International Toxicology Convention on

Emerging Approaches in Risk Analysis and Translational Aspects of Health and Environment (EARTH)

November 27-30, 2024

SOUVENIR

ORGANIZED BY

Lucknow Chapter

Headquarters: Mysuru (www.afsti.org)

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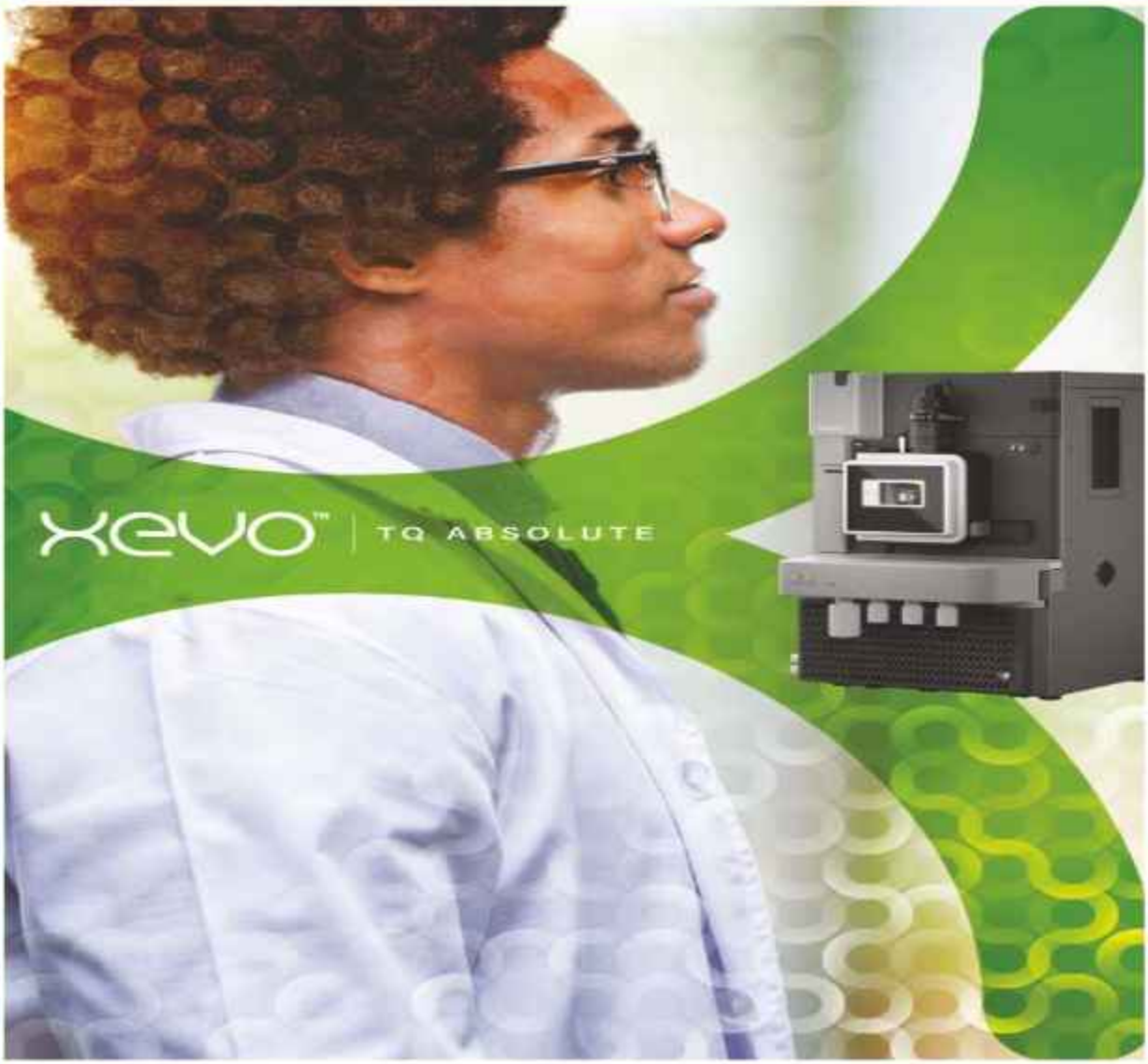
CSIR-INDIAN INSTITUTE OF TOXICOLOGY RESEARCH

LUCKNOW, INDIA



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International Toxicology Convention on

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राज्य मंत्री अंतरिक्ष विभाग
भारत सरकार

सत्यमेव जयते

Dr. JITENDRA SINGH
Minister of State (Independent Charge)
Ministry of Science and Technology;
Minister of State (Independent Charge)
Ministry of Earth Sciences;
Minister of State in the Prime Minister's Office;
Minister of State in the Ministry of Personnel,
Public Grievances and Pensions;
Minister of State in the Department of Atomic Energy; and
Minister of State in the Department of Space
Government of India

Message

Bharat has enriched science and technology with an innovative skillset and a broader vision under the eminent leadership, both governed by intellectuals and bureaucrats that laid the foundation for a liveable EARTH. Mother nature has nurtured our great nation with great minds, knowledge seekers and has continuously transformed the traditional economy to knowledge economy. The preparedness for any challenge or obstacle is an integral part of our society and nation as a whole, we take great pride in our history and one of the greatest democracies in the world with a slogan of unity in diversity leading to an incredible India.

The world is facing a serious threat from climatic changes. The nature has shown in many manners that precautions and improvements are necessary to preserve the climate and environment for future generations. True to the need of the hour, this International Toxicology Convention on "Emerging Approaches in Risk Analysis and Translational Aspects of Health and Environment" (EARTH-2024) will be organized by CSIR-Indian Institute of Toxicology Research (CSIR-IITR) in association with ASTRA (Association of Toxicologists and Risk Assessors) and Association of Food Scientists & Technologists, India (AFSTI)Lucknow Chapter during November 27-30, 2024 at Lucknow. Michigan State University, USA, shall be the overseas partner for this convention.

A clear roadmap with plausible interventions from policymakers and regulators will create a paradigm shift in thought processes to aim for better human health and the environment. To catalyse these processes and methods to implement, the Government is providing all support, infrastructure and logistics to make a greater impact on society, which is our mother nature, EARTH. The Ministry of Science and Technology is a dedicated wing of the Government of India that oversees technological innovations to practice and nurture young researchers and students to dream and aim big in their careers. This conference will put forth a machinery that predictive tools, emerging modules and research collaborations, both with public and private agencies, to have an environment with clean water and air and improve quality of life.

I sincerely believe that this conference will bring upon and touch many lives to pursue research and keep working on the issues where common citizens could utilize the benefits and transform lives. I am sure together we all can envision INDIA in a safer EARTH by putting our best efforts and the themes of this conference will benefit researchers, academicians by following the vision of Swatch Bharat, Swasth Bharat and Atmanirbhar Bharat.

(Dr. Jitendra Singh)
MBBS (Stanley, Chennai)
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महानिदेशक

Dr. (Mrs.) N. Kalaiselvi
Secretary
Department of Scientific & Industrial Research, and
Director General

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वैज्ञानिक और औद्योगिक अनुसंधान विभाग
Government of India
Ministry of Science and Technology
Council of Scientific & Industrial Research
Department of Scientific & Industrial Research

Message

I am pleased to learn CSIR-Indian Institute of Toxicology Research, Lucknow, The Association of Toxicologists and Risk Assessors (ASTRA), The Association of Food Scientists & Technologists-India, Lucknow Chapter (AFSTI-LKO), and Michigan State University USA are jointly organizing the "Emerging Approaches in Risk Analysis and Translational Aspects of Health and Environment (EARTH)" conference. The event is sure to serve as a vital platform for discussing and addressing critical issues at the intersection of health and environmental sciences.

The theme of this conference is particularly relevant as we confront unprecedented global health and environmental risks. The insights and innovations shared during the event would be essential for developing effective strategies to mitigate these risks.

I am confident that the knowledge exchanged here will lead to impactful solutions that enhance public health and environmental sustainability.

I encourage all participants to engage actively in the discussions, share their valuable insights, and build lasting collaborations to contribute to our shared goals.

I wish the EARTH 2024 conference a great success.

N. Kalaiselvi

(N Kalaiselvi)

18th November, 2024
New Delhi

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प्रो. अभय करंदीकर
Prof. Abhay Karandikar

सचिव
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विज्ञान एवं प्रौद्योगिकी मंत्रालय
विज्ञान एवं प्रौद्योगिकी विभाग
Secretary
Government of India
Ministry of Science and Technology
Department of Science and Technology

21st November, 2024

MESSAGE

It gives me immense pleasure to extend my warm greetings to the participants of the International Toxicology Convention, EARTH-2024 ("Emerging Approaches in Risk Analysis and Translational Aspects of Health and Environment"), organized by the CSIR-Indian Institute of Toxicology Research (CSIR-IITR) in collaboration with ASTRA (Association of Toxicologists and Risk Assessors) and the Association of Food Scientists & Technologists, India (AFSTI) Lucknow Chapter). This prestigious convention, scheduled from November 27-30, 2024, in Lucknow, is further enriched by the partnership of Michigan State University, USA.

I congratulate CSIR-IITR, Lucknow, for its dedicated commitment to its motto, "Safety to Environment and Health and Service to Industry." The institute's excellence in advancing toxicological research and its dedication to precise risk evaluation are vital for promoting a safer and healthier future.

The theme of EARTH-2024 is both relevant and thought-provoking. While nature has always provided humanity with abundant resources, the responsibility to protect the environment and mitigate the impacts of climate change lies with us. This convention serves as a significant platform to address emerging risks, understand human needs, and explore strategies to balance development with environmental preservation for a sustainable future.

Risk prediction, assessment, and precision are key to shaping effective policies and ensuring a health risk-free environment. The tools, data insights, and research outcomes discussed at this convention will help build a robust framework for guiding strategic developments in climate protection and public health. A deeper understanding of these risks will empower policymakers to establish forward-looking strategies that benefit human health and proactively address future challenges.

I am confident that EARTH-2024 will encourage meaningful discussions, innovative solutions, and awareness in the critical areas of risk analysis and environmental safety. My best wishes to the organizers and participants for the grand success of this convention and for impactful deliberations that will contribute to a safer, healthier, and more sustainable world.

(Abhay Karandikar)

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Adjunct Professor, NIAS, Bengaluru
Padma Shri Awardee, 2022; Karnataka Rajyotsava Awardee, 2013
Formerly
Secretary, DARE, GoI & Director General, ICAR; President, NAAS, New Delhi
Chancellor, CAU, Imphal; NABARD Chair Professor, Bengaluru
Chairman, KSTA, Bengaluru; Chairman, NABL, Gurgaon

Date: 19 November, 2024

Message

I am delighted to learn that the CSIR-Indian Institute of Toxicology Research (CSIR-IITR) and Association of Toxicologists and Risk Assessors (ASTRA) are organizing International Toxicology Convention on "Emerging Approaches in Risk Analysis and Translational Aspects of Health and Environment (EARTH-2024)" from November 27 to 30, 2024, in Lucknow.

Considering the high levels of pollution and significant changes in the environmental chemical composition, the theme of the international convention is particularly relevant. I am confident that EARTH-2024 will gather experts from academia, research, and industry to discuss the latest applications, advancements, and challenges in risk analysis and emerging technologies related to health, environment, and safety. EARTH 2024 shall serve a wonderful platform for academics, scholars, entrepreneurs, technologists, industry professionals and other stakeholders to interact with each other and showcase their achievements. The theme of the conference is highly relevant for research scientists, policy makers and industry stakeholders. I am hopeful that the event will inspire and energize the young researchers towards pursuing science. I am confident that the conference will be scientifically enriching for all participants and will achieve great success.

I wish all the delegates a pleasant stay in Lucknow, a city rich in history and tradition.

(S. Ayyappan)

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Email: sayyappan1955@gmail.com; Mobile: 0091 9582898989

Dr. Debabrata Kanungo
Chairman
Research Council-CSIR-IITR, Lucknow
& Former Additional Director General
Directorate General of Health Services (DGHS)
Ministry of Health & Family Welfare

MESSAGE

My heartfelt congratulations to CSIR-Indian Institute of Toxicology Research (CSIR-IITR), Lucknow – on reaching the monumental milestone of Diamond Jubilee. As the institute celebrates 60 years of ground-breaking achievements in the field of toxicology and technology development, it is a moment to recognize CSIR-IITR's invaluable contributions to improving public health, environmental safety and industrial sustainability.

The upcoming International Toxicology Convention on *"Emerging Approaches in Risk Analysis and Translational Aspects of Health and Environment (EARTH 2024)"* is an exemplary platform to commemorate the remarkable journey of CSIR-IITR. The themes of the conference - ranging from *Analytical Tools, Risk Analysis, Public Health and Environmental Toxicology*, to *Digital Interfaces and Predictive Toxicology* - represent the cutting-edge research and collaborative efforts that CSIR-IITR has continuously supported over six decades.

The vision of this convention to address emerging environmental and health risks - particularly in the context of climate change, and the need for a paradigm shift in risk assessment - is highly laudable. The integration of modern tools like Artificial Intelligence and Machine Learning alongside traditional approaches in toxicology will undoubtedly open new doors to more efficient and sustainable solutions for both human and planetary health.

As a pivotal event aligned with the Diamond Jubilee celebrations of CSIR-IITR, *EARTH 2024* is an ideal forum to bring together experts from diverse disciplines, share knowledge, and discuss the future of toxicology research. It will also serve as a powerful reminder of CSIR-IITR's commitment to fostering innovation and providing actionable solutions for both industry and society.

I look forward to this prestigious event and to engage in thought-provoking sessions to celebrate the continued success of CSIR-IITR. Once again, congratulations to the entire team at CSIR-IITR for 60 years of remarkable achievements and wish all the success in hosting *EARTH 2024*.

Dr. Debabrata Kanungo

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कृषि एवं किसान कल्याण मंत्रालय, भारत सरकार, Ministry of Agriculture and Farmers Welfare, Govt. of India

डा. रविशंकर सी.एन.
निदेशक/कुलपती
Dr. Ravishankar C.N.
Director/Vice Chancellor

MESSAGE

I am happy to hear that the CSIR-Indian Institute of Toxicology Research (CSIR-IITR) and the Association of Toxicologists and Risk Assessors (ASTRA) are organizing the International Toxicology Convention titled **"Emerging Approaches in Risk Analysis and Translational Aspects of Health and Environment (EARTH-2024)"** from **November 27 to 30, 2024,** in Lucknow.

The themes of EARTH-2024, set in the realm of climate change, reflect the efforts to tackle the critical challenges associated with risk analysis and environmental health. Featuring a diverse assembly of renowned experts from various disciplines and corners of the globe, I am sure that through EARTH-2024 CSIR-IITR is poised to become an influential center for knowledge sharing. I hope that this convention will foster an environment that promotes dynamic discussions and collaborative initiatives on innovative solutions to address the most pressing global challenges. With leaders and innovators in toxicology coming together, I am confident that EARTH-2024 will provide a transformative experience that inspires practical solutions and paves the way for impactful change in our world.

I extend my best wishes for a successful and memorable event to everyone involved, whose efforts and contributions are greatly appreciated.

21 November 2024
Mumbai

Ravishankar C.N.

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National Accreditation Board for
Testing and Calibration Laboratories
(A Constituent Board of Quality Council of India)

21st November 2024

MESSAGE

With great pleasure, I extend my heartiest congratulations to CSIR-Indian Institute of Toxicology Research (CSIR-IITR) and the Association of Toxicologists and Risk Assessors (ASTRA) for organizing the International Toxicology Convention on **"Emerging Approaches in Risk Analysis and Translational Aspects of Health and Environment (EARTH-2024)"** from November 27 to 30, 2024 in Lucknow, Uttar Pradesh.

This prestigious event, taking place in the historic city of Lucknow, represents a significant milestone in our collective efforts to tackle the pressing challenges in risk analysis and environmental health. With the active participation of distinguished experts from around the world, EARTH-2024 promises to be a hub for knowledge exchange, innovative ideas, and collaborative efforts in order to integrate emerging approaches and to provide practicable solutions in the area of toxicology.

I am confident that the insights and advancements shared during this convention will lead to groundbreaking solutions and inspire future research and development in the field. I hope this convention proves to be both scientifically enriching and professionally rewarding for all attendees.

I convey my best wishes to entire CSIR-IITR family for their wonderful work and appreciate their efforts towards providing a holistic approach in toxicological research and wishing you all a successful and memorable event.

N. Venkateswaran
Chief Executive Officer

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CENTRE FOR CELLULAR AND MOLECULAR BIOLOGY
(Council of Scientific & Industrial Research)
Uppal Road, Hyderabad - 500007, India
Dr. Vinay Kumar Nandicoori
Director

MESSAGE

I am delighted to welcome you all to the "Emerging Approaches in Risk Analysis and Translational Aspects of Health and Environment (EARTH-2024)" conference. This event, hosted by the CSIR-Indian Institute of Toxicology Research (CSIR-IITR) in association with ASTRA (association of Toxicologists and Risk Assessor) and Michigan State University, USA, is a testament to our commitment to advancing scientific knowledge and addressing critical global challenges.

The theme of this conference, "Emerging Approaches in Risk Analysis and Translational Aspects of Health and Environment," is particularly timely, given the rapid pace of technological advancements and the increasing complexity of environmental and health issues. The conference will provide a unique platform for scientists, researchers, policymakers, and industry experts to come together and discuss the latest breakthroughs in these fields.

One of the key advantages of attending EARTH 2024 is the opportunity to network with leading experts from around the world. By interacting with these individuals, you can establish valuable collaborations, share knowledge, and gain new insights into your research. The conference will also feature a diverse range of technical sessions, keynote lectures, and poster presentations, covering a wide spectrum of topics, from environmental toxicology to occupational health.

Another significant benefit of participating in this conference is the chance to learn about the latest tools and techniques in risk assessment and translational research. The workshops and training sessions offered at EARTH 2024 will provide practical skills that can be applied to your own work. I am confident that EARTH 2024 will be a stimulating and rewarding experience for all participants. I encourage you to take full advantage of the opportunities offered at this conference and to contribute to the ongoing dialogue on how to protect human health and the environment.

Vinay Nandicoori

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Director

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No. 45-1(9)2024-D/

Message

It is a matter of immense pleasure for me to know that CSIR-Indian Institute of Toxicology Research (CSIR-IITR) is organizing the International Toxicology Convention on "Emerging Approaches in Risk Analysis and Translational Aspects of Health and Environment (EARTH)" during 27-30 November, 2024, in Lucknow, in collaboration with ASTRA (Association of Toxicologists and Risk Assessor) and Michigan State University, USA. This conference is very timely and will be providing a common platform to researchers, academicians, scholars, entrepreneurs, technologists, industry and other stakeholders, enabling them to interact among themselves and showcase their accomplishments. As evident, its primary focus is to revisit the issues pertaining to human activities induced effects on mother EARTH and the strategies for restoration using newer analytical tools, mechanistic understanding of chemical induced toxicity, exposure assessment science, epidemiological data, AI and ML based advanced risk assessment and predictive tools. The participation of renowned speakers is expected to enrich the experience and promote a synergy towards better earth through future collaborations. The proposed international convention will provide a scientific forum for the exchange of ideas and information about (a) Analytical Tools, Techniques, and assays for Research and Advancement of Competency in Toxicology (ATTRACT), (b) Risk Analysis: Techniques and Existing and Emerging Risks (RATE), (c) Public health and Environmental Toxicology (PET), (d) Development and Management of Toxicology facility (DEMAT) (e) Digital Interfaces and Predictive Toxicology (DIPTox). The various scientific sessions will facilitate exchange of opinions and scientific interactions.

The scientific discussion during this 4-day event is expected to produce an amalgamation of researchers for enhanced synergy in future. I am confident that the convention will be scientifically fruitful to all the participants and would be a great success.

Kannan Srinivasan

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प्रो. विभा टंडन, एफएनएएससी, एफआरएससी
निदेशक

Professor Vibha Tandon, FNASc, FRSC
DIRECTOR

सीएसआईआर - भारतीय रासायनिक जीवविज्ञान संस्थान
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MESSAGE

I extend my warmest greetings to all attendees of the "Emerging Approaches in Risk Analysis and Translational Aspects of Health and Environment (EARTH)" conference, organized by CSIR-IITR and Michigan State University, USA, from November 27-30, 2024.

EARTH-2024 will bring together experts and researchers to discuss innovative strategies in risk analysis and their applications in health and environmental sciences. This event aims to foster interdisciplinary collaboration, share cutting-edge research, and explore translational approaches that bridge the gap between scientific discoveries and practical solutions. Attendees will have the opportunity to engage in thought-provoking discussions, attend keynote sessions, and participate in workshops designed to address contemporary challenges in health and environmental risk management. The EARTH 2024 conference is crucial in addressing the pressing global challenges related to health and environmental risks. The conference aims to foster a deeper understanding of emerging threats and innovative risk management strategies by bringing together leading scientists, policymakers, and industry experts. The discussions and collaborations at EARTH 2024 will contribute to the development of evidence-based policies and practices that can mitigate risks and enhance public health and environmental sustainability. This conference serves as a vital platform for translating scientific research into actionable solutions, ultimately benefiting communities and ecosystems worldwide.

At CSIR-IICB, we strongly believe in risk assessment and management as well as translational aspects towards health and the environment. We are proud to support this conference with its emphasis on risk analysis, risk mitigation and translational research. I am confident that the lively interactions and discussions at EARTH 2024 will encourage the students, scientists, academicians, and industry personnel to pursue their passion and make contributions in their respective fields. May EARTH 2024 be a grand success!

Vibha Tandon
(Prof. Vibha Tandon)
Director, CSIR-IICB, Kolkata

Date: November 11, 2024

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सीएसआईआर – केन्द्रीय औषधि अनुसंधान संस्थान
CSIR-CENTRAL DRUG RESEARCH INSTITUTE

वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद्
COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH

डॉ. राधा रंगराजन
निदेशक

Dr. Radha Rangarajan
Director

Message

I extend my warmest greetings to all attendees of the "Emerging Approaches in Risk Analysis and Translational Aspects of Health and Environment (EARTH)" conference, organized by CSIR-IITR and Michigan State University, USA, from November 27-30, 2024.

