPs possess promising antifungal and antibiofilm properties and may serve as potential nanotherapeutic agents for the prevention and management of denture-induced stomatitis caused by C. albicans. The findings may help in the development of future therapeutic agents for the treatment of such infections.

Keywords

Antimicrobial Resistance, Nanotherapeutics, Candida albicans, Denture Stomatitis, Oral Biofilms



Assessing Sustainable Intensification Through Productivity Metrics

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Presenter

Eman Ibrahim Abdel-Wahab

Type

Poster Presentation

Track

Agricultural & Biological Sciences

Abstract

Intercropping soybean (Glycine max L. Merrill) with maize (Zea mays L.) is an important component of sustainable agricultural intensification because it increases land productivity, improves resource efficiency, and provides ecological benefits. However, the genetic and genomic mechanisms underlying soybean adaptation to intercropping environments remain insufficiently understood. This study aimed to examine the effects of maize intercropping on the soybean genome and gene expression patterns and to identify molecular mechanisms associated with soybean adaptation, particularly those related to phenotypic plasticity, shade tolerance, light use efficiency, and nitrogen use efficiency. Genomic, transcriptomic, proteomic, and metabolomic approaches were considered to investigate the genetic and molecular responses of soybean under soybean–maize intercropping systems. Particular emphasis was placed on genes associated with photosynthesis, hormone production and metabolism, nitrogen fixation and assimilation, root architecture development, light perception and signaling, and stress responses. Allelic diversity in soybean germplasm was also examined to identify specific genes and alleles associated with adaptation to intercropping environments. Maize intercropping induces significant genomic and transcriptome reprogramming in soybean, particularly under shade conditions produced by the maize canopy. Differential responses were observed in genes and genomic regions associated with photosynthesis, hormone regulation, nitrogen metabolism, root development, light signaling, and stress responses. Integration of transcriptomic, proteomic, and metabolomic information revealed intricate genetic networks activated under intercropping conditions and identified potential genes and genomic regions exhibiting different expression and selection patterns compared with solid plantings. Understanding the genetic and genomic responses of soybean to maize intercropping is essential for improving sustainable agricultural intensification. Genomic approaches and marker-assisted selection can support the development of soybean cultivars with enhanced shade tolerance, phenotypic plasticity, light use efficiency, and nitrogen use efficiency, contributing to resource-efficient and climate-resilient intercropping systems.

Keywords

Antimicrobial Resistance, Nanotherapeutics, Candida albicans, Denture Stomatitis, Oral Biofilms



PROCEEDING
ACSTM2026

Integrated Digestate Valorization and Biogas Production Using Microalgal–Bacterial Granular Sludge

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Presenter
Marcin Debowski

Type
Poster Presentation

Track
Agricultural & Biological Sciences

Abstract

Digestate-derived liquid streams contain organic matter and nutrients that can contribute to the pollutant load of wastewater treatment plants. Their treatment and conversion into energy-rich biomass can support renewable energy recovery and circular bioeconomy principles. This study aimed to evaluate the use of microalgal-bacterial granular sludge (M-BGS) for the simultaneous treatment of the liquid fraction generated during dewatering of anaerobically digested sewage sludge and the production of biomass suitable for biogas generation. The experiment was conducted in a pilot-scale hybrid photobioreactor with a working volume of 2.0 m^3, initially inoculated with a Scenedesmus sp. monoculture. Changes in the taxonomic structure and chemical composition of the biomass, pollutant removal efficiency, settling characteristics, and anaerobic digestibility were evaluated. After 40 days of photobioreactor operation, a stable microalgal-bacterial granular consortium was established. Its microbial structure was dominated by Scenedesmus sp., Microthrix parvicella, and filamentous bacteria classified as types 1851 and 1701. The biomass concentration reached 3970 ± 320 mg TS/L. Total organic carbon removal amounted to 81.4 ± 3.2%, while chemical oxygen demand removal reached 76.3 ± 7.4%. Maturation of the consortium was accompanied by an improved C/N ratio, enhanced settleability, and increased susceptibility of the biomass to anaerobic biodegradation. The maximum biogas yield was 478 ± 48 mL/g VS, with a methane content of 62.7 ± 4.4%. The results demonstrate that M-BGS can integrate efficient treatment of digestate-derived liquid streams with the production of readily separable biomass characterized by high energy potential. This approach may reduce the internal pollutant load of wastewater treatment plants and support the recovery of renewable energy and nutrients in accordance with circular bioeconomy principles. Acknowledgment: This research was supported by the National Science Centre, Poland, under the MINIATURA 1 funding scheme, project no. 2017/01/X/NZ9/00317, “Assessment of the potential use of extracellular polymeric substances (EPS) produced by activated sludge bacteria for concentrating microalgal biomass.”

Keywords

Microalgal-Bacterial Granular Sludge, Digestate Treatment, Microalgae, Anaerobic Digestion, Biomethane, Circular Bioeconomy

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