EARTH-2024 will bring together experts and researchers to discuss innovative strategies in risk analysis and their applications in health and environmental sciences. This event aims to foster interdisciplinary collaboration, share cutting-edge research, and explore translational approaches that bridge the gap between scientific discoveries and practical solutions. Attendees will have the opportunity to engage in thought-provoking discussions, attend keynote sessions, and participate in workshops designed to address contemporary challenges in health and environmental risk management. The conference aims to foster a deeper understanding of emerging threats and innovative risk management strategies by bringing together leading scientists, policymakers, and industry experts. The discussions and collaborations at EARTH 2024 will no doubt, contribute to the development of evidence-based policies and practices that can mitigate risks and enhance public health and environmental sustainability. This conference serves as a vital platform for translating scientific research into actionable solutions, ultimately benefiting communities and ecosystems worldwide.

At CSIR-CDRI, we strongly believe in the role that risk assessment and management plays in addressing environmental challenges. I am confident that the lively interactions and discussions at EARTH 2024 will encourage the students, scientists, academicians, and industry personnel to pursue their passion and make contributions in their respective fields. May EARTH 2024 be a grand success!

(Radha Rangarajan)

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सीएसआईआर–केन्द्रीय औषधीय एवं सगंध पौधा संस्थान
(वैज्ञानिक तथा औद्योगिक अनुसंधान परिषद्)
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डॉ. प्रबोध कुमार त्रिवेदी, एफएनए, एफएएससी, एफएनएएससी, एफएनएएएस
जे.सी. बोस नेशनल फेलो
निदेशक

Dr. Prabodh Kumar Trivedi, FNA, FASc, FNASc, FNAAS
JC Bose National Fellow
Director

Date: 08/11/2024

Message

It is a matter of immense pleasure for me to know that CSIR-Indian Institute of Toxicology Research (CSIR-IITR) and Michigan State University-USA are organizing the conference on "Emerging Approaches in Risk Analysis and Translational Aspects of Health and Environment (EARTH-2024)" during 27-30 November, 2024, in Lucknow.

EARTH-2024 is set to convene experts and researchers to deliberate on innovative risk analysis strategies and their applications in health and environmental sciences. It will bring together experts from academia, research, and industry to discuss the latest applications, advancements and challenges in risk analysis and emerging technologies in health, environment and safety. The associated conclave for entrepreneurs and start-ups working in the area of emerging advancement is risk analysis, and the sustainable protection of health and the environment will also be highly beneficial for stakeholders. Overall, the conference will provide a common platform for academicians, scholars, entrepreneurs, technologists, industry and other stakeholders, enabling them to interact among themselves and showcase their accomplishments. It will lead to an exchange of ideas and information about safety, toxicology and health at the national level. The participation of renowned experts is expected to enrich the experience and promote a synergy towards future collaborations. The various scientific sessions will facilitate the exchange of opinions and scientific interactions. The theme of the conference is highly relevant for young researchers and I am very hopeful that the event will facilitate the galvanization of young scholars towards science. I am confident that the conference will be scientifically fruitful to all the participants and will be a great success.

I wish a pleasant stay for all delegates in the historical and traditionally rich city of Lucknow.

(Prabodh K. Trivedi)

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डॉ. अजित कुमार शासनी
निदेशक
Dr. Ajit Kumar Shasany
Director

08 November 2024

Message

I am pleased to learn that the CSIR-Indian Institute of Toxicology Research, Lucknow and Michigan State University, USA, are organizing the 'Emerging Approaches in Risk Analysis and Translational Aspects of Health and Environment (EARTH-2024)' conference from November 27-30, 2024.

In today's world, the primary challenge is to provide affordable and safe food, health, and environmental solutions to a global population in the coming decades. This must be achieved through emerging technologies, sustainability, minimal waste, and reduced environmental impact, all while ensuring social and economic sustainability. Health and safety are achieved when everyone can access the resources needed for a healthy life in a manner that the planet can sustain for the future.

EARTH-2024 will convene experts and researchers to discuss innovative risk analysis strategies and their applications in health and environmental sciences. The event aims to promote interdisciplinary collaboration, share cutting-edge research, and explore translational approaches that bridge the gap between scientific discoveries and practical solutions. Attendees will engage in thought-provoking discussions, attend keynote sessions, and participate in workshops designed to address contemporary challenges in health and environmental risk management. This conference is crucial for addressing pressing global challenges related to health and environmental risks. By bringing together leading scientists, policymakers, and industry experts, the conference aims to deepen understanding of emerging threats and innovative risk management strategies. The discussions and collaborations at EARTH-2024 will contribute to the development of evidence-based policies and practices that can mitigate risks and enhance public health and environmental sustainability. This conference serves as a vital platform for translating scientific research into actionable solutions, ultimately benefiting communities and ecosystems worldwide.

The relevance of this conference is underscored by the global challenges of risk assessment, risk management, affordable health, and sustainable environment. Organizing such an event provides a platform to discuss these issues and find possible solutions. I am confident that this conference will be a milestone in generating new ideas for initiatives in risk assessment, risk management, affordable health, and sustainable environment.

I am sure that the scientific deliberations during the conference will enhance the institute's efforts in fulfilling its mandate. I wish the conference great success and an intellectually stimulating experience for all participants!

(Ajit Kumar Shasany)

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सीएसआईआर-भारतीय विषविज्ञान अनुसंधान संस्थान
CSIR-INDIAN INSTITUTE OF TOXICOLOGY RESEARCH
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(विज्ञान एवं प्रौद्योगिकी मंत्रालय, भारत सरकार) | MINISTRY OF SCIENCE & TECHNOLOGY, GOVT. OF INDIA)

डॉ. भास्कर नारायण एमएससी, पीएचडी
Dr. Bhaskar Narayan MSc, PhD
एफएएबी, एफएएफएसटी, एफएनएबी, एफएसएफटी, एफएनएएएस
FSAB, FAFST, FNAB, FSFT, FNAAS
निदेशक
Director

Dear Delegates,

Greetings from CSIR-IITR and the Association of Toxicologists & Risk Assessors (ASTRA)!!

With pleasure, I extend you all, a warm welcome to the International Toxicology Convention on *Emerging Approaches in Risk Analysis and Translational Aspects of Health and Environment*(EARTH-2024), the festival of science which will begin at CSIR-IITR, Lucknow. As the Director of CSIR-IITR and the President of the ASTRA, I am honoured to be hosting this prestigious event, which also marks the beginning of the Diamond Jubilee Celebrations of CSIR-IITR.

CSIR -IITR has been addressing critical issues related to human health and the environment for close to six decades now. True to its mandate of ensuring safety for the environment &health and providing service to industry, the Institute has been transforming lives through research and innovation.The Institute has been evolving progressively, continuously adapting to the changes in the scientific landscape and delivering implementable solutions for the challenges posed by the changing chemical environment. Today's challenges—such as new chemicals in food, climate change, and the need for sustainable practices—call for innovative thinking and careful planning. As toxicologists and safety researchers, our work is vital for advancing toxicology and protecting public health and the environment. We at CSIR-IITR and ASTRA believe that one needs to remain Invested with Interest in Translating Research outcomes for the benefit of the society and Industry. In order to achieve success in the journey towards excelling in research for the benefit of global good, we must focus on moving from R&D to R4D i.e., Research, Develop, Demonstrate, Deliver and Digitize.The conference as its primary objective is emphasizing the interdisciplinary approach for developing implementable solutions& innovative Technologies that will help in makinginformed policy decisions. In the era of logarithmically growing digital imprints in human lives, it is all the more important that we as toxicologists and risk assessors make the best use of artificial intelligence and machine learning. The conference is rightly hosting a specific forward-looking theme under DIPTox (Digital Interfaces and Predictive Toxicology) signifying the importance of digital tools. EARTH 2024 hopes to be a *GLOCAL* forum for researchers, policymakers, industries and stakeholders to delve into the technical as well as technological advancements & innovations needed to address the health and environmental risks posed by the everchanging ecosystems. I appreciate all of you for joining us in this mission to ensure a safe and healthy environment for future generations.

Wishing you all a pleasant stay in Lucknow! Do enjoy the hospitality and culinary diversity of this heritage city which also incidentally is the city of Nawabs!!

Jai Hind!!

(Bhaskar Narayan)
Director, CSIR-IITR&President, ASTRA

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#startupindia

International Toxicology Convention on
Emerging Approaches in Risk Analysis and Translational Aspects of Health and Environment (EARTH)

27-30 November, 2024

Message

On behalf of the Association of Toxicologists and Risk Assessors (ASTRA) and the organizing committee, we are immensely pleased to welcome you to the International Toxicology Convention on "Emerging Approaches in Risk Analysis and Translational Aspects of Health and Environment (EARTH-2024)" at CSIR-Indian Institute of Toxicology Research (CSIR-IITR), Lucknow during November 27-30, 2024.

We are excited about your participation in EARTH-2024, as this convention also marks the diamond jubilee celebrations of CSIR-IITR. Thank you for joining us in celebrating this significant milestone, and we appreciate your participation in discussions that aim to advance the fields of toxicology, risk analysis, and environmental health. We have made our best efforts to bring together esteemed researchers, professionals, and policymakers from around the globe in toxicology and risk assessment. Through dialogue among research experts in the Es of toxicology (Exposure, Effect, Epidemiology, and Environment), regulatory professionals from As (Analysts, Assessors, Accreditors, and Administrators) and those promoting alternative animal approaches or the 3Rs (reduce, reuse, and refine) of toxicity evaluation, this convention envisages several essential Ts (toxicant detection, their threshold limits, tolerance levels and translation of existing knowledge into viable tools and technologies) that Holistically ensure Human and Environmental Health.

The Association of Toxicologists and Risk Assessors (ASTRA) is indeed grateful to the leadership of CSIR-IITR for conceiving such an incredible scientific platform and for the opportunity to be a joint organizer for this event. We appreciate the leadership and administration of CSIR-IITR for the unwavering guidance and support in organizing an event of this magnitude. The contributions of the Lucknow Chapter of the Association of Food Scientists and Technologists (AFSTI-Lucknow Chapter) and Michigan State University, USA, have also been commendable. We also acknowledge the generous financial backing from our governmental and non-governmental sponsors, which has been instrumental in making this event possible.

We wish everyone a comfortable stay and enjoyment during these four days of scientific feast.

(Dr. Kausar M. Ansari)	(Dr. Alok Kumar Pandey)	(Dr. Ravi Ram Kristipati)
Organizing Secretary	Organizing Secretary	Organizing Secretary

Conference Secretariat

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Dr. Neera Tewari-Singh
Department of Pharmacology & Toxicology,
Michigan State University, USA
Email : tewarisi@msu.edu

Keynote Address

Professor Balakrishnan acquired her undergraduate education at the All India Institute of Medical Sciences, New Delhi, India and subsequently her doctoral and post-doctoral training at the Johns Hopkins University in Baltimore, MD, USA. Over the last 28 years, she has established one of the largest inter-disciplinary occupational and environmental health research groups in India, at the Sri Ramachandra Institute of Higher Education and Research, Chennai. She is currently engaged in research and training collaborations with a network of more than 50 national and international institutional partners to address national and global health research priorities.

Her primary research involvement has been in the area of air pollution and health and chemical risk assessment. She has designed and conducted large scale field studies concerning the household, ambient and occupational environment across multiple states in India, including monitoring and evaluation of intervention efforts. Recently, she has also been engaged in the conduct of mother-child cohort studies as well multi-country randomized control trials to strengthen the evidence for efficacy of air pollution interventions on birth/early childhood and adult cardio-vascular outcomes. She has been a recipient multiple center of excellence grants from national and international funding agencies.

She is globally acclaimed for her contributions on (i) developing novel exposure assessment approaches to characterize the complex exposures experienced by rural and urban populations in low and middle income countries (ii) designing and conducting strategic epidemiological investigations in India to catalyze policy level actions by leveraging across the national and global pools of evidence and (iii) informing the climate change and human health discourse using a co-benefits approach.

She has led and served as a member in many national and international technical assessments concerned with air quality and health, including the Global Burden of Disease and Comparative Risk Assessments, The World Health Organisation Air Quality Guidelines, The International Agency for Research on Cancer Monographs, The Global Energy Assessments, UNEP Asia Pacific Regional Assessments and the India State level Burden of Disease Initiative. She serves in more than dozen National and Global Technical Review Committees across multiple countries. She currently serves as a member of the National Steering Committee on Air Pollution Related Issues for Health Effects for the Ministry of Health and Family Welfare, Govt. of India and the Indian Council for Medical Research led National Task Force for assessment of impact of initiatives to promote clean household energy.

She has published more than 200 scientific articles in high impact peer-reviewed journals as well as book chapters and training manuals that have merited an H-index of 60, more than 80,000 citations and several million views to date. Since 2020, she has been ranked for the last four consecutive years among the top 2% of scientists in the field of General and Internal Medicine in an independent study conducted by Stanford University. She is a distinguished fellow of the National Academy of Medical Sciences

She is a recipient of numerous awards including the Clarivate India Research Excellence Citation award (2021), the Public Health Foundation of India award (2008) for Outstanding Scientist in Public Health, The Hari Om Ashram Trust Award(2000) for Outstanding Scientist administered by the University Grants Commission, Govt. of India, the Outstanding Woman Scientist Award(1999) of The Government of Tamil Nadu and The Award for Excellence in Environmental Health Research(1998) administered by Harvard Medical International.

She has also led the development of new and novel academic programs at Sri Ramachandra Institute for Higher Education and Research with support from the NIH Fogarty International Center and the Center for International Migration, GIZ that includes Masters programs in Industrial Hygiene and Safety, the BPH and MPH program in Occupational and Environmental Health and BSc (Hons.) program in Environmental Health Sciences. Her current portfolio is focused on building a world class Faculty of Public Health at SRIHER that can jointly provide advanced research and public health practice capacities for a diverse range of students and professionals in public health and to scale research capacities at SRIHER to enable ranking as an Institute of Eminence within the next 5 years.

Redefining paradigms for health impact assessment for air pollution in India

Professor Kalpana Balakrishnan PhD, FAMS
Dean(Research) and Director
WHO Collaborating Center for Occupational and Environmental Health
ICMR Center for Advanced Research on Air Quality, Climate and Health
Sri Ramachandra Institute for Higher Education and Research, Chennai, India

Air pollution ranks among the leading risk factors contributing to the disease burden in many countries in South East Asia. In the most recent assessment of the global burden of disease (GBD 2021), approximately 2.1 million premature deaths and 60 million disability-adjusted life years (DALYs) were attributable to air pollution in India, with roughly equal contributions from ambient air pollution (AAP) and household air pollution (HAP). This places air pollution near or at the top of the list of all known risk factors for ill health in the region including high blood pressure, tobacco smoking, child and maternal malnutrition. With competing risk factors and limited resources, the dual burden from AAP and HAP poses an enormous challenge for air quality management.

There is now an increasing body of evidence that compartmentalization of exposures as rural or urban, especially in settings where they co-exist is not helpful and the goal really should be to create a coherent frame work for addressing relevant sources. Under the National Clean Air Program, considerable progress has been made in building the evidence for required inter-sectoral solutions and is reflected in on-going regulatory actions. However, the health case for action is hampered by insufficient evidence from local epidemiological studies that can reliably provide inputs for health impact assessment models.

The talk will describe the most recent methodological advances in health impact assessments being adopted globally to provide a framework for strengthening similar efforts in India. Opportunities to develop new risk assessment paradigms to strengthen the evidence for policy will also be discussed.

PL-1

Stem Stroma & Beyond: Biology of Mitigation of Radiation Toxicity

Subhrajit Saha
University of Kansas Medical centre, Kansas City, Kansas, USA

Regenerative medicine represents a transformative approach in the field of radiation sciences. This abstract explores the intersection of regenerative medicine and radiation sciences, focusing on key areas where regenerative strategies have demonstrated potential. Regenerative medicine plays a crucial role in radiation biology by elucidating cellular responses to radiation exposure and facilitating the development of radioprotective agents. Radiation injury can range from organ/tissue-specific damage to a complex syndrome depending on the field of exposure, radiation exposure type, and scenario. Consequences of radiation injury can be acute and/or chronic, depending on the tissue type. Both therapeutic and accidental radiation lead to normal tissue toxicity. Unlike therapeutic radiation toxicity, where prophylactic measures specific to normal tissue can be applicable, accidental radiation exposure demands a mitigation approach and addresses more complex biology. However, repair and regeneration of organs at risk is crucial in both cases to regain normal physiological function. Repairing and rebuilding any organ depends on the health and functionality of tissue building blocks, A.K.A tissue stem cells. Regenerative approaches attempted so far against radiation damage are very much stem cell-targeted or stem cell-driven. These approaches aim to repair and replace damaged tissues and enhance the regenerative capacity of irradiated tissues, enabling better functional recovery post-treatment. The success of these approaches depends on understanding stem cell biology and their signaling cross-talk with the stromal niche. This presentation will highlight the biology and potential regenerative strategies examined by our group and others against the acute and chronic effects of radiation exposure, such as gastrointestinal and pulmonary injury, respectively. This presentation will also cover the impact of the microbiome and immune microenvironment in the regenerative process, available experimental radiation models and future challenges. In conclusion, the integration of regenerative medicine principles into the radiation sciences represents a paradigm shift towards personalized and regenerative approaches in cancer treatment and mitigation of radiation toxicity.

ABOUT THE SPEAKER

Dr. Subhrajit Saha is a radiation biologist, researcher, and teacher. He is currently a Professor (tenured) and Director of Basic Science Research in the Department of Radiation Oncology at the University of Kansas Medical Center, Kansas, USA. His research is focused to understanding the biology of toxicity from radiation and other environmental genotoxic agents. Over the period of the last 10 years, Dr. Saha's group has been engaged in examining the trophic role of immune cells in tissue regeneration to mitigate tissue toxicity. He has served as a principal investigator in multiple NIH-funded studies and has authored several publications in journals like Nature Communications, Clinical Cancer Research, Stem Cell Research, and Therapy. He is a member of study sections in NIH and NASA and has served on advisory boards for biopharma companies. He has received multiple awards and recognition from the Radiation Research Society and the American Association of Cancer Research.

PL-2

Investigating Immune Cells as a potential biomarker to limit tumor development

Manoj K Mishra

Department of Biological Sciences, Alabama State University, 915 S Jackson Street, Montgomery, AL 36104

Despite the advances in treatment, early detection, and targeted cancer therapy, cancer alone kills more people each year. Multiple new immunotherapeutic approaches have recently been developed that can help patients with advanced cancers– sadly, the majority of patients still struggle with their cancers. Given the recent clinical successes of immune checkpoint inhibitors, oncolytic viruses, and adoptive cell transfer therapies, there is a great deal of optimism about the prospects for cancer immunotherapies. Immunotherapies have the potential to be used to treat all types of cancer and to induce long-lasting remissions or cures. This presentation summarizes how immune cells behave in a tumor microenvironment, how they can be used for therapeutic developments, and their impact on treating prostate cancer.

ABOUT THE SPEAKER

Dr. Manoj K Mishra received his M.Sc. and Ph.D. from Banaras Hindu University, Varanasi, India. Before moving to Alabama State University in early 2009, Dr. Mishra continued at the Medical College of Wisconsin as a Research Scientist in the Division of Allergy and Clinical Immunology within the Department of Pediatrics. He also holds a secondary appointment at the Division of Molecular and Cellular Pathology within the Department of Pathology, School of Medicine at the University of Alabama Birmingham, Birmingham, AL. He serves on several NIH study sections and the editorial board of scientific peer-reviewed journals. Research and educational grants from the National Institutes of Health, the American Cancer Society, the US Department of Defense, and the National Science Foundation support Dr. Mishra's lab. Dr. Mishra has several awards and recognition for his teaching and research. In 2013, he was selected as one of the top 25 professors among mid-sized universities in the USA. He was a faculty scholar in cancer research at the American Association of Cancer Research in 2013, 2014, and 2016. In 2020, he was nominated as the Association of Biotechnology and Pharmacy Fellow. Dr. Mishra is the founding director of the Cancer Research Center and the founding director of the Freshmen Biology program at Alabama State University. Dr. Mishra's interest in education revolves around training, mentoring, and providing opportunities to undergraduate and graduate students, mainly from underrepresented populations. His research interest focuses on broader areas of immunology, tumor biology, and health disparity, using prostate cancer as a model system. Dr. Mishra's lab investigates the roles of dietary compounds, microbial metabolites, and immune cells, especially regulatory T and NK cells, in prostate cancer development and progression.

PL-3

Scaling In Vivo Phenotypic Screening with Zebra fish to Help Achieve Predictive Toxicity Goals

Robyn Leigh Tanguay
Oregon State University, Oregon, USA

In the 21st century, toxicology faces the challenge of proactively evaluating new chemicals and assessing the risks posed by existing ones. We propose that zebrafish, with its intrinsic advantages, serves as an ideal model to address these knowledge gaps. Utilizing multi-dimensional zebrafish assays allows for the swift identification and comparison of chemical bioactivity, aiding decision-making and elucidating mechanisms of action. This presentation will highlight instances where high-throughput screening and systems approaches are enhancing environmental health assessments. Together, we aim to generate comprehensive data on phenotypic and gene expression responses to structurally diverse chemicals, enabling us to predict attributes that lead to biocompatibility or toxicity.

ABOUT THE SPEAKER

Dr. Robyn Leigh Tanguay is a University Distinguished Professor in the Department of Environmental and Molecular Toxicology and the Director of the Superfund Research Program and the Sinnhuber Aquatic Research Laboratory at Oregon State University. She earned her BA in Biology from Cal State University-San Bernardino, obtained her PhD in Biochemistry from the University of California-Riverside, and completed her postdoctoral training at the University of Wisconsin–Madison. Dr. Tanguay is a pioneer in utilizing zebrafish as a model for systems toxicology. With over 300 manuscripts and numerous book chapters spanning various disciplines, she has made significant contributions to her field. Additionally, she is dedicated to mentoring and guiding the next generation of scientists.

PL-4

Characterization of novel mechanisms and targets to stop blindness and restore vision following toxic/vesicating chemical exposure to eyes

Rajiv R. Mohan[1,2,3*], Nathan P Hesemann[2,3], Ratnakar Tripathi[1,2], Maxwell Jeffery[1], Brenden Lankau[1], Nishant Sinha[1,2,3], Alexandria Hofmann[1,2,3], Madeline E. Bhend[1], Will Dunscombe[1], Rajnish Kumar[1,2] James Landreneau[2,3]

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Ocular exposure of industrial, household, agricultural and toxic/vesicating chemicals accounts about 22% of blindness. Presently, nearly 7% of world population has corneal blindness. About 23 million people are blind in one eye while 4.9 million people are blind in both eyes from corneal opacity/fibrosis globally. Also, approximately 4 million people worldwide develop corneal cloudiness/haze because of trauma from eye surgeries. The incidence of traumatic eye injury has increased 24% from 1990 to 2023. Chemical contact to eye causes corneal inflammation, edema, ulcer, swelling, fibrosis/haze, redness, neovascularization, recurrent epithelial erosions, ocular pain, and corneal nerve damage. The severity of pathological symptoms depends on amount and duration of chemical contact to eyes. The lack of mechanistic knowledge remains a major barrier for the development of newer therapies, specific for treating corneal blindness. The focus of my lab is to characterize novel mechanisms mediating corneal opacity and unique approaches to restore vision in humans and companion animals using state-of-the-art multimodal diagnostic eye imaging via clinical microscopes; rabbit *in vivo* and human cornea organ culture models; histological, molecular, immunofluorescence and bioinformatics. The talk will provide clinical *in vivo* eye imaging data showing time- and dose-dependent toxicological effects of industrial, agricultural, and warfare/vesicating chemicals (alkali, carbofuran and sulfur mustard) collected from live animals and recently discovered role of novel genes, signaling pathways, and protein-protein interactive networks in corneal damage and blindness. Additionally, talk will present newly identified therapeutic targets suitable for developing innovative medical countermeasures to prevent and treat chemical-induced corneal toxicity and vision loss in humans, pets, and service animals.

ABOUT THE SPEAKER

Dr. Rajiv R. Mohan is a Curators' Distinguished Professor and Ruth M. Kraeuchi Endowed Chair of Ophthalmology and Molecular Medicine at the University of Missouri, Columbia, Missouri, USA. Additionally, he holds a Senior Research Career Scientist position at the Harry S. Truman Medical Center, United States Department of Veterans Affair, Columbia, Missouri. Dr. Mohan's lab studies mechanisms causing corneal blindness and developing tissue targeted gene therapy, nanomedicine, and ophthalmic formulations to prevent and treat vision loss in humans and companion animals using state-of-the-art 2D/3D multimodal in vivo eye imaging, molecular techniques, preclinical in vivo animals (rodent, rabbit, and pig) and human in vitro and ex vivo organ culture models. Dr. Mohan's research program is funded through multiple grants federal (National Eye Institute, NIH, United States Department of Veterans Affairs) and non-federal agencies. He has coauthored 180+ peer-reviewed journal articles, 14 book chapters, and >400 meeting abstracts and received numerous prestigious international awards including the "Newest and Most Innovative Research Award", "Silver Fellow", and "Gold Fellow" from the Association for Research in Vision & Ophthalmology. Dr. Mohan was named among *world's top 2% of scientists* based on the Elsevier science-wide author databases of standardized citation indicators by the Stanford University, USA.

PL-5

Identifying hidden GEMs in neurological diseases

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GEMIN5 is essential for core assembly of small nuclear Ribonucleoproteins (snRNPs), the building blocks of spliceosome formation. We identified novel autosomal recessive mutations in GEMIN5 gene among patients presenting with developmental delay, motor dysfunction and cerebellar atrophy. We found that these GEMIN5 variants perturb snRNP complex protein expression and assembly. While doing an in vivo genetic screen, we identified SMN as a genetic suppressor of GEMIN5-mediated neurotoxicity in Drosophila. We discovered that an increase in SMN expression by either genetically or the antisense oligonucleotide (ASO) Nusinsersen, significantly upregulated the expression of GEMIN5 in mammalian cells and mutant GEMIN5 derived iPSC neurons. Furthermore, we identified a strong functional association between the expression patterns of SMN and GEMIN5 in patient Spinal Muscular Atrophy (SMA) derived motor neurons harboring loss of function mutations in the SMN gene. Interestingly, SMN binds to the C-terminus of GEMIN5 and regulates GEMIN5 expression through the Tudor domain. Lastly, we observed that SMN upregulation ameliorates defective snRNP biogenesis and alternative splicing defects caused by loss of GEMIN5 in iPSC neurons and in vivo. Collectively, our work indicates that SMN is a potent regulator of GEMIN5 expression and neuropathologies.

ABOUT THE SPEAKER

Dr. Udai Pandey is a renowned expert in neurodegenerative diseases, motor neuron diseases, and neurodevelopmental disorders. He is a Professor at the Department of Pediatrics, and Director, Children's Neuroscience Institute at the University of Pittsburgh School of Medicine, where his research focuses on understanding the molecular mechanisms underlying these disorders using animal models and induced pluripotent stem cells (iPSCs). He earned his MS in Biochemistry from Dr. Ram Manohar Lohia Avadh University in India, followed by a PhD in Medical Genetics from Sanjay Gandhi Postgraduate Institute of Medical Sciences. He completed his postdoctoral fellowship at the University of Pennsylvania and St. Jude Children's Research Hospital. He has received numerous honors throughout his career, including Young Investigator and Best Poster Awards at several prestigious conferences. Dr. Pandey has published over 65 articles with over 22,000 citations and an h-index of 38, and serves as an editor for several journals. He has been a reviewer for major scientific journals and grant agencies, including NIH, the ALS Society of Canada, and the European Research Council. His expertise is highly sought after, having reviewed for various NIH panels, and he has chaired committees for the Department of Defense's Congressionally Directed Medical Research Programs.

PL-6

Environmental Chemicals and their Impact on Health Economics

Prof. Sheikh Raisuddin, FST
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Environmental chemicals not only affect human health leading to different types of diseases but their persistence in the human ecosystem poses risk of long-term cost. This cost is attributed to mitigating efforts, disease control and insurance and compensation. In the recent history chemical disasters such Bhopal Gas Leak Tragedy has demonstrated devastating health, social economic impacts of accidental chemical exposure. Similarly, pesticide exposure in farming community of Western states with high cancer incidence and its economic fallout are other examples. Since it is not possible to eliminate chemicals fully from our environment the time has arrived when we factor in the subtle and continuous exposure to chemicals in our health policies and health economics. We are working on the various toxic consequences of exposure to an endocrine disrupting chemical (EDC), bisphenol A (BPA). It has been demonstrated that BPA has obesogenic effect and young individuals (children) are in particular highly susceptible to obesogenic effect of BPA. It has been shown in a report from the US that BPA exposure was associated with childhood obesity and incident coronary heart disease, with estimated social costs of about $3.0 billion in 2008. It was also projected that by removing BPA from food products a large majority of cases of childhood obesity and new cases of coronary heart disease could be prevented annually. Such as act will yield economic benefits of $1.74 billion per year. Therefore, since now we have volumes of data from laboratories, industry and field on the toxic effects of chemicals, focus is required to be on the short- and long-term health economics of chemical exposure. In India to the best of my knowledge such a dimension of chemical exposure has not been explored yet. Nevertheless, since India has become an economic giant in last decade, we cannot ignore the importance of this issue. This presentation will focus on various health economics issues of exposure to chemicals.

ABOUT THE SPEAKER

Prof. Raisuddin was till recently was the Dean of the School of Chemical & Life Sciences, Jamia Hamdard (Deemed to be University), New Delhi. He has been Head of the Department of Medical Elementology & Toxicology, Jamia Hamdard for two terms. He has also served as Head of the Department of Translational & Clinical Research, Jamia Hamdard for three terms of total 9 years. In fact, he established the Department of Translational & Clinical Research which produces professionals for Clinical Research and Drug Trial Industry. Prof. Raisuddin obtained his PhD degree while working with CSIR Fellowship at the CSIR-India Institute of Toxicology Research (IITR), Lucknow in 1994. He also served as a DBT-Scientist at CSIR-IITR for about two years and then served as a DBT-Scientist and Head of the Immunotechnology Section at prestigious Bose Institute, Kolkata for about three years. In 1994 he joined Jamia Hamdard and since then has contributed to academic and research development of the university. Prof. Raisuddin has guided 52 PhD scholars and some of his students are in high positions in India and abroad. He has published more than 200 research and review papers with Scopus citation of more than 8700 and h-index of 52. He has served as Associate Editor of SCI-journal – Drug & Chemical Toxicology for two years (2021-23). He has been listed in top 2% scientists of the world for last 4 years. Besides teaching and research, Prof. Raisuddin is the Director, Internal Quality Assurance Cell (IQAC) and contributed to high ranking of Pharmacy No. 1 in NIRF Ranking and NAAC accreditation of Jamia Hamdard in grade A+. He is a Commonwealth Fellow of UK and has served a Visiting Scientist at Plymouth University, UK for one year in 2003 and Visiting Professor in Hanyang University, Seoul, South Korea for two years from 2006 to 2008. Recently, in October 2024 he was conferred with Life Time Achievement Award of Society of Toxicology (India).

PL-7

Issues Relevant to Human Health Risk Assessment and Challenges

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Health is prime to humans. Maintaining it throughout the life is crucial. However, it is difficult to maintain due to the associated risks in the changing climate worldwide. Although the methodologies and techniques used in health risk assessment are firmly established, they have many limitations. Which are unfit for facing the new challenges. The current thinking in regulators' minds will be discussed.

ABOUT THE SPEAKER

Dr S K Rath is a renowned toxicologist in India and currently works as Chief Scientist at Toxicology Department of CSIR-Central Drug Research Institute, Lucknow, India. he holds a Ph.D. in Zoology from Banaras Hindu University (BHU) and has extensive postdoctoral research experience, including a fellowship at the Centre for Cellular and Molecular Biology (CCMB), Hyderabad. He specializes in toxicology and experimental medicine, contributing significantly to drug safety and regulatory toxicology. He has received several prestigious awards, including fellowships and recognition for his work on patents, technology transfer, and high-impact research papers (over 100 publications). He is actively involved in various scientific committees, including those related to drug safety and cosmetics, and has been a member of several national and international regulatory bodies. His work and leadership have earned him numerous accolades, including the CSIR Technology Award and the Dr. Mridula Kamboj Award for outstanding research in drug development.

PL-8

Microplastics: Exploring Male Reproductive Toxicity and Metabolic Alterations in the Context of Health Risk Analysis

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Microplastics (MPs) have emerged as significant environmental contaminants, raising concerns about their potential effects on human health. Among the most common types of MPs, polyethylene (PE) microplastics have been extensively used due to their widespread use in personal care and cosmetic products. Recent research has identified the presence of MPs, including PE, in human testis and semen, highlighting potential concerns about their effect on reproductive health. Despite these initial findings, comprehensive studies on the effects of microplastics on male reproductive health and related metabolic processes are ongoing and still in their nascent stage.

This presentation will detail findings from a 60-day study conducted using a rat model to investigate the systemic effects of polyethylene microplastics. Significant testicular toxicity was observed, evidenced by disruptions in testicular function and alterations in metabolic pathways. Significant alterations related to inflammation and oxidative stress, along with effects on adipose tissue and thyroid function, were observed. Additionally, the study revealed alterations in serum metabolite profiles. The talk will provide insights into how microplastics impact male reproductive health, including their effects on serum metabolites, adipose tissue, and thyroid function. The study's findings could be pivotal for health risk analysis, emphasizing the need for thorough risk assessments and further research on the systemic effects of microplastics. In conclusion, the urgent need to address the widespread issue of microplastics is clear, underscoring the importance of developing effective strategies to mitigate their effect on human health and the environment.

ABOUT THE SPEAKER

Dr Sapana Kushwaha completed her MS (Pharm) and PhD from NIPER Mohali, and CSIR-Nehru Postdoctoral Fellowship at CSIR-CDRI, Lucknow, India. Currently, she is working as an Assistant Professor in the Department of Pharmacology and Toxicology, NIPER Raebareli. She published more than 25 papers, and her research area includes genotoxicity, reproductive toxicity, and heavy metal toxicity. She is an active member of the Society of Toxicology (SOT), USA, the Society of Toxicology (STOX), the Laboratory Animal Science Association of India (LSSAI), and the Indian Pharmacological Society (IPS), India. She has received notable awards in the field of toxicology, including the International Union of Toxicology (IUTOX) Travel Award in 2020 and the Association of Scientists of Indian Origin (ASIO) International Toxicologist Travel Award in 2014. Her research has been cited in the OECD 489 Guideline for the "In Vivo Mammalian Alkaline Comet Assay," highlighting her contributions in toxicology.

PL-9

Global Regulatory Landscape for Contaminants in Food

Shrinivas Joshi

Food & Environment Market Waters India Pvt Ltd, II-Phase, Bangalore

The global regulatory landscape for food contaminants, including emerging threats such as per- and polyfluoroalkyl substances (PFAS), is evolving rapidly in response to growing concerns over food safety and public health. Contaminants such as heavy metals, mycotoxins, pesticide residues, and industrial chemicals like PFAS pose significant risks to food safety, necessitating stringent regulations and surveillance programs. Various international organizations, including the Codex Alimentarius, have established guidelines and maximum allowable limits for a range of contaminants in food. National regulatory bodies such as the U.S. Food and Drug Administration (FDA), the European Food Safety Authority (EFSA), and regulatory authorities in Asia and Latin America are also implementing stricter control measures. These bodies emphasize risk assessment, hazard analysis, and continuous monitoring of contaminants across the food supply chain, often integrating advanced analytical methods and technologies. For PFAS, the regulatory framework is still developing, though countries like the U.S. and members of the European Union are taking the lead by setting threshold levels in drinking water, food packaging, and food products. Recent policy shifts are increasingly focused on harmonizing testing methodologies and establishing standardized risk limits for PFAS across international borders. The challenge remains to create a globally harmonized regulatory framework that can adapt to new contaminants, incorporate scientific advancements, and protect public health without unduly disrupting food trade. Multilateral efforts, such as those facilitated by organizations like AOAC and ISO, play a crucial role in the harmonization of testing methods, particularly for contaminants like PFAS, which require precise and sensitive detection techniques. This evolving landscape demands greater collaboration between regulatory bodies, industry stakeholders, and scientific communities to establish comprehensive and enforceable standards for contaminants in food, ensuring global food safety and public trust in food systems.

ABOUT THE SPEAKER

Mr. Shrinivas B. Joshi is a highly experienced professional in the field of food safety and quality testing with over 25 years of expertise in business and market development for analytical technologies. His proficiency spans key analytical techniques, including Spectroscopy, Chromatography, and Mass Spectrometry, which are applied across diverse industries such as pharmaceuticals, petrochemicals, academia, and food & environmental sectors. He has focused extensively on food testing, food safety, and food research, and has played a key role in various capacity-building initiatives aimed at enhancing global food trade, food regulations, food safety applications, food quality, and food authenticity. Mr. Joshi has served in leadership roles, such as President of the India Section of AOAC INTERNATIONAL and Board Member of NABL. He has also been involved with the Global Food Safety Partnership (World Bank) and FSSAI's Method Review Group.

PL-10

Environmental Monitoring and Biomonitoring: Contaminants of Emerging Concern and Risk Assessment

Mohana Krishna Reddy Mudiam

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The chemical contaminants like pharmaceuticals, personal care products (PPCPs), endocrine-disrupting compounds (EDCs), flame retardants, pesticides, PFAS etc. were found in waterbodies and may cause ecological or human health impacts and presently not regulated, known as contaminants of emerging concern (CEC). In recent times, these were suspected to possess a big challenge to environment and human health. The CECs found in the aquatic systems may pose adverse health effects including the development of antibacterial resistance and endocrine disrupting effects on fish and other aquatic organisms affecting their physiology and morphology. These may enter into the environment through various routes like animal and/or human excreta, industrial wastage, discarding the expired or unused drugs, hospital effluents etc. In the human and other organisms life, the rivers play a vital role in providing the potable water and improve the cleanliness. Due to rapid urbanization, the rivers getting polluted at a rapid pace with intensified human activities. The monitoring of CECs in various water bodies will able to give an idea of the level of contamination and also can able to evaluate the risk associated with these CECs to the aquatic organisms. Further the identification and quantification of biotransformed and/or degraded products of these CECs in various organisms will able to correlate the level of contamination with the risk associated to the aquatic organisms. In my talk, I will illustrate the advanced analytical methods for the identification and quantification of CECs and their metabolites along with the monitoring of these in the different water bodies and risk associated to the aquatic organisms.

ABOUT THE SPEAKER

Dr. Mohana Krishna Reddy Mudiam, Director, Institute of Pesticide Formulation Technology (IPFT), Gurugram having expertise in Analytical and Bioanalytical Chemistry with specialization in Food Safety, Environmental Toxicology and Biopharmaceuticals characterization. He has 24 years of research experience in Analytical and Bioanalytical Chemistry with applications in Environmental, Health, Food, Pharmaceutical and Forensic Sciences. His group research interests are mainly focused in understanding the occurrence/fate, transport and accumulation of chemicals in Pharmaceuticals, Food, Environment and Biological samples using latest analytical and metabolomics approaches. His group efforts yielded several miniaturized analytical methods for the analysis of toxicants/contaminants in various food, biological and environmental matrices. He successfully established metabolomics in India as a comprehensive screening tool to understand/evaluating the (i) toxicity of xenobiotics in various model organisms, (ii) effect of ripening agents on the fruit metabolome and (iii) metabolic profiles in plants through Phytometabolomics. He is instrumental in the establishment of GLP compliant analytical facility for biologics and biosimilars characterization at CSIR-IICT, Hyderabad and Test Facility Management for IPFT/OECD-GLP facility in Agrochemicals. He guided 18 Ph.Ds. so far and authored more than 120 publications in peer-reviewed international journals with more than 4400 citations (h index of 40). He is recipient of Fellow of Royal Society of Chemistry (FRSC), ISMAS Eminent Mass Spectrometrist Award, BRSI Industrial Medal Award, CSIR Technology Award for Innovation for his work on COVAXIN, Fellow of Andhra Pradesh and Telangana Academies of Sciences (FTAS & FAPAS) and several other appreciations. He visited countries like USA, Germany, France, Australia, China and Taiwan as part of his scientific collaborations and/or assignments.

PL-11

Metabolic engineering of microorganisms for sustainable production of chemicals and polymers

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Microorganisms have extensively used as host strains for the production of value added products from renewable resources. Since natural capacity of microorganisms to produce what we want in industrial application is often not enough to meet economic feasibility, metabolic engineering strategies have extensively been develop to engineer host microorganisms for the efficient production of value added products under various culture conditions. Recently, metabolic engineering has been powered by synthetic biology to design cells in systems level to fully optimize production of target products.

Among many value added products that can be produced in natural and recombinant microorganisms, industrially useful products such as biopolymers, biofuels, and biochemicals have drawn much attention as one of the promising solutions to solve fossil fuel depletion problem and environmental problems including global boiling crisis and non-degradable plastic wastes accumulation. When biorefinery process is designed to produce industrially useful products such as chemicals, fuels, and plastics from renewable resources by microorganisms, it depends on microbial fermentations that can produce such products from renewable resources. Since microbial host strains employed as host catalysts in biorefinery are one of the most important factors determining efficiency of bioprocess, microorganisms that can be used as host strains have extensively engineered to produce target products in most efficient way by metabolic engineering strategies strengthened by various synthetic biology strategies.

In this presentation, metabolic engineering strategies employed for the construction of host microorganisms in biorefinery are mainly discussed.

ABOUT THE SPEAKER

Dr. Si Jae Park is a Ewha Fellow Professor at Department of Chemical Engineering and Materials Science, Ewha Womans University since 2017, Korea. Before joining Ewha Womans University, he worked for Department of Environmental Engineering and Energy, Myongji University as an assistant and associate professor (2012-2017), Chemical Biotechnology Research Center, Korea Research Institute of Chemical Technology (KRICT) as a senior research engineer (2009–2012), and Corporate R&D in LG Chem Research Park as a principal investigator of biomaterial research team (2003–2009). He received the BS. degree in chemical engineering from Seoul National University in 1997, and obtained the MS. and Ph.D degrees in chemical engineering from KAIST in 1999 and 2003, respectively. Currently, his research group focuses on the development of metabolically engineered microorganisms for the production of novel biopolymers, biochemicals and biofuels for biorefinery. As of April 2024, he has published over 100 scientific articles.

PL-12

Harnessing Waste Substrates: Circular Solutions in Bioplastic Production

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Plastics have become essential in our everyday lives, contributing significantly to socio-economic progress. Yet, the heavy dependence on plastics has posed substantial environmental problems due to their non-biodegradability. They are derived from petroleum, a non-renewable resource that takes thousands to millions of years to regenerate. Another troubling issue is the potential release of persistent, bio-accumulating, and toxic compounds from plastic debris, which can accumulate in the environment. Hence, there is an urgent need to explore sustainable substitutes from renewable sources such as polyhydroxyalkanoates (PHAs). PHAs are biodegradable plastics produced by various microbes under limited nutrient conditions as carbon and energy source. They exhibit material properties similar to petrochemical plastics but offer enhanced biodegradability and biocompatibility. PHA can completely decompose in the environment, typically biodegrading within about two months under natural and standardized soil conditions. These attributes have positioned PHA as a next-generation bioplastic suitable for a wide range of applications including packaging, medical products, food packaging, electronics, cosmetics, construction materials, automotive components, and agricultural applications.The biodegradable plastic market is projected to increase from US$ 3.02 million in 2018 to US$ 6.73 million by 2025. However, the adoption of PHA remains limited due to its high production costs, primarily influenced by the cost of raw materials, especially carbon sources. The predominant use of pure sugars (such as glucose, sucrose, and maltose), food crops, and edible vegetable oils by major PHA producers poses significant challenges to the scale-up of industrial PHA production. Therefore, there is a critical need to explore low-cost waste carbon sources for PHA production. This approach not only addresses the economic viability of PHA production but also helps mitigate waste treatment and disposal issues by transforming waste into value-added products. Our recent research efforts have focused on generating PHA from inexpensive and renewable carbon sources, such as activated sludge, crude glycerol, waste cooking oil etc. Despite advancements in the PHA production process, it still adheres to principles of a linear economy, highlighting the urgent need for sustainability integration. Valuable co-products such as microbial proteins, extracellular polymeric substances (EPS), surfactants, pigments, carotenoids, and amino acids can be recovered alongside PHA. Quantifying and characterizing these co-products are essential to understand their behavior and potential applications. This research aims to propose a closed-loop system for recovering additional bio-products generated along with PHA. While recent years have seen efforts to reduce the production costs of bioplastics, minimal attention has been paid to making the PHA production process sustainable and circular. After downstream processing of PHA, various liquid streams are generated at different treatment stages, typically discarded as waste. Therefore, this research strategically investigates methods to reuse the waste streams, aiming to achieve a zero-waste discharge system. Recycling these waste streams not only promotes circularity in the process but also mitigates ecological risks by reducing the wastewater load on wastewater treatment plants (WWTPs). This study integrates the use of waste substrates for PHA production, while also focusing on recovering industrially valuable products and recycling waste streams generated during the polymer production process. The presentation will delve into essential aspects of PHA production utilizing organic wastes, including pre-treatment methods, process optimization, co-product generation, and waste stream recycling. The objective is to foster a circular economy, promote sustainability, enhance process robustness, and improve resource efficiency, paving the way for widespread adoption of PHA production methods.

ABOUT THE SPEAKER

Professor Rajeshwar Dayal Tyagi has earned several awards and distinctions in recognition of the quality of his work aimed at reducing waste and turning it into value-added products. Accolades include the Superior Achievement Award from the American Academy of Environmental Engineers and Scientists, the ASCE State-of-the-Art of Civil Engineering Award, the Global Honour Award for Applied Research from the International Water Association, and the 2016 Mahatma Gandhi Pravasi Samman Award. He is also a Fellow of the International Water Association and a member of the European Academy of Sciences and Arts.

PL-13

Innovations in Green-Nanomedicine for Applications in Oncology, Treating Drug Resistant Bacteria (MRSA-Antibiotics) and Deadly Viral Infections

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World Health Organization (WHO), in its latest report, has forecast that over 80% of global population prefers polyherbal plant-based remedies, rather than the toxic chemical-based medicines, in the treatment of various disease and disorders. Kadamba is one of the few companies in the world which has embarked on innovative approaches toward enhancing the bioavailability and effectiveness of herbal power, through Green Nanotechnology, to develop new and unprecedented nanomedicines for the treatment of various diseases and disorders. Kadamba owns/has licenses to a maximum number of green nanotechnology patents with proven green nanotechnologies and nanomedicine-based products for use in numerous inflammatory diseases and toward the development of next generation of cosmeceuticals. Kadamba's approved vast product range, through its proprietary polyherbal-based Green Nanotechnology and Nanomedicines, include products for (i) treating cancers; (ii) treating deadly infections including drug-resistant MRSA; (iii) treating viral infections including deadly COVID-19; (iv) treating osteoarthritis; (v) cosmeceuticals for treating inflammatory skin conditions including acne, dry skin and topical applications; (vi) treatment of dandruff—without the use of toxic chemicals; (vii) dental hygiene through 100% natural toothpaste and mouth wash. This stellar product range of over 50 products is based on the following innovative science and technology which Kadamba has developed and continues to innovate through its scientists in Bangalore, United States, Brazil and South Africa: Nanomedicine: A Paradigm Shift in Sustainable Healthcare: Nanomedicine represents a groundbreaking innovation blending the precision of green nanotechnology with advanced phytomedicine. At Kadamba, we are dedicated to the meticulous development of nanopharmaceuticals using ecofriendly and sustainable polyherbal 100% green processes. By integrating the principles of Green Nanoscience, we ensure that our approach is not only innovative but also environmentally responsible, aligning with the global need for sustainability within the healthcare industry. Our green nanomedicines, recognized by the US Patents and Trademarks Office, mark a revolutionary advancement in medical treatments. These highly advanced formulations offer a holistic approach to healing, transforming conventional drug discovery and therapy through evidence-based overarching objectives. Kadamba's commitment to Green Pharmacology is a deliberate deviation from conventional toxic chemical-based approaches and thus represents a cognizant response to the growing concerns surrounding the toxicity of chemical-based drugs, which have dominated the pharmaceutical landscape for decades. The Need for Green Pharmaceuticals: The over-reliance on chemical-based drugs has led to increasing environmental pollution, adverse side effects, and long-term irreparable health concerns on human bodies. Traditional pharmaceutical production often involves hazardous chemicals, which not only threaten human health but also contribute to environmental degradation. In contrast, green pharmaceuticals, particularly those derived from Green Nanotechnology, offer a safer, reliable and more sustainable alternatives. Green Nanomedicines incorporate natural, non-toxic polyherbal ingredients, reducing the burden of toxicity on the human body and the environment. By using plant-based compounds and nanoparticles, these medicines ensure enhanced bioavailability, targeting the disease more efficiently and reducing the potential for harmful side effects. The biocompatibility of these nanomedicines, coupled with their environmentally-friendly production processes, makes them a crucial advancement in modern pharmacology. Kadamba's Role in Revolutionizing Healthcare: At Kadamba, we are bridging the gap between traditional holistic practices and modern nanoscience. Our Green Nanotechnology-based formulations amplify the therapeutic potential of natural herbs and bioactive compounds, thus ensuring that patients experience superior therapeutic outcomes with minimal/no side effects. The precision of nano-drug delivery systems improves bioavailability while concomitantly enhancing therapeutic efficacy of polyherbal active ingredients anchored on bioactive nano surfaces—all aimed at transforming them to be far more effective than conventional herbal remedies. In an industry burdened by the challenges of toxic chemical-based drugs, Kadamba's green nanomedicines offer a stellar scientific approach bridging the unmet and a long-awaited clinical need reflecting a harmonious relationship between nature and science. Kadamba's innovations are a "God-Send Gift" for humanity, providing advanced, safe, reliable, scientifically rigorous and sustainable healthcare solutions. Kadamba's Green Nanomedicine Approach Aligns with NIH, USA, and AYUSH, India: National Institutes of Health (NIH), USA, has shown considerable interest in unraveling the clinical potential of Polyherbal Integrative Medicine approaches through various educational, research and funding opportunities. AYUSH, India and NIH, USA, held the first ever joint

workshop on Integrative Medicine in May 2024—where new opportunities to unravel the scientific rationale for Polyherbal Nanomedicines were discussed. Kadamba, from Bangalore, India, through its Research and Development partners from the University of Missouri—were one of the few groups invited to present pre-clinical and clinical findings of our Nanomedicine product developments at this workshop. This workshop provided a unique opportunity to showcase Kadamba's research and product development efforts which represent 'A Revolution in Modern Medicine' through green nanomedicines. The use of highly precise nanocarriers to ensure that therapeutic polyherbal cocktails are targeted precisely at cellular levels represents a new paradigm in precision medicines. Kadamba's immunomodulatory approaches for treating a myriad of human diseases including cancers, diabetes, arthritis, and deadly infections are built on a solid scientific foundation of providing strength to the human body to fight and treat deadly diseases effectively while minimizing systemic toxic exposure. As the world seeks more attractive and reliable alternatives to toxic chemical-based treatments, Kadamba's green nanomedical revolution is at the forefront of a new genesis in medicine that embodies a future where advanced and affordable healthcare is made available to humans across the world through sustainable, non-toxic and transformative green nanotechnologies. This lecture will focus on our Nano Herbal Medical approach which stands as a testament to our commitment to science and technology-embedded holistic healthcare offering a future where therapeutic excellence is not at the expense of human health or the environment.

ABOUT THE SPEAKER

Dr Kattesh V. Katti Globally recognized as the 'Father of Green Nanotechnology', Professor Kattesh V. Katti, MSc Ed, PhD, DSc, FRSC, FNAI, Curators' Professor of Radiology, Director, Institute of Green Nanotechnology, within the Medical School, University of Missouri, Columbia, USA—is internationally renowned as a leader in the interconnecting fields of—chemistry, Materials science, radiopharmaceutical sciences, nanotechnology/green nanotechnology and nanomedicine—for biomedical applications, specifically for molecular imaging and therapy of living subjects. Dr. Katti has won the International Hevesy Medal Award—A Global award for excellence in Nuclear Medicine—regarded as equivalent to a Nobel Prize in Nuclear Sciences. Dr. Katti is a pioneer in the field of Nano-Ayurvedic Medicine—a new medical modality which he has discovered by the application of Nuclear Analytical, Radiochemical techniques and Green Nanotechnology to Ayurvedic-Holistic Medicine. In 2024, the US/European Union Patents and Trademarks office has granted the first ever US patent on Dr. Katti's discovery of a new medical modality referred to as 'Nano-Ayurvedic Medicine' Several cancer therapy products and antibiotics, discovered by Dr. Katti, are currently used in treating human patients. Dr. Katti is an Elected fellow of the American Institute of Medicine and Biological Engineering and Elected fellow of the American Association for the Advancement of Science, Elected fellow of the National Academy of Inventors; and Elected fellow of the Academy of Science, St Louis—one of the oldest scientific academies of the world. In 2024, United States Department of States Bureau of Educational and Cultural Affairs (ECA) and world Learning selected Dr. Katti as a Fulbright Global Specialist in Chemistry Education. National Academy of Inventors—the largest Inventors Academy of the World has recently produced a documentary on Dr. Katti's inventions which are used for combating COVID and related deadly infections: https://www.youtube.com/watch?v=-OVI33BFMtk&t=13s United Nations/IAEA recognized Dr. Katti as the Global Expert in 'Green Nanotechnology' and in 'Nano-Radiopharmaceuticals'; Dr. Katti is winner of the 2016 'Person of the Year in Science' award. Elected to the fellowship of the National Academy of Inventors (NAI in 2015) recognizing the discovery of 'Katti Peptides'—a group of peptides used in biomedical sciences and nanomedicine product development. Dr. Katti has been recognized as One of the '25 Most Influential Scientists In Molecular Imaging in the World' by RT Image. Dr. Katti has received the 'Father of Green Nanotechnology' citation by the Nobel Prize Winner Norman Borlaug and has been bestowed with the Gauss Professorship—Hall of Fame—from the Gottingen Academy of Sciences. The 'Outstanding Missourian Award' from the Governor of the State of Missouri. Dr. Katti has won the 'Outstanding Scientists Fellows' award and inducted as a Fellow of the St Louis Academy of Science. His discoveries of the production of various nanomaterials through 'Zero Carbon Emission' processes and his cancer treatment approaches through Nanomedicine and Green Nanotechnology have been highlighted in Nature, Future Medicine, in Science (AAAS), in Popular Science, and by the Discovery Channel. and in the scientific/medical programs of the British Broadcasting Company (BBC), Discovery Channel and the Voice of America. Dr. Katti has published over 300 publications, reviews, and book chapters and is the principal inventor on over 150 inventions and over 50 patents.

PL-14

Illuminating cells for smart screening of bioactive & toxic compounds

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An immune response is multiple physiological reactions which occurs within an organism for the purpose of keeping a body homeostasis against several exogenous factors. For the purposes of the evaluating bioactive compounds, bioluminescence reporter assay system is a powerful tool. Bioluminescence is a simple reaction that is triggered by the addition of luciferin solution, and the equipment for measuring light intensity is simple and convenient. So, luciferases are suitable reporter enzymes for the quantitative measurement of gene expression. Our team originally established the multicolored reporter assay using color difference beetle luciferases, which this system can evaluate the bioactivity of compounds based on the complicated cellular mechanism. Until now, reporter cell lines using our system has been identifying several bioactive compounds from natural resources for immune response or antistress. In this lecture, I will talk about the principle of bioluminescence tools and how to identify the novel bioactive compounds from natural resource based on clarifying the bioactive mechanism of them.

ABOUT THE SPEAKER

Yoshihiro Ohmiya earned his M.Sc. and Ph.D. degrees in Biochemistry and Material Science from the Gunma University (Japan). AIST recruited him in 2001 and he organized the research group for the basic and application of bioluminescence. He was appointed in the Director of Biomedical Institute, AIST, from 2012 to 2019. From 2019, he has been the Prim Senior Researcher of AIST. He is a author or co-author of over 180 research articles in peer-reviewed journals, over 60 review articles/book chapters and over 40 patents. He served on the past-President of International Society of Bioluminescence and Chemiluminescence. He has been the Distinguished Professor of VISTEC (in Thailand) and Visiting Professor of University of Bucharest (in Romania), OIT (Osaka Institute of Technology) and Tottori University.

PL-15

Toxicity of Dietary Flavonoids and Induction of Epigenetic Alterations in Triple Negative Breast Cancer

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Triple-negative breast cancer (TNBC) is a highly aggressive and metastatic subtype of breast cancer that presents significant treatment challenges due to its acquired drug resistance to current targeted and hormonal therapies. Epigenetic modulations, particularly through histone deacetylases (HDACs), are known to trigger the epithelial to mesenchymal transition (EMT) in TNBC resulting in a more invasive tumor phenotype. To avoid the side effects associated with chemotherapy and radiotherapy and boost the effectiveness of current anti-cancer medication, plant-derived flavonoids have been investigated. Our study aimed at investigating the role of dietary flavonoid Galangin (Gal) in the modulation of epigenetic regulators such as HDACs and HATs and their impact on the reversal of the EMT process in TNBCs. We examined the anti-TNBC potential of Galangin both alone and in combination with SAHA through a series of in vitro assays including MTT for cell proliferation, migration and invasion, cell cycle regulation, ROS generation and mitochondrial dysfunction, nuclear fragmentation and apoptosis induction etc. The expression profiles of epigenetic regulators, apoptosis regulating proteins, and EMT markers were analyzed by performing transcriptomic and proteomic studies. The in vivo efficacy of Gal was studied using BALB/c mice xenograft model studies. Our results revealed that Galangin, at an IC50 of 50 µM/mL, significantly inhibited cell proliferation, migration and invasion, arrested cell cycle at sub-G0/G1 phase, induced ROS production, reduced mitochondrial membrane potential and triggered apoptosis in MDA-MB-231 TNBC cells. Additionally, through transcriptomic, proteomic and calorimetric analysis it was observed that Galangin potentially downregulated the expression of HDAC1 and HDAC3 while elevating HAT levels. It also modulated the EMT process by downregulating mesenchymal markers and upregulating epithelial markers. Further, the combination of Gal with SAHA exhibited a synergistic effect on the growth of TNBC cells by modifying the expression of apoptotic and epigenetic regulators and EMT markers. Transcriptomic and western blotting techniques showed a substantial increase in the expression of tumor suppressor protein pTEN and a significant decrease in the proteins involved in the proliferation pathway namely AKT, PI3K, and mTOR. The in vivo investigation and the in vitro results were consistent. Thus, our findings highlight the efficacy of anti-TNBC properties of Galangin, that may aid in the development of a more successful treatment plan for TNBC patients with aggressive and metastatic phenotypes.

ABOUT THE SPEAKER

Prof. Rajesh N Gacche is presently working as a Senior Professor and Head at the Department of Biotechnology, Savitribai Phule Pune University. His area of research interests are cancer biology and diabetes. Prof. Gacche has published over 158 research articles. Prof. Gacche's work has gained international recognition, in the WHO's Global Hepatitis Report (2017) and notable publications in prestigious journals like Nature-Oncogenesis, Nature-Scientific Reports, BBA Cancer and Drug Resistance Updates. He is a recipient of several awards including Best teacher award , Erasmus Fellowship by European Union, Award of Appreciation by the Italian Ministry of Health and Government of Croatia,

PL-16

Mechanistic insights of delayed effects of heavy metal toxicity in lungs

Ranu Surolia

Environmental Lung Diseases Research Division of Pulmonary, Allergy,
and Critical Care, Department of Medicine, University of Alabama at Birmingham, AL

Heavy metals such as cadmium , arsenic are environmental pollutant s. The exposure to heavy metals results in oxidative stress, and lung injury. The long biological half life of these metals may lead to maladaptive innate and adaptive immune responses which in turn can lead to chronic lung diseases. My talk will focus on these mechanisms for the pathogenesis of small airway diseases such as COPD, and Asthma.

ABOUT THE SPEAKER

Dr Ranu Surolia is a molecular toxicologist specialized in studying the impact of heavy metals on small airway diseases, particularly in exposed populations and military persons. Her research, funded by NIH, focuses on the role of systemic inflammation in developing small airway diseases like COPD and Asthma. She is also interested in understanding how cadmium, a heavy metal present in cigarettes, computer batteries, and anti-corrosive coatings of jet plane fuel tanks, contributes to the development of COPD and emphysema. Additionally, she investigates deployment-related disease models using a novel murine model of lewisite exposure-induced constrictive bronchiolitis, which is an Arsenic-containing chemical agent developed during WWI and WWII. Dr. Surolia plays a vital role in advancing our knowledge of how environmental factors can impact respiratory health, especially in vulnerable groups.

She serves as a reviewer for NIEHS grants and is an active member of the Environmental and Occupational Public Health (EOPH) Assembly at the American Thoracic Society. Additionally, she is an executive committee member and a nominating member of the Terrorism and Inhalation Disaster section at the EOPH assembly and is the chair-elect of the Early Career Professional Working Group at the EOPH assembly at the American Thoracic Society.

PL-17

inhibition of aspergillus flavus, aspergillus niger and aspergillus carbonarius growth and aflatoxin production by rhamnolipids produced by pseudomonas aeruginosa and burkholderia thailandensis

Ana I. Rodrigues, E. Gudina, L. Abrunhosa, L. R. Rodrigues, J. A Teixeira

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Mycotoxins are low molecular weight toxic secondary metabolites naturally produced by different types of filamentous fungi mainly belonging to the *Aspergillus, Penicillium* and *Fusarium* species, capable of causing adverse effects in human and animal health. Additionally, mycotoxins have a negative impact on agriculture, causing huge economic losses.

Although several hundreds of different mycotoxins have been identified, the most commonly observed mycotoxins that represent the major concerns to human and animal health include aflatoxins, deoxynivalenol (DON), fumonisins, ochratoxin A (OTA), patulin, and zearalenone (ZEN) with several countries establishing limits for their presence in food and feed.

In order to eliminate the risk associated with the presence of mycotoxins and their fungal sources in food/feed for human and animal health, as well as the economic impact caused by the huge losses of contaminated crops, in the last few years several strategies have been pursued to reduce or eliminate mycotoxins and mycotoxigenic fungi, with focus on new and environmentally friendly strategies. The use of biosurfactants is an alternative that has been considered, as, due to their similarity with chemical surfactants and their antifungal activity, they can be used as "natural fungicides" and anti-mycotoxin agents in different agriculture commodities.

Results on the effect of rhamnolipids produced by *Pseudomonas aeruginosa* #112 and *Burkholderia thailandensis* E264 on the growth and aflatoxins production by *Aspergillus flavus MUM 17.14* will be presented as well as strategies for their production discussed.

ABOUT THE SPEAKER

Professor José Teixeira is a Full Professor at the University of Minho. He is also member of the Scientific Steering Committee and previous Head of the Research Unit Centre of Biological Engineering (CEB) and serves since 2009 as the President of the Portuguese Biotechnology Society. He is also a member of the Institute of Food Technologists. Prof. Teixeira has a wide research expertise in Industrial Biotechnology (bioprocess development for the transformation of lignocellulosic materials into 2nd generation bioethanol and chemicals; valorization of agro-industrial residues; bioreactor development and continuous processing) and Food Biotechnology (non-conventional food processing; edible films for packaging; food nanotechnology, process development for production of prebiotics with over 500 publications in these topics (https://www.scopus.com/authid/detail.uri?authorId=13402823200)

PL-18

Physics-Informed Neural Networks (PINNs) for Bioprocess Digitalization

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In the realm of bioprocess technology, bioreactors play a central role. The intrinsic mechanistic complexity of cell cultivation systems due to population heterogeneity in cell size, reproduction cycle, genetic stability as well as intracellular composition poses a formidable challenge for process digitalization. The development of predictive models for optimization and control at an acceptable cost is still challenging in the bioprocessing industries. Physics-informed neural networks (PINN) are an emerging Machine Learning (ML) technique that incorporates known physical knowledge governing the system, usually partially differential equations or ordinary differential equations (PDE or ODE), into the loss function of a deep neural network during the training process. PINNs enable to capture complex physics even with limited data, and this unique approach is standalone from traditional hybrid modeling. In this study, we showcase the concept of PINN with examples of bioprocess development. Throughout the study, we used the adaptive moment estimation (ADAM) algorithm, Automatic Differentiation (AD), different node activation functions and varying number of hidden layers for deep learning of bioprocess data. Particularly, we evaluate the effect of including prior physics knowledge in the training process where data and physics loss functions are simultaneously minimized. The key conclusion is that embedding physics knowledge in the neural network during the training process has systematically achieved a higher prediction accuracy than traditional deep neural network modeling in comparable circumstances.

ABOUT THE SPEAKER

Rui Oliveira is Full Professor of Chemical and Biological Engineering at NOVA University Lisbon, Portugal. He is the head of the Systems Biology and Engineering lab and the head of the integrative research lab in Bio-Chemical Process Engineering (BCPE), LAQV-REQUIMTE, a consortium of Portuguese universities. His main research area is Hybrid Artificial Intelligence/Physical systems for Industry 4.0/5.0. He has been deeply involved in digitalization innovation in the biotechnological sector.

PL-19

Development of human iPSC-derived 2D and 3D models for toxicity/ safety assessment: CSIR-IITR's perspective

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Humans have long been fascinated by their body's biology and disease mechanisms. Limited access to human tissues led to reliance on speculation about organ formation and function. Non-primate models (*Drosophila* to Zebrafish and rodents) advanced the understanding of human development but failed to translate directly. Two-dimensional (2D) cell cultures have revolutionized research, although transformed cell lines have genetic expression and metabolic contours not indicative of human bodily systems. 2D cell cultures obtained from stem cells/ induced pluripotent stem cells (iPSCs) have transcriptional profiles that are very similar to those of human cells, yet 2D cultures struggle to mimic 3D tissue architecture. The advances in cultivation, bulk production, differentiation, and cytosolic and genetic transformation of immortalized and primary cells derived from human and animal origin in 3D cultures have provided an edge in developing high-throughput screening models for testing drugs and chemicals. The potential applicability of human iPSCs is also being looked at as restorative medicine by replacing the specified damaged tissues with stem iPSC-derived 3D systems. Researchers in India have had tremendous success restoring various degenerative disorders with special reference to neuronal disorders, spinal cord injuries, aplastic anemia, acute myeloid leukemia, etc., by transplantation of iPSC/ stem cell-derived specific cell types in experimental models and limited clinical trials. Industry and academia joint efforts have also culminated in the less complex, unique 3D characterized spheroid epidermis model using two major cell types present in the epidemic, i.e., keratinocytes and melanocytes. This human epidermis mimicking model was found to be suitable for studying the complete melanogenesis pathway and transfer of melanin from melanocytes to physiologically differentiated keratinocytes within the 3D spheroids microenvironment. Nevertheless, a long list of questions is still to be answered. The pace of iPSC/ stem cell research indicates that a rationalized remedy to cure each individual's disease will be possible someday using specified desired cells derived from human iPSCs.

ABOUT THE SPEAKER

Professor Aditya Bhushan Pant is a seasoned toxicologist who started his research career with over thirty-three years of experience in the area of toxicology. His strategic international collaboration with the University of São Paulo, Brazil, has developed a strong roadmap for effectivedrug development and therapeutic interventions in Amyotrophic Lateral Sclerosis, a fatal neurodegenerative disorder. He is a lead GLP inspector for theGovernment of India and also serves as an expert for regulatory bodies, such as BIS, CDSCO, NABL,FSSAI, NGCMA, ICMR, DST, Pharmacovigilance, etc.

PL-20

Experimental evidence of the antistress and anticancer activities in Ashwagandha

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Ayurveda, the oldest and most-renowned Indian system of home medicine, has a history of over 5000 years. Amongst various herbs, Ashwagandha (*Withaniasomnifera*) is most commonly used and highly trusted for various health benefits. We have investigated active components and molecular mechanisms of its anticancer and antistress activities by cell culture-based molecular assays. Alcohol, water, and DMSO-based extracts of Ashwagandha leaves were prepared. Various human cancer and normal cell types were treated with the extracts and subjected to various viability, stress, and death assays. The underlying signaling pathways were investigated by biochemical and imaging assays. We found that the alcoholic extract of Ashwagandha leaves (i-Extract) contains Withanone (Wi-N) and Withaferin-A (Wi-A) and causes the selective killing of cancer cells. The molecular mechanism of the latter, as resolved by bioinformatics and experimental assays, endorsed activation of tumor suppressor protein p53, accumulation of oxidative stress and mitochondrial dysfunction, inactivation of telomere maintaining mechanisms, and NF-kB signaling. Intriguingly, cells treated with low concentrations of these compounds showed better viability under stressed conditions. Furthermore, in a three-way blinded screening of natural compounds for antistress activity, 4/70 compounds were found to protect against oxidative and metal stress. Molecular assays of stressed cells treated with low nontoxic concentrations of these four (Wi-A, Wi-N, methoxyWi-A, triethylene glycol, TEG) compounds revealed protection against apoptosis, ROS accumulation, mitochondrial dysfunction, DNA damage and protein aggregation. Wi-N and TEG offered protection against intrinsic replicative stress accumulation in normal human fibroblasts and attenuated stemness of cancer cells, as validated by decreased clustering and increased differentiation ability. Chronic stress and aging are considered precancerous conditions often connected with many other pathologies. Our study suggests that Ashwagandha's dose-dependent anti-stress and anti-cancer potential are helpful in managing environmental and age-related pathologies.

ABOUT THE SPEAKER

Dr Sunil Kaul is currently an Invited Senior Research Scientist at the National Institute of Advanced Industrial Science & Technology (AIST), Tsukuba, Japan. He has been on the editorial board of several scientific journals with more than 250 research publications in international peer-reviewed journals, patents, and several invited lectures internationally. He has been honored as Fellow of Geriatrics Society of India (FGSI), Overseas Fellow of Biotech Research Society of India (FBRSI), Fellow of Indian Academy of Neuroscience (FIAN) and Foreign Fellow of National Academy of Sciences, India (FNASI). He is the President of KAUL-Tech Co., Ltd, Japan.

PL-21

Gaseous and particulate emissions from the combustion of wood pellets

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Wood combustion results in gaseous emissions (mainly CO, CO_2, NO, NO_2, and low concentrations of SO_x) which are harmful to humans and partly responsible for climate change. Such combustion also results in emissions of fine and ultrafine particles which are also harmful to humans. The aim of the present study is to analyze the gaseous and particulate emissions occurring during the combustion of wood pellets in a drop tube furnace. This device allows reproducing combustion experiments in domestic pellet furnaces, the pellet falling from the top of the drop tube furnace to the reaction zone in approximately 1 s, thus leading to high heating rates. The temperature of the reaction zone can be adjusted, here between 500 and 900 °C. Gas analyzers and an Electrical Low Pressure Impactor complete the experimental setup to continuously measure the gaseous and particulate emissions. The pellet mass is also continuously measured during the combustion experiment. From these different experimental conditions that leading to minimal emissions are determined, which reduce the risks to humans and the environment. The present study is complementary to that carried out on the combustion of a wood pellet but under low heating rates, [1]. Comparisons of the results obtained under high and low heating rates will be presented.

ABOUT THE SPEAKER

Alain Brillard is currently Emeritus Professor in Applied Mathematics at the Research Lab Risk Management and Environment, University of Upper-Alsace (Mulhouse), France. He defended his PhD in 1986 at University Paris XI-Orsay and his Thèse d'Etat (Habilitation) in 1990 at University Montpellier 2, both in Applied Mathematics. He was President of the University of Upper-Alsace during the years 2007-2012, after being Vice-President, Dean of the Faculty of Sciences and Technology... His current major research interests are modeling (thermal degradations of biomass or metal particles, depollution processes...) and the associated numerical resolution of these models. He is active in international collaborations (Russia, Morocco, India, USA). He is author or co-author of 82 papers, with a *h* index of 18 and 664 citations (Scopus, July 2024).

PL-22

Novel Insights into pathways of viral neurotoxicity – Implications in cognitive health

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Understanding host-pathogen interactions and cellular and molecular mechanisms of viral neuropathogenesis is of paramount importance to reduce the morbidity associated with viral infections of the central and peripheral nervous systems. Several neurotropic viruses gain access to highly protected brain tissue by various mechanisms leading to irreparable damage to neuronal tissue that can lead to considerable motor and cognitive deficits. It is hence very critical to conduct detailed investigations in physiologically relevant model systems of human origin. Our laboratory has established 2D and 3D models of human brain cells to study how viruses or their neurotoxic viral proteins breach the human blood brain barrier and cause damage to neuronal cells either directly to the neurons or via glial cells. Using primary cultures of human brain cells, we have studied effect of HIV-1, Zika and SARS-CoV2 on neural stem cells, neurons and astrocytes. Our studies reveal novel insights into how the neurotropic viruses alter the glia-neuronal crosstalk and caused glia mediated neuronal apoptosis via the purinergic receptors and VDAC-1. We have also identified novel roles miRNAs in viral neurotoxicity in Zika and HIV-1 cases. In addition to the cell culture experiments, we have validated the in vitro findings using the post mortem brain sections from HIV-1 and COVID-19 patients.

ABOUT THE SPEAKER

Dr. Seth's research endeavor after returning to India from National Institutes of Health, Bethesda, USA, has been originality of thinking, taking up challenges of direct relevance to national health problems - particularly HIV-1, drug abuse, Zika virus mediated neuropathogenesis, and very recently effect of SARS-CoV2 on human brain. He is currently serving as Board member of International Society of Neuro Virology (ISNV), USA, International Council Member – Society of Neuro Immune Pharmacology (SNIP), USA and as Council member of Asia Pacific Society of Neurochemistry (APSN). The National Academy of Sciences India, National Academy of Medical Sciences and Indian Academy of Neurosciences (IAN) have elected him their Fellow. He has been appointed as area expert to number of DBT, ICMR task forces to lend his expertise. He also serves on Editorial boards of numerous international journals in various capacities.

PL-23

Biodegradation of plastic polymers: Insights from pure culture and genomic studies

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Million metric tonnes of plastics released continuously and these ultimately enter into the terrestrial and marine ecosystems. In India, a large number of open municipal dumps generate plastic debris and undergo fragmentation and generate microplastics. Also different types of plastics and the plasticisers become a serious threat to the marine. We have studied samples from different municipal dump sites to characterize the microbial communities that possesses the biodegradation capabilities of these pollutants. Two novel bacterial strains, Dietzia kunjamensis IITR165 and Brucella intermedia IITR166, were isolated and found to efficiently degrade DBP at high concentrations. The degradation followed first-order kinetics, and both strains exhibited a removal efficiency of over 99%. Metabolite analysis revealed that both bacteria utilized de-methylation, de-esterification, and decarboxylation steps during degradation. Phthalate esters degrading gene cluster in IITR165 comprised two novel genes coding for carboxylesterase (dkca1) and mono-alkyl phthalate hydrolase (maph), having only 37.47% and 47.74% homology, respectively, with reportedphthalate degradation genes. Moreover, Amino acid composition showed that the Dkca1 enzyme belongs to family VII carboxylesterase containing conserved catalytic triad of Ser183-Glu289-His378. However, IITR166 harbored different gene clusters comprising di-alkyl phthalate hydrolase (dph_bi), and phthalate dioxygenase (ophA, B, and C) genes. We present genomic and functional analysis of Dietzia kunjamensis IITR165 and Brucella intermedia IITR130, bacteria that are capable of degrading PET and other plasticizers. Genomic annotation revealed key enzymes implicated in the PET biodegradation pathway, including hydrolases, ring hydroxylating dioxygenases, protocatechuate 3,4 dioxygenases, genes related to biofilm formation and metabolism of several natural and synthetic plastics, and aromatic compounds. Dietzia kunjamensis IITR165 bacterium, capable of degrading dibutyl phthalate (DBP), terephthalate (TPA), and polyethylene terephthalate (PET), was studied to uncover its metabolic pathways. Whole-genome analysis revealed a circular chromosome of 3,477,711 bp and a plasmid of 58,850 bp with 70.6 % GC content. Among 3,311 functional genes, phthalate dioxygenase/decarboxylase (padAa1, padAb1, phtB, phtC), alkane monooxygenase (alkB), di-and mono-alkyl phthalate hydrolase, and extra-diol dioxygenase were identified. Gene clusters for terephthalate (tphA1A2A3 and tphB), benzoic acid (benABCD), and catechol (catABCD) were also found. The key results obtained on growth and genomic insights of our study on the plastic biodegradation will be presented.

ABOUT THE SPEAKER

Dr Natesan Manickam is a Chief Scientist at CSIR-Indian Institute of Toxicology Research, Lucknow. Currently he is the Head of the FEST Division at CSIR IITR that comprises of about 35 scientists. He is a 'Task Force member' in different committees of Department of Biotechnology (DBT), Ministry of Environment, Forest and Climate Change (MOEF&CC), under Government of India. He is also International Scientific Council member at Rovaltain Foundation, France. More than 60 publications in international peer reviewed journals.

PL-24

A low-cost and environment-friendly approach for removal of arsenic employing solar oxidation

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A large population across the globe do not have access to clean drinking water. Arsenic is among one of the major geogenic groundwater contaminants and it is an elemental cumulative trace toxin which can also undergo biomagnification. Its concentration at many places has been observed to be exceeding the permissible limit of 10 µg/L. Many technologies have been developed for removal of arsenic but almost all of these are either chemical or energy intensive. Solar Oxidation and Removal of Arsenic (SORAS) involves photocatalytic oxidation of arsenic in presence of sunlight and subsequent co-precipitation with iron. It can be used as an appropriate technology, which is simple in application, requires no artificial source of energy and consumes almost negligible amounts of non-hazardous chemicals. In addition, the chemical precipitate generated can be easily separated and stored. SORAS technique can also be used effectively in rural areas. It could further be observed that the process of photocatalytic oxidation followed by co-precipitation can also be employed for removal of many other trace toxins like aluminium, cadmium, chromium, lead, manganese, nickel and zinc.

ABOUT THE SPEAKER

Professor Devendra Mohan received his B. Tech., M. Tech., and Ph. D. in Civil Engineering from Institute of Technology, Banaras Hindu University, Varanasi. He has an extensive and diverse experience in teaching, research, testing and consultancy, and extension for about thirty-six years. He has supervised about a dozen of Ph. D. He has more than one hundred research publications in journals and books of national and international repute. He has served as the Head, Civil Engineering Department, Indian Institute of Technology (Banaras Hindu University) Varanasi. Recently, he received an award from All India Council for Technical Education, New Delhi, for the book, *Paryavarana Kee BharateeyaAvadharana* (in Hindi language).

IL-1

Climate Change and Heart Disease

Sanjay Srivastava

University of Louisville Superfund Research Center and the Envirome Institute, Louisville, Kentucky, U.S.A

Climate change is a major environmental challenge which indirectly or directly affects human health by altering atmospheric conditions such as ambient temperature, air pollution, and chemical exposures. Climate change-induced frequency and extent of wildfire augments air pollution which can affect regions thousands of miles distal to the origin of wildfire. Extreme heat or cold conditions promote cardiovascular, respiratory, and immunological diseases, at least in parts by promoting air pollution. Thermal stress along with chemical exposure and air pollution can also induce sleep perturbation and anxiety which exacerbates cardiovascular disease. We have employed novel exposomics approach to assess chemical exposure at the atmospheric and individual level, developed simulated wildfire emission platforms, custom built temperature and humidity regulated cabinets for well controlled pre-clinical exposures, and established rodent models of endothelial dysfunction, atherosclerosis, and heart failure. The presentation will discuss how environmental exposures affect blood pressure and arterial stiffness in humans and vascular dysfunction and atherogenesis in mice and how these processes are regulated by stress responses. The talk will also discuss how decomposition of chemical pollutants and increased vegetation can mitigate heart disease.

ABOUT THE SPEAKER

Dr Sanjay Srivastava is a Distinguished University Scholar at the University of Louisville and Professor of Medicine (Division of Environmental Medicine), Pharmacology & Toxicology, and Biochemistry & Molecular Biology. He is also the Director of the NIEHS-funded University of Louisville Superfund Research Center. His group focus is to elucidate cellular and molecular mechanisms of vascular inflammation and atherogenesis and examine how these processes are affected by environmental pollutants and tobacco products. His laboratory extensively uses mass spectroscopy, flow cytometry, cytomics, clinical chemistry analyses, pathology, and biochemical assays, especially protein chemistry and enzymology. For mass spectroscopic analyses, they have synthesized numerous radiolabeled and stable isotope-labelled reagents chemically or enzymatically. They have also made several transgenic mice and rats to examine the effect of endogenous stimuli and xenobiotic on vascular functions and atherosclerosis. His research has been continuously supported by the National Institutes of Health for the last 22 years by multiple R01 grants. He has also served as a project leader on several multi-investigator projects, including a NIEHS P01 on the cardiovascular toxicity of environmental aldehydes, an NIH P20 on Center of Excellence in Diabetes and Obesity Research at the University of Louisville; and an NIH P50 on American Heart Association Tobacco Regulatory Science and Addiction Center. He has served as a chair or a member on more than 50 NIH Study Sections and as a member on the editorial board of *Circulation Research*.

IL-2

Gender differences in counteracting toxic gas inhalation induced-lung toxicity

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Department of Nephrology[1], School of Medicine, University of Alabama at Birmingham, Birmingham, AL, Department of Cellular and Molecular Medicine[2], Herbert Wertheim College of Medicine, Florida International University, Miami, FL, 33199

Males and females are known to have distinct immunological responses to stimuli. Whether these distinctions in immune response exist with the inhalation of toxic gases such as chlorine (Cl_2) is not known. The binding of the chemokine ligand, stromal-derived-factor-1 (SDF-1), to C-X-C chemokine receptor type 4 (CXCR4) on lung immune, epithelial, and endothelial cells promote the migration of leukocytes from circulation to lungs and their activation and survival in lungs. Previously, we showed that Cl_2 gas exposure increases SDF-1/CXCR4 signaling more in male than female mice. The *overall objective* of this study was to determine whether gender differences exist in counteracting Cl_2 induced lung toxicity. Adult male and female C57BL/6 mice were exposed to air or Cl_2 gas (500ppm, 15 min). Few Cl_2 exposed animals received AMD3100 (0.2 mg/kg body weight, IM or IN, 1-hour post exposure), which is an FDA-approved small molecule inhibitor of CXCR4. One day post Cl_2exposure, the bronchoalveolar lavage fluid of male mice had significantly higher proteins, inflammatory cells, and cytokines than female animals. Male mice also had more lung edema (assessed by lung wet/dry weight ratio) and lung injury score (assessed by lung H&E staining) than female mice post Cl_2 exposure. However, these lung injury markers were significantly lower in male compared to female mice that received either intranasal or intramuscular AMD3100. In conclusion, abrogating SDF-1/CXCR4 signaling with AMD3100 significantly mitigates Cl_2-induced lung injury in males vs. females. The identification of gender differences is a first step towards personalized medicine and improving healthcare for those exposed to Cl_2 gas.

ABOUT THE SPEAKER

Dr. Saurabh Aggarwal is an Associate Professor in the Department of Cellular and Molecular Medicine at Florida International University, College of Medicine. He received his Doctor of Medicine (MD) with distinction and then his PhD from the Medical College of Georgia (MCG) again with distinction by a unanimous decision by the members of his dissertation committee. During his doctorate, he received the prestigious American Heart Association predoctoral fellowship for his work on pulmonary hypertension in children with congenital heart diseases. During his postdoctoral training at MCG and then at the University of Alabama at Birmingham (UAB), he was acknowledged by several travel awards and Excellence in Research awards for his work on pulmonary edema in acute respiratory distress syndrome. As an Assistant Professor at UAB, he investigated the pathogenesis of toxic gases such as chlorine, bromine, and phosgene in developing acute and chronic lung injury. He won the K12 award to study the role of cigarette smoking in lung health in people with HIV. He is a PI on a U01 grant to determine the role of innate immune cells in the pathogenesis of acute and chronic lung injury post-inhalation of toxic gases. He is also a PI of a RO1 grant, which will determine mechanisms and therapeutics of chronic widespread pain in HIV. He has authored over 85 peer-reviewed manuscripts and book chapters in reputed journals like Redox Biology (impact factor 11.8), European Respiratory journal (impact factor 16.67), and JCI Insight (impact factor 8.315). Over the past 15 years, he has won several accolades for his research, including the Young Investigator of the Year award from the Society for Redox Biology and Medicine.

IL-3

Enhanced thermophilic dark fermentation of hydrogen production from food waste by Fe-modified biochar

Yen Wah Tong

National University of Singapore, Singapore

The industrialization of biogas production through anaerobic fermentation of food waste faces challenges, such as low yields and unpredictable fermentation processes. Biochar has emerged as a promising green additive to enhance hydrogen production during dark fermentation. Our study demonstrated that the introduction of Fe-modified biochar (Fe-L600) significantly boosted hydrogen production during thermophilic dark fermentation of food waste. The addition of Fe-L600 led to a remarkable 31.19% increase in hydrogen production, and metabolite analysis revealed an enhancement in the butyric acid pathway. Microbial community analysis indicated a substantial increase in the relative abundance of *Thermoanaerobacterium* due to the presence of Fe-L600. This research contributes to a deeper understanding of biochar role in enhancing anaerobic bio-conversion of food waste.

With the increase of the dosage of Fe-L600, the hydrogen yield showed a trend of initially increasing and then decreasing. When the dosage of Fe-L600 reached 10 g/L, maximum hydrogen yield was obtained and 31.19% higher than that of the control group. From Fig. 2B and 2C, the addition of Fe-L600 increased the hydrogen yield from 57.10 mL/g to 74.91 mL/g. Sunyoto et al. reported the same result that biochar addition improved hydrogen yield by 31.0% and methane 10.0% of anaerobic digestion of food waste. The concentrations of Fe^{2+} and Fe^{3+} in the fermentation broth at 0 h and 12 h were examined, and it was found that the concentrations of both Fe^{2+} and Fe^{3+} increased after 12 h of thermophilic dark fermentation in the presence of Fe-L600. In the fabrication of Fe-L600, the Fe^{3+} attached to the biochar and the biochar were pyrolyzed into a biochar/Fe^{3+} coupling state. *Hungateiclostridium* had the highest relative abundance in inoculum. *Hungateiclostridium* and *Pseudoclostridium* were considered to be responsible for the utilization of cellulose and hemicellulose jointly, and these two genera were often found to dominate in cellulose-enriched cultures.

ABOUT THE SPEAKER

Professor Tong Yen Wah joined the Department of Chemical and Biomolecular Engineering at the National University of Singapore (NUS) in 2001 after graduating from the University of Toronto with a PhD in Chemical Engineering. His expertise is in biomaterials research for tissue engineering and in bioenergy from food wastes and biomass wastes, with over 250 publications and 14000 citations. His recent works in food wastes management has been successfully commercialized with distributed anaerobic digesters that can be effectively used in cities through a spin-off company from NUS.

IL-4

Epigenetics meets Precision Medicine: Opportunities for Stratification and Improved Outcome in Non-Small Cell Lung Cancer

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Lung cancer is responsible for the most cancer-related deaths. Non-small cell lung cancer (NSCLC) is the major lung cancer subtype. Targeted therapies for NSCLC include those that target EGFR, MET, ALK, HER2, BRAF, KRAS etc., particularly the tumors with mutations in these genes. Accumulating evidence suggests differential response of NSCLC patients to different therapies, based on their genetic and mutational make-up. In particular, the relative expression of non-coding RNAs, particularly miRNAs and lncRNAs, seems to play an important role in sensitivity and response to targeted therapies. This knowledge has opened up avenues for precision medicine in the treatment of NSCLC patients with possible stratification of patients and identification of the most optimum treatment strategy. Interestingly, non-coding RNAs-based epigenetic signature can also segregate NSCLC patients based on the toxic agent/pollutant that triggered the onset of cancer. Administration of a personalized therapy invariably leads to improved patient outcome.

ABOUT THE SPEAKER

Dr. Aamir Ahmad is a Senior Research Scientist at Academic Health System and Dermatology Institute, Translational Research Institute, Hamad Medical Corporation (HMC), Doha, Qatar. Dr. Ahmad holds a PhD degree in Biochemistry from AMU, Aligarh, India. He completed his post-doctoral training at National Cancer Institute, National Institutes of Health, Bethesda, MD, USA and continued his research as an independent scientist and faculty member for two decades in the US. He is a Principal Investigator on 8 ongoing research studies at HMC and has authored more than 250 peer-reviewed publications (h-index: 77, >19000 citations) and 30 book chapters. He serves as Editor-in-Chief of journal 'Non-coding RNA Research' and as editorial board member of several journals. He has also edited 10 books for leading publishing houses and serves as Expert Reviewer for Scientific Research Proposals submitted to different funding agencies in US, Canada, Europe, Asia and Africa. He has consistently ranked among the top scientists globally for career-long citation impact for the years 2020 through 2024. Dr. Ahmad's research is focused on studying the epigenetic changes, particularly gene activation/silencing through methylation/acetylation and the regulation by non-coding RNAs such as microRNAs, long non-coding RNAs and circular RNAs, in the progression of various human diseases.

IL-5

Mitochondria in Cancer: Insights into Adaptation, Prognosis, and Therapeutic Opportunities

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Mitochondria are vital not only for bioenergetics and metabolism but also for regulating cell proliferation and apoptosis in healthy cells. In cancer, however, mitochondrial reprogramming is a significant event that correlates with tumor progression, metastasis, and resistance to chemotherapy. Understanding these mitochondrial alterations can unveil new strategies for controlling disease progression and enhancing therapeutic efficacy. Our research primarily aims to elucidate the mitochondrial mechanisms involved in human cancers by examining their biogenesis, functions, dynamics, and clearance, along with their associated signaling pathways. We employ a multidisciplinary approach that integrates genomics, proteomics, and mitochondrial functional analyses, utilizing patient samples and both in vitro and in vivo cancer models. Our findings reveal that mitochondrial regulation varies across different cancer types. For instance, in colorectal cancer, mitochondrial complex I (C-I) significantly influences metastatic potential during the metastatic transition, suggesting that targeting mitochondria or C-I could mitigate this potential. In triple-negative breast cancer (TNBC), the deregulation of mitochondrial clearance may drive the disease's aggressiveness; modulating autophagic or mitophagy through pharmacological means shows promise in curbing TNBC proliferation. Furthermore, glioblastoma (GBM) exhibits chemoresistance linked to increased autophagy and mitochondrial fission in glioma initiating cells (GICs), indicating that inhibiting these pathways could improve treatment outcomes.

In summary, our research highlights the critical role of mitochondria in cancer by identifying alterations in their quality control pathways, which contribute to the disease's pathophysiology. These insights could pave the way for the development of mitochondrial biomarkers for diagnosis and prognosis, as well as innovative mitochondrial-targeted therapies for effective cancer treatment.

ABOUT THE SPEAKER

Dr. Lokendra Sharma is an Associate Professor at Department of Molecular Medicine & Biotechnology, Sanjay Gandhi Post Graduate Institute of Medical Science (SGPGIMS). He did his PhD from Lucknow University & CSIR-NBRI in 2009. Dr. Sharma's laboratory is focused on understanding the mitochondrial mechanisms in human diseases including cancer, aging and mitochondrial disorders. His research work contributed in the understanding the critical role of mitochondrial alterations including changes in complex I functions andfree radical signaling in tumor proliferation and metastasis, and thus tumor mitochondria could be targeted for novel therapeutic interventions. His research also highlighted the rescue approaches for reversing the diseases phenotype through complex I recovery by genetic methods and mitochondrial targeted molecules in cellular and animal models of cancer

IL-6

Maintenance of Cancer stem cell during Epithelial to Mesenchymal Transition in Oral Squamous Cell Carcinoma

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Oral squamous cell carcinoma (OSCC) is an aggressive oral malignancy usually seen in cases with harmful habits such as the consumption of alcohol and tobacco-related products. The development of OSCC is generally preceded by premalignant lesions or conditions, now referred to as potentially malignant disorders. In an established squamous cell carcinoma, malignant cells functionality oscillates between epithelial and mesenchymal phases, depending on microenvironmental cues. A growing body of literature suggests that tumor initiation, growth, and metastases are controlled by a small group of tumor cells known as cancer stem cells (CSCs). These cells are endowed with stem cell-like attributes, that drive tumorigenesis, and resistance to conventional treatment. These have been described as stationary and mobile CSCs.

CD133+ population bears a subset of CD44+ cells that has more stemness markers like SOX2. Nanog. CD133+ cells are more in spheroid culture compared to 2D culture. CD133 cells are more migratory in a scratch assay. During migration CD44+ cells moved toward the CD44 low/- expression evaluated by flow cytometry. Side-population assay, a method based on Hoechst dye efflux properties detects cancer stem cells by FACS analysis, CD133+ cells are more in the side population compared to the main population of the cell. Ki67 and CFSE staining revealed that CD133+CD44+ cells are less proliferative and go back to quiescence at a lower rate than other populations. CD133+CD44+ cells have a higher expression of stemness genes Sox2 and Nanog. Migratory OSCC primary cells were selected by trasnwell migration assay and RNA sequencing was performed. Comparing RNA seq data of migratory and non-migratory cells isolated from the same patient sample revealed several pathways upregulated like stemness, cell migration, metastasis, DNA repair, etc. We evaluated *in vitro* transition of EpCAM+ cells into Vimentin+ cells in cell migration assay and monitored different CSC markers. Precise identification of these markers and delineation of deregulated genes in cells with migratory capability is essential for their effective elimination.

ABOUT THE SPEAKER

Dr. Satyendra Kumar Singh works as Additional Professor at Stem Cell/ Cell Culture Lab, Centre for Advance Research, King George`s Medical University, Lucknow, UP. Dr. Singh has an M.Sc. from the School of Life Sciences and an Advance PG diploma in Bioinformatics from JNU, New Delhi. He did his PhD thesis in the field of Radiation Oncology where he worked on "Complexity of DNA damage induced by Ionizing radiation (IR) and dependence of B-NHEJ on growth state" in Prof. George Iliakis Lab, University Hospital Essen, Germany. He published more than 10 research papers in peer-reviewed journals. After completing the PhD, he moved to Dr. Phillip Oberdoerffer's Lab NCI/ NIH, USA. He pursued research on the role of DNA damage-induced epigenetic deregulation and its consequences on hematopoietic stem cell (HSC) maintenance using SIRT1 mouse model. He also worked on role of transcription factors like Id1, Id2 and Id3 on HSC maintenance using various mouse models. His post-doctoral training was very rewarding and published his research work in journals like Journal of Experimental Medicine(2013), Cell Stem Cells (2018) and Cell Reports (2018, 2020) etc.

He has been awarded with couple of prestigious fellowship like "program to encourage research personnel Non-Resident Indian (NRI), PIO serving abroad, to come back to India for undertaking health research in identified areas" and Ramalingaswami fellowship. He is working on adult stem cells like Hematopoietic Stem Cells, Mesenchymal Stem Cells maintenance and differentiation in degenerative disease using mouse models as well as clinical samples. He is also working on cancer stem cells hierarchy and its metastatic polarization in oral squamous cell carcinoma primary cells.

IL-7

Drosophila lymph gland: Model to study environmental chemicals induced hematopoietic emergencies

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Hematopoietic Stem Cells (HSCs) generate all blood cell types during all life. In adult mammals, hematopoiesis takes place in the bone marrow. In *Drosophila* larvae, hematopoiesis takes place in a specialized organ called the lymph gland (LG). The LG is composed of three zones: (1) the medullary zone (MZ) that contains the hematopoietic progenitors called pro-hemocytes, (2) the cortical zone (CZ) containing the differentiated hemocytes, and (3) the Posterior Signaling Center (PSC) that acts as a niche to regulate the hematopoietic response to immune stress such as wasp parasitism. Due to the enormous rate of blood cell production, the hematopoiesis process is sensitive to local and systemic stress. As a result of agricultural and industrial developments, the distribution of chemicals into the environment represents a severe risk to human health, including hematopoietic malignancies. This study uses *Drosophila* LG as a model to investigate the hematopoietic response to environmental chemical stress. *Drosophila* larvae were exposed with 15 different environmental chemicals (i.e., pesticides, heavy metals, volatile organic compounds). As a result to these exposures, various LG phenotypes were observed, such as pre-dispersal of the organ, aberrant blood cell (hemocyte) production, and defect in the PSC morphology. These phenotypes are classified into six groups illustrating the complex hematopoietic defects induced by environmental chemical ingestion. Moreover, these findings are in accordance with previous studies on other vertebrate models, suggesting that *Drosophila* responds similarly to higher vertebrate models and thus can be utilized to uncover intricate molecular mechanisms behind xenobiotic-induced hematopoietic emergencies

ABOUT THE SPEAKER

Dr. Anurag Sharma is an Associate Professor in the Department of Environmental Health and Toxicology at Nitte University Center for Science Education Research (NUCSER), Nitte (Deemed to be University), Mangalore, Karnataka, India. With a Ph.D. from CSIR-Indian Institute of Toxicology Research (awarded by Jamia Hamdard University, New Delhi), his early research honed in on understanding cellular and molecular stress responses to environmental toxicants using the Drosophila melanogaster model system. Transitioning to Centre de biologie du développement (CBD) Toulouse, France, he delved into blood cell development using the same Drosophila model system for his post-doctoral tenure. Dr. Anurag focuses on unravelling the molecular mechanisms behind environmental toxicant-induced immune injury and exploring host-microbe interactions due to environmental toxicant exposure. His contributions include over 30 published research papers in SCI-indexed journals and nine book chapters. Notably, he has supervised 02 Ph.D. students, and several master's theses, and guided 01 post-doc, presenting a h-index of 18 with 1960 citations as per Google Scholar.

IL-8

Bisphenol A-induced obesity, as a model to study obesity-associated male reproductive dysfunction in Drosophila melanogaster

Snigdha Mishra

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Obesity is a major global public health concern, and the World Health Organization (WHO) has set a goal to combat it by 2025 as part of Sustainable Development Goal (SDG) 3.4. This is in itself a testament that obesity is a major health threat worldwide. In addition to traditional factors, exposure to environmental chemicals known as "obesogens" has been linked to obesity. Obesogens can disrupt the body's energy balance and promote fat storage, increasing the risk of various non-communicable diseases (NCDs) such as metabolic syndrome, diabetes, heart disease, and reproductive issues. The current study aims to establish *Drosophila* as an alternative model for identifying the role of obesogen (Bisphenol A) in causing metabolic dysfunction leading to obesity and discover new candidates and pathways through which Bisphenol A (BPA)-induced metabolic dysfunction can affect the normal functioning of reproductive tissues.

Here, we exposed the fruit flies to BPA, an endocrine-disrupting chemical (EDC) that acts as a potential obesogen as well and evaluated the fruit flies' metabolic responses to BPA exposure by measuring triacylglyceride (TAG) and free glycerol levels under standard and stress conditions (starvation). Our findings showed elevated TAG levels in adult males along with their inability to metabolize them in response to starvation stress, which is a classic indicator of metabolic dysfunction. Additionally, we observed a significantly increased rate of feeding and reduced satiety levels in BPA-exposed males. Furthermore, we examined the reproductive parameters of BPA-exposed male flies, including their fertility and reproductive tissue morphology. Our observations revealed reduced testes size, compromised accessory glands, and decreased fertility in mates of BPA-exposed males.

The present study, therefore, would help us understand and unveil the triangular relationship between obesogens, obesity, and male reproductive dysfunction, and identify any shared pathways involved in metabolism and reproduction.

ABOUT THE SPEAKER

Dr. Snigdha Mishra is an Assistant Professor (Selection Grade)at Department of Allied Health Sciences (Biotechnology), School of Health Sciences and Technology, UPES, Dehradun. She did her PhD from CSIR-Indian Institute of Toxicology Research, Lucknow in 2015. She was Post Doctoral Research Associate at Dept of Molecular Biology and Genetics, Cornell University, New York, Ithaca, USA. Her research interests include Molecular Biology, Recombinant DNA Technology and Genetics; Developmental Biology; Drosophila Research in Reproductive Biology and endocrinology.

IL-9

Role of Hsp27 in protection of cadmium-induced nephrotoxicity in Drosophila melanogaster.

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Cadmium (Cd) is reported as nephrotoxic compounds. It increases oxidative stress, mitochondrial dysfunction, renal cell death, altered transporters in renal system. Hsp27 has been shown as one of the modulators in renal dysfunction and increased against the Cd induced toxicity. However, no studies are reported on the genetic modulation of stress protein against the Cd-induced nephrotoxicity. Therefore, current study proposed to examine protective role of hsp27 overexpression against Cd-induced nephrotoxicity using *Drosophila melanogaster* as an animal model. *D. melanogaster* renal system includes nephrocytes and Malpighian tubules (MTs) that show the functional similarity with mammalian kidney nephron. Drosophila 1st instar larvae were exposed to the Cd by feeding mixed diet till 3rd instar larval stage. MTs were dissected out and biochemical and molecular test were performed. Overexpression of the hsp27 was found to reduce the Cd induced oxidative stress, rescue cell death in MTs of Cd exposed *D. melanogaster* larvae. The rescued GSH level, NADPH level, G6PD activities were also observed in the MTs of the Cd exposed organism. Function (efflux activity and fluid secretion rate) of the MTs was restored in Cd exposed hsp27 overexpressed larvae. Further, results were confirmed by restored brush border microvilli density and reduced uric acid level. Tissue specific knockdown of hsp27 developed Cd like phenotypes in MTs and the phenotypes enhanced in Cd exposed condition. The present study clearly shows the role of hsp27 overexpression in restoration of the MTs function and protection against the Cd induced renal toxicity

ABOUT THE SPEAKER

Dr. Naveen Kumar Gautam is Associate Professor (Basic Sciences) in the Department of Urology and Renal Transplantation, SGPGIMS, Lucknow, India. He earned his Doctoral degree from Banaras Hindu University, Varanasi. He is a recipient of several national and international fellowships. He has worked in the CSIR-IITR, Lucknow as a DST-INSPIRE faculty. Dr Gautum has made major contribution in the area of kidney and urological diseases. He has published many research papers in reputed national and international journals. Currently, he is mentoring 4 Ph.D. students and running many intramural and extramural projects in his laboratory.

IL-10

Cell-based therapy, Biomaterials in Ocular research: Safety and Ethical considerations

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The cornea, essential for allowing light into the eye, is prone to becoming cloudy, a leading cause of vision loss worldwide. Fortunately, advancements in regenerative medicine are offering new hope. Our team has developed a groundbreaking biomimetic corneal hydrogel aimed at treating wounds, post-infection scars, and keratoconus—major causes of corneal blindness, especially in developing countries like India. This innovative hydrogel, infused with stem cells derived from the human eye, holds the potential to restore corneal clarity and transform the lives of those affected by these conditions. We are currently focused on scaling up clinical-grade manufacturing, validating the hydrogel through pre-clinical trials for regulatory approval, and moving forward with initial clinical trials.

While the promise of biomaterials, gene therapy and regenerative medicine is immense, it's crucial to address potential risks, and ethical considerations, and ensure patient safety throughout the clinical trial and treatment process. Our commitment is not just to pioneering advanced treatments, but also to navigating these complex challenges with utmost care and responsibility. This advancement heralds a new era in vision care, promising efficacy and safety through innovative therapeutic approaches.

ABOUT THE SPEAKER

Dr Vivek Singh is an alumnus of MS University, where he completed his master's degree in microbiology and biotechnology. He earned his PhD at School of Biotechnology, Banaras Hindu University, Varanasi, India, and went on to complete a four-year post-doctoral fellowship at the prestigious Cole Eye Institute, Cleveland Clinic, Ohio, USA. Currently, Dr Singh is a Senior faculty member at the Centre for Ocular Regeneration, LV Prasad Eye Institute, Hyderabad.

In his laboratory, Dr Singh combines stem cell biology, molecular biology, and bioengineering to tackle scientific questions related to ocular surface diseases. His research focuses on corneal wound healing, regenerative biology, Dry Eye, animal models in ophthalmology, and the development of biomaterials.

Dr Singh's recent accolades include being named a Tata Innovation Fellow for 2024 and being inducted as a Life member of the National Academy of Sciences, India (NASI) and as an Associate Fellow of the Telangana Academy of Sciences. Appointed to the board of the International Society of Eye Research (ISER) - Early Career Researcher Education Committee. Dr Singh serves as an Associate Editor for Frontiers in Medicine and has authored around 100 peer-reviewed papers. He has also secured more than 15 national and international research grants and the prestigious Sree Padmavathi Venkateswara Foundation award.

His other notable achievements include receiving the Young Scientist Award in 2017 at the 86th annual Conference of the Society of Biological Chemists. Under his leadership, his team has obtained DCGI approval for two clinical trials involving new cell-based therapies. Furthermore, his group has developed a reliable, low-cost encapsulation method for transporting mesenchymal stem cells (MSCs), thereby making MSC therapies accessible to remote and underserved patients in India

IL-11

Corneal Toxicity from ocular chemical threat agent exposures: Mechanisms and Treatments.

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Chemical substances that can be easily available, synthesized, and whose toxic properties can kill, incapacitate, or cause devastating injuries to human beings can cause emergencies due to their use in terrorism events, warfare or industrial accidents. Ocular tissue is the most sensitive organ to chemical exposures. Our lab is currently studying the toxic effects and mechanisms of ocular injuries from mustard vesicants (most widely used chemical weapons and strong alkylating agents), and from pesticides like chloropicrin. These agents cause devastating ocular injuries and long-term effects and diseases, mainly to the outermost corneal layer, but mechanistic consequences and effective and targeted therapies are still deficient. The toxicity and mechanism of ocular injuries from mustard vesicants like sulfur mustard (SM) and nitrogen mustard (NM) have been studied in several injury models. Our studies demonstrate that a biphasic ocular injury and inflammatory response is caused mainly due to DNA damage and oxidative stress. Exposure to chloropicrin (CP), a warfare agent now majorly used as a soil pesticide, results in severe ocular injury, especially to the cornea; however, studies on this injury progression and underlying mechanisms in a relevant injury model are lacking. Nuclear factor-erythroid factor-2-related factor2 (Nrf2) pathway regulates the cellular expression of both anti-oxidative and -inflammatory genes. Using a mouse in vivo injury model, we tested if Nrf2 plays a protective role in CP-induced corneal injury. To further assess the Nrf2 related signaling and to understand the molecular mechanism of CP- induced corneal injury, we employed RNA-Seq. The left eye of male 8-10 weeks old wild type (WT) and Nrf2 knockout (KO) Balb/C mice was exposed to 10% CP for 1 min (~0.7652ppb) and the right eye served as control. Clinical assessments were carried out, and mice were euthanized at 6h, day 1-, 7- and 28-post exposure. Corneal injury was further assessed and RNA- Seq analysis was conducted using NovoGene sequencing on illumina NovaSeq PE150 platform. CP caused an early and more severe increase in gross corneal lesions, reduced regeneration of epithelial layer, increased neutrophil infiltration and expression of inflammatory cytokines in Nrf2 KO mice compared to WT mice. Transcriptomic analysis showed differential expression of 1876 and 2376 genes in CP exposed corneas at 6 and 24h, respectively, versus the control group. qPCR analysis validated the CP-induced overexpression of selected genes like. Functional analysis via EnrichR showed that CP exposure caused significant enrichment (p-value ≤ 0.01) of pathways related to ferroptosis, inflammation, oxidative stress, wound healing, and apoptosis. Our study provides new insights into the role of Nrf2 and possible signaling pathways in CP corneal toxicity with a potential to identify effective countermeasures for CP-induced ocular injuries while serving as a potential to be implemented for ocular injuries from other chemical threat agents.

ABOUT THE SPEAKER

Dr. Neera Tewari-Singh is Associate professor at the Department of Pharmacology and Toxicology and an affiliated faculty at the Institute for Integrative Toxicology at Michigan State University (MSU). She received her doctoral degree from the Jawaharlal Nehru University, New Delhi and carried out her doctoral research under the German Academic Exchange Service (DAAD) fellowship at the Leibniz University, Hannover, Germany. Her lab at MSU focuses on understanding the mechanisms of toxicity from chemical threat agent exposures employing state-of-the-art molecular techniques and models to identify therapeutic targets.

IL-12

Proper lipid metabolism ensures reduced risk of severe ROP among preterm infants

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Extremely preterm infants are at risk of developing ROP, characterized by neovascularization and neuroinflammation leading to blindness. Lipids such as polyunsaturated fatty acids (PUFAs) are required for optimal retinal development, homeostasis, and signalling.

Total lipid metabolites were identified and quantified by LC-MS in the vitreous humor (ROP=21, control=19). Global retinal transcriptome analysis and vitreous humor proteomics (ROP and control n=3 in each category) was performed to confirm the involvement of lipid metabolic pathways in ROP development. Genes of ceramide and sphingolipid pathway were quantified in the blood by quantitative RTPCR (severe ROP = 38, No/Mild= 30).

A total of 344 lipid of different classes were identified with fold change of $\pm$ $Log_2$1.5, among which 161 were significantly dysregulated (p-value: <0.05, FDR:1%). Fatty acids were most dysregulated class constituting 30%, followed by phospholipid by 27%, and sphingolipid class constituting 6% of total lipids identified. Pathway enrichment showed arachidonic acid, sphingolipid metabolism, and glycerophospholipid metabolism as top dysregulated pathways. Cer(d18:0/14:0), Cer(d18:0/16:0), PG (15:1(9Z)/0:0), Sphinganine, L-carnitine, etc. were significantly (p-value$\leq$0.05) upregulated while SM(d18:0/24:1(15Z)), Sphing-4-enine-1-phosphate, phosphosphingolipids, (p-value $\leq$ 0.05) was significantly downregulated. Besides, metabolites of arachidonic acid pathway such as DHA, TBHX, Prostaglandins showed significant differential expression among ROP. Retinal transcriptomics and vitreous proteomics further confirmed a significant (p-value <0.05) involvement of sphingolipid metabolic pathways genes to be the significantly dysregulated in ROP. A further validation of these pathways confirmed altered expression of genes *SPTLC1, CERS2, ACER1* (all upregulated) and *SPHK1* (downregulated) among ROP.

Significant alterations in lipid metabolism underscore their role in ROP pathogenesis and thus targeting these offers a great potential for preventing the risk of ROP development and vision loss among preterm born infants.

ABOUT THE SPEAKER

Dr Inderjeet Kaur is primarily trained to study the genetic underpinning for various Mendelian and non-Mendelian ocular diseases using OMICS technology and complex eye diseases with a sole aim to identify biomarker that can aid in early diagnosis and better prognosis. Her laboratory has been involved in understanding the molecular mechanisms in neovascularization, neuroinflammation and neurodegeneration for retinal vascular diseases (AMD, ROP, DR and Uveitis), the major blinding conditions in the developing world. Over 30 students have been trained in her lab and 7 PhD have been awarded. Her group has established a high throughput transcriptomics and protein profiling, exosome isolation and primary neuron glia culture facility at the institute for carrying out systematic and detailed analysis of underlying molecular mechanisms that regulate the neovascularization, neuroinflammation and neurodegeneration in the retina under disease stress particularly hypoxia. Currently, she is involved in identifying the markers that predicts neurodegeneration and neovascularization in retinal vascular conditions including ROP AMD and DR for devising novel molecular diagnostics for predictive testing and developing novel drug targets for better prognosis.

IL-13

CS Tear Gas Agent-induced Skin Injuries: Potential Drug Targets, Biomarkers, and Medical Countermeasures

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Abstract: 2-chlorobenzalmalononitrile (CS) tear gas agent has been used as a common riot-control agent (RCA) by law enforcement at an alarming rate over the past several decades. The deployment of tear gas has dramatically increased in recent years, with very large amounts released in population centers in several countries including India. The conflicted use in Turkey, the United States, and Hong Kong has drawn widespread attention in recent times. The effects of CS have been believed to be transient and benign. However, CS induces severe pain, blepharospasm, lachrymation, airway obstruction, and skin blisters. Frequent injuries and hospitalizations have been reported following exposure. Skin injuries, blisters, and allergic contact dermatitis have been reported with CS exposure. Here, we developed a mouse model of CS-induced ear inflammation and identified potential drug targets and biomarkers. Using multiplex protein array assays against 1308 protein targets, we identified 275 differentially expressed potential biomarkers. Based on drug target studies, we have identified the sensory neuronal ion channel, transient receptor potential ankyrin 1 (TRPA1), as a key CS target resulting in acute irritation and pain, and also as a mediator of neurogenic inflammation. We examined therapeutic effects of TRPA1 antagonists (HC-030031 or A-967079) in inhibiting CS-induced cutaneous injury. The TRPA1 antagonist was administered post-CS exposure. In the mouse ear skin, exposure to CS resulted in significant tissue edema, plasma extravasation, and a sharp rise in inflammatory cytokine levels. We also showed that the effects of CS were not transient, but caused persistent skin injuries. These injury parameters were reduced with TRPA1 antagonist treatment. Our findings showed that TRPA1 is a crucial mediator of CS-induced nociception and tissue injury, and that TRPA1 inhibitors are effective countermeasures that reduce key injury parameters when administered post-exposure. Additional therapeutic efficacy studies with advanced TRPA1 antagonists and decontamination strategies are warranted.

ABOUT THE SPEAKER

Dr Satyanarayana Achanta is an Assistant Professor in the department of Anesthesiology at Duke University School of Medicine. After completing his Ph.D. at the Center for Veterinary Health Sciences, Oklahoma State University, he accepted a prestigious postdoctoral fellowship at Yale University School of Medicine in the Department of Pharmacology and then moved to Duke University School of Medicine in 2014. He was promoted to the rank of Assistant Professor in 2018.His overall research interest is to protect the biological barrier from chemical injuries by targeting transient receptor potential (TRP) ion channels; and by activating the mediators of the resolution phase of the inflammation pathway to restore architecture and function. Satya has been actively pursuing medical countermeasures research for the last 12 years. He is actively funded by the NIH CounterACT program and industry partners. Apart from active research, he also taught two pharmacology courses at Yale University and Duke University as Instructor-of-Record. He is a board-certified toxicologist and is currently licensed to practice veterinary medicine in North Carolina State. He has been serving in various leadership roles in the Society of Toxicology and the American Thoracic Society.

IL-14

Micro plastics and Chronic Kidney Disease: Risk and Mechanistic Insights

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Environmental pollutants are being increasingly linked with rapid rise in cases of kidney diseases of unknown etiology (CKDu). Numerous reports have determined the presence of plastics at high levels in our water bodies, which, with the passage of time and due to environmental withering, can give rise to microplastics and nanoplastics. Some recent reports have identified microplastics in human blood and tissues, including the kidney, where they can be a risk factor. Our lab has been working on developing methods to assess and characterize microplastics in different environment matrices and also determine the risk of kidney disease using animal model systems and studies on samples from people with chronic kidney disease.

Using a BALB/c mouse model, we have shown that subchronic exposure to polystyrene microplastics can increase the progression of renal fibrosis, leading to the early onset of kidney diseases. The effect of microplastic exposure is compounded when co-exposed with commonly present pollutants such as arsenic. In an *in vitro* model using normal rat kidney cells (NRK52E), we observed that microplastics can promote rapid uptake of arsenic into the cells, leading to their higher toxicity and cellular transformation. Our lab is also studying patients with CKDu and assessing the presence of microplastics in them to ascertain the risk and their role, if any, in the aggravation of kidney diseases. Initial studies using biopsy samples and tissues from patients with nephrectomy have consistently shown the presence of plastic fibers and granules in their kidneys. We are now assessing the extent of plastic exposure in a larger human population, and our studies will provide a comprehensive risk assessment for kidney disease due to microplastic exposure.

ABOUT THE SPEAKER

Dr. Vikas Srivastava is a Principal Scientist at the CSIR-Indian Institute of Toxicology Research, Lucknow, India, with over 20 years of research experience. He holds a Ph.D. from the Central Drug Research Institute, Lucknow, and completed his postdoctoral studies at the University of Calgary, Canada. His research focuses on identifying epigenetic mechanisms and biomarkers for chronic diseases, particularly those related to xenobiotic exposures, metabolic disorders, and kidney diseases, including Chronic Kidney Disease (CKD) and Kidney Disease of Unknown Etiology (CKDu). Dr. Srivastava has received over 15 research grants from ICMR, DBT, CSIR, and SERB. He has authored over 40 publications in leading journals and holds several patents, including one for a herbal formulation for urolithiasis and nephrolithiasis, marketed as Uro-5. He has also developed novel markers for diabetic nephropathy, currently under patent. Dr. Srivastava has received numerous awards, including the TTS Mentor-Mentee Award, Young Investigator Award from the American Transplant Congress, and the CST FITS Award. His contributions to the field have been recognized globally, marking him as a leader in toxicology and kidney disease research.

IL-15

Divergent effects of arsenic exposure in organs and species.

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Arsenic, a pervasive environmental toxicant, exhibits diverse effects on animal species, reflecting complex interactions between exposure levels, biological mechanisms, and species-specific traits. This review synthesizes current knowledge on the divergent impacts of arsenic exposure across different animal models, highlighting variations in toxicological outcomes and underlying physiological responses. In mammalian species, such as rodents and primates, chronic arsenic exposure is commonly associated with a spectrum of adverse health effects, including carcinogenesis, cardiovascular disorders, and metabolic disruptions. Rodents, for example, often develop tumors and experience cardiovascular abnormalities, while primates exhibit similar, albeit more complex, health issues due to their closer genetic relationship to humans. These effects are largely attributed to arsenic's interference with cellular processes such as DNA repair, oxidative stress induction, and disruption of endocrine functions. In contrast, certain aquatic species, including fish and invertebrates, demonstrate notable resilience to arsenic exposure. These organisms have evolved sophisticated detoxification mechanisms, such as enhanced biotransformation enzymes and adaptive stress response pathways, which effectively mitigate arsenic's toxic effects. For instance, some fish species exhibit robust sequestration of arsenic in less toxic forms, thereby minimizing its bioavailability and mitigating its detrimental impact on cellular functions. This divergence in arsenic toxicity underscores the importance of considering species-specific biological responses when assessing environmental risks and devising mitigation strategies. The differential effects observed across animal models necessitate a comprehensive understanding of the genetic, biochemical, and ecological factors that modulate arsenic toxicity. Integrating these insights into environmental health research and policy can lead to more effective risk assessment and targeted interventions, ultimately safeguarding diverse ecosystems and animal populations from the adverse impacts of arsenic contamination.

ABOUT THE SPEAKER

Dr. Ashok Kumar Datusalia is currently working as an Assistant Professor at the Department of Pharmacology and Toxicology, NIPER Raebareli. He completed M. Pharma from GJUS&T, Hisar and PhD Pharmacology & Toxicology, from NIPER-SAS Nagar. He has received his postdoctoral training at Department of Neuroscience and Pharmacology, University of Iowa, Iowa City, USA (American Heart Association Fellow) and as a Visiting Scientist (IBRO-ISN Research Fellow), Department of Pharmacological and Biomolecular Sciences, University of Milan, Italy. His main interest lies in understanding the functional and molecular determinant for stress vulnerability and resilience behavior. He is principally involved in dissecting the organ specific toxic effects of arsenic exposure at early and late stage of life. He has published >60 research publication in international journal of repute. Dr Ashok has received several recognition and award from IBRO, ISN, Indian Pharmacological Society, ECNP, DST-SERB, ICMR etc. He has membership in many professional bodies including the Indian Pharmacological Society, Indian Academy of Neuroscience and Indian Pharmaceutical Association.

IL-16

PTR-10, the C. elegans Homolog of Human PTCHD1, Plays a Crucial Role in Neuroprotection

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The role of glial cells in neuroprotection and the progression of neurodegenerative diseases is increasingly recognized, particularly in the context of aging. In *C. elegans*, the glia-enriched gene PTR-10 (human orthologue PTCHD1) plays a crucial role in maintaining neuronal integrity. This study explores PTR-10 and its downstream targets, *basl-1* (orthologue of dopa decarboxylase, DDC) and daf-18 (orthologue of PTEN), to understand their roles in neurodegeneration and neuroprotection during aging. Using wild-type and transgenic *C. elegans* strains, we performed behavioral assays, lifespan studies, and assayed 6-OHDA-based injury models. Transcriptomic analysis of the PTR-10 knockout strain (RB1693) revealed significant downregulation of *basl-1* and *daf-18*, both implicated in axonal regeneration pathways. Our results show that knockdown of basl-1 increases alpha-synuclein expression, shortens lifespan, and disrupts dopaminergic neuron function, all of which are associated with aging and neurodegeneration. Similarly, *daf-18* knockdown also led to increased alpha-synuclein expression and reduced lifespan. PTR-10 expression itself declines with age exacerbating these effects and its absence impacts neuronal repair even in the presence of neuronal repair agents. In summary, PTR-10 and its downstream targets are critical in age-related neurodegeneration and neuroprotection. These findings highlight the potential of this axis for therapeutic strategies aimed at mitigating neurodegenerative diseases by promoting axonal regeneration and maintaining neuronal health thereby promoting healthy aging.

ABOUT THE SPEAKER

Dr. Amir Nazir is working as Senior Principal Scientist and Professor within the Division of Toxicology and Experimental Medicine at CSIR – Central Drug Research Institute, Lucknow. He obtained his PhD from CSIR Indian Institute of Toxicology Research, Lucknow Thereafter he has obtained advance trainings from Weizmann Institute of Science, Israel, University of Nottingham UK and University of Freiburg, Germany. He joined CSIR-CDRI as Scientist and established research laboratory which focuses on the area of protein quality control employing functional genomics and epigenetics tools within genetic model system *C. elegans*. He has established a very precious repository with more than 80 transgenic and mutant lines of the nematode which are used for addressing questions related to various aspects of neurobiology. His group holds the credit of discovering novel circular RNA molecule called circ-Zip-2 in *C. elegans* which has relevance in cause of Parkinson's disease. His group has also identified and functionally characterized novel peptide conjugates and a novel Insulin Degrading Enzyme termed "ce-IDE-1" in *C. elegans* with relevance to neurodegenerative diseases. Dr. Nazir has numerous accomplishments to his credit; he has been awarded with prestigious "Raman Research Fellowship", by CSIR, Govt of India and the "India Distinguished Visiting Fellowship" by the University of Nottingham, UK. Dr. Nazir is an author on more than 80 scientific publications (h-index 33).

IL-17

HMGCR Inhibitors and Dopamine Agonists as Repurposed Drugs for Targeting Alzheimer's Disease

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Alzheimer's disease (AD) is associated with synaptic failure, neuronal cell death, and mitochondrial dysfunction. This study investigates the neuroprotective effects of Atorvastatin (ATOR) and Ropinirole (ROP) against amyloid beta (Aβ)-induced neurotoxicity. ATOR, an FDA-approved statin, was repurposed based on its strong docking score against Aβ. In an in vivo AD model with intracerebroventricular Aβ administration, ATOR (at doses of 5 mg/kg or 10 mg/kg) significantly lowered oxidative stress, enhanced antioxidant enzyme activity, and exhibited anti-apoptotic properties by reducing Bax and restoring Bcl2 expression. It also modulated critical pathways, such as Nrf2, GSK-3β, and Akt, thereby protecting the hippocampus from damage. On the other hand, ROP, a dopamine agonist capable of crossing the blood-brain barrier, targeted the MARK4-NFκβ pathway, which is crucial in AD progression. ROP inhibited MARK4 activity, decreased oxidative stress, and reduced NFκβ expression, which resulted in improved cell viability and reduced neuronal apoptosis in an Aβ-induced in vitro model. Both drugs showed significant potential in protecting against AD-related neurodegeneration through distinct mechanisms, highlighting their therapeutic promise and the need for further research into their molecular actions in AD treatment.

ABOUT THE SPEAKER

Dr. Suhel Parvez holds a bachelor's degree in Chemistry from Aligarh Muslim University and completed his M.Sc. and Ph.D. in Toxicology in 2003 from Department of Toxicology, School of Chemical and Life Sciences, Jamia Hamdard. He was post-doctoral scientist at Laboratory of Cell Molecular Signaling, Queens Medical Center, USA from 2005-2008. Currently, Dr. Parvez is a Professor in the Department of Toxicology and Dean, School of Interdisciplinary Sciences and Technology, Jamia Hamdard, New Delhi. He is a recipient of the *Alexander von Humboldt* fellowship and he is also the Fellow of Royal Society of Biology, UK. *He has published more than 200 research papers in peer-reviewed PubMed/Scopus indexed journals with an average impact factor of around 5, h-index: 48, total citations> 6675.*

He has completed/ongoing 15 research grants from International and National extramural funding agencies both as Principal as well as Co-Investigator. He guided more than 40 Ph.D. research scholars as supervisor/co-supervisor who have been awarded their degrees. In addition, Dr. Parvez is University Coordinatorof Promotion of University Research and Scientific Excellence (PURSE) program, Fund for Improvement of S&T Infrastructure (FIST) program and Synergistic Training program utilizing the Scientific and Technological Infrastructure (STUTI) program by Department of Science and Technology, Govt. of India.

He has extensively worked to explore the possible therapeutic interventions of nutraceuticals and their mechanism for the treatment and prevention of several neurodegenerative and neurological disorders. He is also working towards the drugs repurposing for better understanding of inter-relations of several mechanisms in brain. *The rodent model of Traumatic Brain Injury, Behavioral Tagging and In Vivo Electrophysiology developed by his research group are the first and only in the entire country.* His lab has also successfully established other disease rodent models, such as Ischemic Stroke, Alzheimer's disease and Subarachnoid Haemorrhage.

In addition to rodent models, he has also been working extensively on development of alternative models to gain the mechanistic insights of the mechanism of neurodegenerative disorders such as Alzheimer's disease and Parkinson disease. He has been working on *Drosophila* model to screen the potential drugs for neuroprotective effects in Alzheimer's. The *C. elegans* model has also been established recently in his lab with the purpose of screening of possible therapeutic targets for neuroprotection in Alzheimer's and Parkinson disease.

IL-18

Neurotoxic Effects of Synthetic Pyrethroids through Mitochondrial Impairment and Autophagy Dysregulation

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Synthetic pyrethroids are widely used insecticides for household, agricultural, and public health purposes in many commercial formulations against insects and parasitic crustaceans. These chemicals have received much attention because of their neurotoxic efficacy and widespread occurrence in the ecosystem. Nonetheless, some recent studies show that synthetic pyrethroids have significant implications for human health, especially when it comes to neurotoxicity. Our research seeks to determine the role of mitochondrial dysfunction and dysregulated autophagy in mediating the neurotoxic effects of synthetic pyrethroids. Long-term exposure to experimental animal/cellular models of pyrethroids impairs mitochondria, leading to changes in mitochondrial membrane potential (MMP), reduced ATP synthesis, decreased NADH production, enhanced reactive oxygen species (ROS) levels, and induced intrinsic apoptosis within neuronal cells. These toxic substances also disrupt different aspects of mitochondrial dynamics, such as fission-fusion machinery, transport, and biogenesis processes. At the same time, pyrethroids alter expression levels for autophagy-associated marker proteins, including LC3 and p62, ultimately causing autophagy to be dysregulated in affected neuronal cells. Thus, the findings highlight an immediate requirement for an in-depth re-evaluation of synthetic pyrethroid safety for their possible long-term implications for human health, mainly through cellular mechanisms linked with mitochondrial and autophagic perturbations. The results highlight critical areas for future investigation and potential impact on public health policies.

ABOUT THE SPEAKER

Dr. Abhishek Kumar Mishra is an Assistant Professor of Zoology at Government Shaheed Gendsingh College, Charama, Chhattisgarh. He is a neurotoxicologist who earned his PhD from the CSIR-Indian Institute of Toxicology Research, Lucknow, India. His research interest lies in autophagy, dopaminergic neuronal dysfunction, and neurotoxicity. He has published in reputed journals, and has presented papers and delivered lectures at national and international conferences. As a dynamic academic, he is contributing to the field through his research, teaching, and professional development programs.

IL-19

DNA Repair Deficits and Its Links to Neurodegeneration and Dementia.

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Neurodegenerative diseases encompass a broad range of conditions that result from progressive degeneration and death of brain cells. Alzheimer's disease (AD) is the most common neurodegenerative disease affecting around 50 million people worldwide. Despite the extensive effort to define the etiology of AD, therapeutic approaches for treating the disease remain ineffective. Thus, there remains a gap in our knowledge of the disease etiology and pathways that may be amenable to therapeutic intervention. Increasing evidence supports a role DNA damage, particularly, nuclear DNA double-strand-breaks (DDSB) in aging and several neurodegenerative diseases. Furthermore, several environmental factors trigger DNA damage response and stimulate pathobiology which is similar to those found in humans with AD. However, it is not clear how DNA DSBs contribute to AD and whether targeting the DNA DSB response can alleviate the pathological consequences in AD. We first examined the expression levels of DNA repair deficits and DNA damage in human AD brains. We observed enhanced expression of -H2A.X (Ser139) a biomarker of DDSB, and reduced expression levels of DNA repair proteins MRE11, RAD50 and CIZ1 in the brains of AD patients. This was positively correlated with upregulation of cGAS-STING immune response pathways. Next, using novel complementary genetic, viral-based manipulation and state-of-the art approaches, we examined the role for DNA repair deficits in age-related neurodegenerative pathways of the Aβ-Tau cascade in APP and tau overexpression mouse models of AD. Our results showed that DDSBs and reduced expression of DNA repair proteins were further associated with significant increase in immune responses, neuroinflammation and cognitive deficits in mouse models of AD. Our data provide evidence that accumulation of DDSB and/or alteration in DNA repair proteins trigger inflammatory responses in the brain which may further influence neurodegeneration and cognitive deficits in AD. Thus, targeting the DDR and cGAS-STING pathway together might offer an innovative approach to prevent or slow down AD progression.

ABOUT THE SPEAKER

Dr. Moshahid Khan is an Associate Professor of Neurology and Joint Associate Professor of Physical Therapy at University of Tennessee Health Science Center,USA. He did his Ph.D. from Hamdard University, Delhi in 2009. At the UTHSC, my laboratory is actively engaged in identifying the early mechanisms of age-related neurological disorders using multiple genetic, cellular, molecular and biochemical approaches. My prior work has so far led to more than 60 publications, multiple NIH, DOD and foundation grants. So far, my published works have been cited more than 5000 times with a collective h- index of 38 and i10 index of 59. Moreover, I have been enlisted as Lead editor and editorial board member of multiple journals in the field of neuroscience and neurological disorders and have the honour of serving as an International adhoc reviewer for the National Research Foundation, Alzheimer's Research foundation and an adhoc member of the DOD and NIH study sections as well. I also intermittently contribute to teaching as needed and assigned by my current institution and have mentored several undergraduate and graduate students in the lab. My long-term research is committed to unraveling the mysteries of neurological diseasesand to discovering new treatments for these incurable diseases.

IL-20

Noncoding RNAs in Traumatic Brain Injury : Clues to Diagnosis & Therapy

D P Mishra

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Traumatic brain injury (TBI) is a major cause of neurodegeneration , morbidity and mortality in the Indian scenario. Especially, the therapeutic strategies against mild to moderate cases of TBI are still limited due to a lack of detailed understanding of the underlying mechanisms. The Noncoding RNAs have recently emerged as critical regulators of signalling cascades associated with neurodegeneration. In the present study we have studied the role of some exosomal ncRNAs in closed head traumatic brain injury. For this study we have established and standardised a mice model of closed head TBI. We have studied the differential expression of Noncoding RNAs in the exosomes associated with TBI. The functional gain and loss of function in vitro studies revealed a set of miRNAs critical for regulating neuronal cell death. The overexpressed miRNAs were associated with disease severity and therapeutic targeting of these miRNAs ameliorated key hallmarks of TBI. In conclusion this study revealed that Noncoding RNAs could provide clues to diagnosis and therapy in TBI.

ABOUT THE SPEAKER

Dr. Durga Prasad Mishra is a Chief scientist at the CSIR-Central Drug Research Institute, India, with expertise in molecular cell biology, endocrinology, and cancer biology. He obtained his Ph.D. in Molecular Cell Biology & Endocrinology from Jawaharlal Nehru University (JNU) in 2003 and has since built a career focused on understanding the molecular mechanisms underlying diseases, particularly in the fields of cancer, metabolic disorders, and cell signaling. His research includes significant contributions to the identification of potential therapeutic targets and inhibitors for cancer treatment, including studies on histone deacetylase inhibitors, proteasome inhibition, and the role of NADPH oxidase in glioblastoma. He has published over 20 research articles in high-impact journals, contributing to the understanding of cancer cell survival, metastasis, and therapy resistance mechanisms. His postdoctoral training includes work at prestigious institutions such as the University of Pennsylvania, USA, and IGBMC, France. Dr. Mishra has been awarded several fellowships and honors, including the JSPS Young Investigator Award, DAAD Short Term Fellowship, and AACR-Pfizer Postdoctoral Fellowship.

IL-21

HCMV miRNAs: Emerging Approaches in Risk Analysis and Translational Aspects of Health and Environment

Sunil Babu Gosipatala

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Human Cytomegalovirus (HCMV) is a highly adaptive virus that persists within its host through sophisticated mechanisms of immune evasion and modulation, one of which involves the expression of viral microRNAs (miRNAs). These small, non-coding RNA molecules play a crucial role in fine-tuning host-virus interactions, influencing both viral latency and reactivation. In this paper we try to explores the role of HCMV miRNAs, i.e., miR UL 70-3p and 148D in shaping the outcomes of viral infections. By targeting host gene expressions involved in apoptosis and autophagy, these miRNAs alter immune surveillance, promote immune evasion. Understanding these interactions is key to developing novel diagnostic tools that can detect early signs of HCMV reactivation or complications in vulnerable populations, such as organ transplant recipients, newborns, and individuals with immunodeficiencies. Moreover, the translational aspects of HCMV miRNA research extend beyond clinical applications, offering insights into how viral infections might interact with environmental stressors to impact human health. By integrating HCMV miRNA profiles into risk analysis models, researchers can better predict how environmental factors such as pollution or climate change might influence viral reactivation patterns and subsequent health outcomes. These insights have the potential to improve public health strategies, personalize therapeutic approaches, and inform policies aimed at minimizing the environmental triggers of viral reactivation. In this paper we highlights the potential of HCMV miRNAs as versatile tools for bridging the gap between virology, epidemiology, and environmental health.

ABOUT THE SPEAKER

Dr. Sunil Babu Gosipatala is an Associate Professor in the Department of Biotechnology at Babasaheb Bhimrao Ambedkar University, Lucknow, since 2005 and earned Ph.D. from Andhra University, Visakhapatnam (2006). His research focuses on the functional validation of viral microRNAs (vmiRNAs), and how these tiny regulatory molecules shape immune evasion and benefit the viral survival in human hosts. His significant contributions include in identifying the oncogenic potential of Epstein Barr Virus derived miR BART-5 and demonstrating the anti-apoptotic/anti-autophagic role(s) of human cytomegalovirus miR,s miR-UL 70-3p & miR-UL48D. These results uncovered how HCMV miRNAs target mitochondrial-mediated and ER-stress induced apoptosis and interfere with autophagosome formation. Further, he focuses on the identifications of SARS-CoV-2 encoded miRNAs and their role immune regulation. He has well equipped human cell culture laboratory and necessary equipment's and expertise to study mRNA:miRNA binding studies, supported by grants from DBT, DST-SERB and UP-CST. He has an Indian patent on the process of making anticancer compounds through dominos reactions. Dr. Gosipatala published 35 original research papers, 4 reviews, and 11 book chapters, 1 popular article with a total impact factor of 103.21 and reviewed many articles. He successfully supervised 7 Ph.D. students, 2 students are pursuing Ph.ds and guided more than 90 M.Sc. dissertations, trained master's students in scientific writing. With strong ethical organizational skills, he organized International workshops on flowcytometry in 2014, 2024, international and National conferences and International Immunology Day every year in his Department. He exhibited strong scientific vigor by successfully completing 3 research projects and currently running 3 projects. He has earned several honours, including the Talwar Foundation Gold Medal for his research paper, 1st position in CIMAP winter school and nominated for Nobel laureate congregation in Allahabad and recently credited with best teacher award from IMRF in the infectious disease biology. He is the life member of Indian immunology Society, Indian National Science Congress, The Society of Biological Chemists (India), and The Cytometry Society of India.

IL-22

Targeting MicroRNAs by Natural Products: A Novel Therapeutic Approach for Osteoporosis

Divya Singh

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Bones are mineralized structures of connective tissue that are made up of osteoblasts, osteoclasts, osteocytes, and bone lining cells. Bone homeostasis is preserved due to the equilibrium between these bone-resorbing and bone-forming cells. Loss of balance/deregulated signaling in the bone development may lead to pathological conditions such as osteoporosis. There are several therapies available for the management of osteoporosis but these are associated with severe side effects. The search for novel therapeutic targets for treating bone diseases with minimum side effects represents a medical challenge that must be addressed in the upcoming years. miRNAs contribute in the regulation of a wide range of human pathologies, and hence these tiny molecules have a remarkable potential to be used both as biomarkers and therapeutic targets for human illnesses. Our previous studies identified bone forming efficacy in *Butea monosperma* crude extract with medicarpin, a natural pterocarpan being the most potent osteogenic agent. Since natural agents exert their effects by targeting multiple signalling pathways, and miRNAs regulate diverse biological processes, we speculated that miRNAs could play a substantial role in bone forming role of medicarpin. Subsequently, we identified a series of microRNAs controlled by medicarpin with potential as diagnostic biomarkers and novel therapeutic strategy for management of post-menopausal osteoporosis.

ABOUT THE SPEAKER

Dr. Divya Singh has over twenty years of research experience in the field of metabolic bone disorders. Her main research interests include development of novel bone-forming and fracture-repair agents. Her research efforts have led to identification of two novel bone enhancers. These include S007-1500, an orally active fracture repair agent. S008-399, another bone enhancer, was awarded the CSIR technology award in 2019. Both the technologies have been licensed. Dr. Singh has also worked extensively in the area of microRNA regulation of osteoblastogenesis and osteoimmunology. Dr. Singh has published over eighty research articles in peer-reviewed journals and has several patents. She has been elected the Fellow of National Academy of Sciences in the year 2023 and is a recipient of SERB POWER fellowship-2022.

IL-23

CoenzymeQ10 and phloretin attenuate arsenic and chromium-induced oxidative damage via modulating the SIRT1/NRF2/HO-1 pathway in the Swiss albino mice

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Industrial effluents and groundwater, containing the most common environmental and occupational toxicants, trivalent arsenic [As (III)] and hexavalent chromium [Cr (VI)], pose an urgent and pressing threat to the surroundings. Despite the thorough study of their toxicities, the combined effects, particularly the mechanism of underlying toxicity and the associated cellular stress response remain a significant area for exploration. This study aimed to provide a more realistic understanding of the combined effects of As and Cr, often found in environmental settings.

Concerns regarding these persuasive heavy metals' environmental assessment in recent decades suggest that mitigation steps are needed to safeguard the ecological system. Coenzyme Q10 (Q10) and phloretin (PHL) are abundant antioxidants with free radical scavenging and antioxidant properties. The current study aimed to study the underlying mechanism of Q10 and PHL through various biochemical experiments, DNA damage analysis, histological outcomes, and gene expression assays. The two-week experimental procedure was designed to mimic a realistic exposure scenario in which As (100 ppm) and Cr (75) ppm were added to the drinking water to induce oxidative stress-induced toxicity in the experimental mice. These experimental animals were simultaneously co-treated with Q10 (10 mg/kg) and PHL (50 mg/kg) i.p. as per the body weight of each mouse. The As+Cr-treated mice group showed an increase in metal burden, malondialdehyde, and protein carbonylation, along with a decrease in the activity of several antioxidants of the defense system (catalase, reduced glutathione, glutathione-S-transferase, superoxide dismutase, and total thiol). A similar trend was observed with DNA degradation, microscopy observation, and altered SIRT1/NRF2/HO-1 gene expression assays due to As+Cr combined exposure. However, with the Q10 and PHL co-treatment, the above parameters were reversed back to normal cellular homeostasis. Q10 and PHL worked synergistically, and were shown to counteract the increased oxidative stress associated with the above toxicants. Our study reveals that treatment with the selected antioxidants attenuated the ROS, DNA damage, and histological modifications and upregulated the SIRT1/NRF2/HO-1 signaling pathway, inspiring hope for the future of environmental and occupational health. This emphasizes the potential for developing new antioxidant therapies for environmental and occupational toxicants.

ABOUT THE SPEAKER

Dr. Gyanendra Singh earned his PhD (Toxicology) from CSIR-Central Drug Research Institute after qualifying NET & GATE examinations. He later moved to the USA to pursue postdoctoral research in the area of toxicology & molecular biology at LSU Health Sciences Center, New Orleans, LA, and K-State University, Manhattan, KS, USA, respectively. Currently, he is a Scientist at ICMR- National Institute of Occupational Health, Ahmedabad. He is an expert in toxicology and occupational health. He also serves as editor-in-chief of the Journal of Metabolomics and Systems Biology and associate editor of the Universal Journal of Biotechnology & Bioinformatics. He has one national and one international patent on his account and has been honored with international fellowships to attend several trainings and conferences abroad. He has been on the editorial board of several global-famous journals. He has also previously been honored with a full American College of Toxicology membership. During 2019-20, he was a visiting scientist at the University of Pittsburgh Medical Center, Pittsburgh, USA. He has several grants on his account and has mentored several master dissertations, including PhD and MD/MS scholars. His work has significantly advanced the toxicology and molecular biology field, particularly in occupational health.

IL-24

Elucidating the Role of Metabolic Mechanisms of Drug Resistance in Glioblastoma multiforme

Ashutosh Shrivastava and Manendra Singh Tomar

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Glioblastoma multiforme (GBM) is classified as a primary brain neoplasm of the central nervous system, characterized by a high degree of lethality and a median survival of 15 months after the initial diagnosis. The current gold standard for treatment is the surgical removal of the tumor, followed by chemotherapy and radiation. The oral alkylating agent temozolomide (TMZ) is the most commonly used chemotherapy drug in this context. Unfortunately, even with the current standard treatment, GBM remains incurable and has a high recurrence rate due to the development of TMZ resistance. Glioblastoma cell lines U87-MG and LN-229 were treated with gradually increasing doses of TMZ over a period of 10 months to generate stable TMZ-resistant cell lines. We then assessed the mitochondrial mass, membrane potential, and reactive oxygen species (ROS) in resistant cells compared to parental cells. Decreased mitochondrial mass and ROS content were detected in resistant cells, while a significant increase in the mitochondrial membrane potential was observed in resistant GBM cells. Furthermore, we performed integrated transcriptomic and metabolomic studies to identify alterations in the metabolic pathways that contribute to TMZ resistance in GBM. Results from metabolomics suggest alterations in glycolysis, oxidative phosphorylation, and fatty acid oxidation. This study highlights the integrated transcriptomic and metabolomic paradigm of metabolic pathways that fuel drug resistance in GBM

ABOUT THE SPEAKER

Dr Ashutosh Shrivastava is an accomplished academic and researcher currently serving as an Additional Professor at the Center for Advanced Research, King George's Medical University, Lucknow, India. With a strong foundation in endocrinology and biotechnology, he holds a PhD in endocrinology from the Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, and completed his postdoctoral training at prestigious institutions like Harvard Medical School. His research focuses on cancer biology, molecular medicine, and metabolic diseases, with significant contributions to understanding the molecular mechanisms in cancer therapy resistance and metabolic reprogramming in diseases like breast cancer and obstructive sleep apnea. Dr. Shrivastava has been awarded multiple honors, including the Junior Investigator Award from the Gabrielle's Angel Foundation and the DSL Award for Best Paper Presentation by the Endocrine Society of India. He is a founding member of the Translational Biomedical Research Society and an active member of the American Association for Cancer Research. His peer-reviewed publications span high-impact journals like cancer research, molecular medicine, and endocrinology. He has a strong commitment to scientific publishing, having served as an editor for journals like the American Journal of Biomedical Research and as a peer reviewer for numerous scientific journals.

IL-25

LINC00324 Promotes Metastasis in Esophageal Cancer

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Long non-coding RNA LINC00324 emerged as an essential player in manifesting cancer phenotypes. However, the intricate regulatory mechanisms of LINC00324 in the metastatic process of esophageal squamous cell carcinoma (ESCC) remain unclear. To elucidate the impact of LINC00324 on the metastatic process of ESCC, we conducted a series of experiments, including transwell migration and invasion assays, Western blot assay, dual luciferase reporter assay, qRT-PCR, and gain and loss of function assays. Our findings reveal that LINC00324 is significantly upregulated in ESCC blood samples and KYSE-70 cells compared to tumor-adjacent normal cells. Functionally, the knockdown of LINC00324 in KYSE-70 cells led to a significant decrease in migration and invasion ability compared to vehicle control cells. Notably, the wound healing density rate of cells transfected with si-LINC00324 was approximately 3.5% at 24 h and 2.9% at 48 h, demonstrating reduced migratory capacity. Moreover, only 8% of si-LINC00324-transfected KYSE-70 cells invaded the extracellular matrix in the transwell invasion chamber compared to vehicle control cells. Mechanistically, we discovered that LINC00324 functions as a sponge for miR-493-5p and is positively associated with the miR-493-5p target mitogen-activated protein kinase 1 (MAPK1) in ESCC progression. The restoration of miR-493-5p and the inhibition of LINC00324 expression reversed the effects of LINC00324 on metastatic and invasion markers by decreasing MAPK1 and pMAPK1 protein levels compared to vehicle control cells. In summary, our study suggests that LINC00324 facilitates ESCC metastasis by sponging miR-493-5p and positively regulating the expression of MAPK1. These findings contribute to a better understanding of the regulatory network involved in Esophageal cancer metastasis and provide potential therapeutic targets for intervention in this process.

ABOUT THE SPEAKER

Prof. Aklank Jain is currently Professor at Department of Zoology, Central University of Punjab, Bathinda, India. After obtaining his PhD from Jamia Millia Islamia, Delhi, India, he undertook postdoctoral research at Oncology Insitute of Southern Switzerland, Switzerland, MD Anderson Cancer Center, Houston, USA, and The University of Texas at Austin, USA. He is recipient of Ramanujan Fellowship from DST, India, and has served as Former Head of the Department of Zoology, Central University of Punjab. He has more than nineteen years of experience and authored more than 75 papers, and guided several students. His current research interests are identification of non-coding RNA-based biomarkers for lung cancer, esophageal cancer, breast cancer, and cancer metastasis process

IL-26

Decoding Metabolome-Linked Long Non-Coding RNAs, and Cancer Stem Cells Signatures in Breast Cancer

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Chemotherapy is commonly used for breast cancer, but resistance often develops due to metabolic reprogramming and the unique characteristics of cancer stem cells (CSCs). Breast cancer stem cells (BCSCs) are central to tumor progression, metastasis, and therapy resistance, as they depend on specific metabolic pathways to maintain self-renewal and proliferation. Metabolic reprogramming enables both breast cancer cells and BCSCs to acquire the energy and nutrients for survival and growth. Long non-coding RNAs (lncRNAs) are critical regulators of these metabolic processes and stem cell properties, promoting tumor growth, metastasis, and resistance to treatment by influencing metabolic pathways. In this study, we analyzed the metabolite profiles of 43 breast cancer patients (both chemotherapy-treated and untreated) and 13 healthy controls using ^{1}H NMR spectroscopy. We also assessed the expression of metabolism-related lncRNAs in tumor tissues through qRT-PCR. Untargeted analytical techniques, including PCA, PLS-DA, OPLS-DA, and random forest classification, identified over 25 significantly altered metabolites ($p < 0.05$) in breast cancer patients. Notable changes were observed in metabolites like isobutyrate, succinate, lactate, and glucose, particularly in advanced breast cancer (ABC) patients, suggesting their involvement in disease progression. Metabolic pathways such as glycolysis and galactose metabolism were observed as key drivers of tumor growth and survival, especially in advanced stages of the disease. Furthermore, lncRNAs such as H19, MEG3, and GAS5 were found to be dysregulated in breast cancer tumor tissues, impacting metabolic processes and therapy responses. Using breast cancer cell lines (MCF-7 and MDA-MB-231), we studied the effects of doxorubicin on cancer stem cell markers and lncRNA expression in mammospheres. Doxorubicin significantly reduced mammosphere formation and decreased the expression of stem cell markers like ALDH1A and epithelial-mesenchymal transition (EMT) markers. Oncogenic lncRNAs such as H19, MALAT1, and HOTAIR were downregulated, while the tumor-suppressing lncRNA DILC was upregulated in mammospheres. Overall, the study suggests that metabolic pathways and lncRNAs are dysregulated in breast cancer, and that BCSCs can be targeted by doxorubicin. Ongoing work is examining whether doxorubicin also impacts the metabolic patterns of BCSCs.

ABOUT THE SPEAKER

Professor Subash C Gupta is Head, Department of Biochemistry, Associate Dean (Research) All India Institute of Medical Sciences (AIIMS), Guwahati. He has contributed significantly in understanding the role of inflammatory pathways in cancer pathogenesis. His current research interests: acidic tumor micro-environment, pathogenesis of cancer types such as breast cancer, head-and-neck cancer, gallbladder cancer and glioblastoma, cancer chemoprevention and other projects to understand the role of cancer stem cells, exosomal microRNAs and long non-coding RNAs in regulating tumor development. He has published 122 peer-reviewed articles in highly prestigious journals, written several book chapters. He has been honoured with prestigious national and international awards. He has co-edited special issues of scientific journals and four prestigious books. Currently he is an editorial board member on several scientific journals and an active reviewer on more than 80 journals. He has been actively involved in teaching undergraduate and postgraduate students. In addition, he has been supervising masters and doctoral candidates.

IL-27

Unraveling the differential role of GABARAPs in Glial pathogenesis

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Glioblastoma (GBM) is one of the most debilitating and extremely aggressive tumor with a median survival of less than a year. GBM have high metastatic potential and frequently acquire chemoresistance. The current multimodal treatment approaches for GBM include surgical tumor resurrection, radiotherapy, and chemotherapy but these approaches leave the patient with long-term disabilities such as depletion of cognitive abilities, leukoencephalopathy, and recurrence in 6-8 months. Glioma cells are highly dependent on autophagy to survive and proliferate. Autophagy inhibition is proved to be a beneficial strategy for restricting glioma growth. However, due to the lack of specific autophagy inhibitors, the autophagy pathway cannot be efficiently targeted. Understanding the vulnerabilities in autophagy gene expression can help to design better autophagy inhibitors. In this study, we demonstrate differential expression of GABARAP family genes in low-grade glioma and GBM. Our study highlights the differential expression of GABARAP family genes in response to autophagy inhibition and induction. Moreover, the knockdown of specific GABARAP isoforms enhanced proliferation and reduced temozolomide sensitivity of glioma cells by decreasing the p53 expression. The selective expression pattern of GABARAP family genes in GBM can be utilized to screen for patients who might respond better to temozolomide treatment. The differential expression of GABARAP isoforms highlights the subtle regulation of the autophagy pathway in response to environmental cues.

ABOUT THE SPEAKER

Dr Bhawana Bissa is currently working as Assistant Professor, Dept. of Biochemistry, Central University of Rajasthan. She first obtained her PhD from AIIMS, New Delhi, thereafter, she worked as Research Associate and CSIR Nehru Post doctoral Fellow at CSIR-IGIB, India. Her research involves understanding the molecular regulation of autophagy and its role in cancer therapy resistance, particularly in glioblastoma and breast cancer. She has authored more than 15 publications in top-tier journals, with notable works on autophagy and cancer pathways, and holds two U.S. patents. She has presented her research at international conferences and received awards such as Best Poster Presentation at IIT Jodhpur's Young Investigator Meeting. In addition to her research, Dr. Bissa has teaching experience at CURAJ and AIIMS, specializing in Biochemistry, Molecular Biology, and Life Sciences. She is a member of various scientific organizations, including the American Association of Cancer Research (AACR).

IL-28

Characterization and toxicity assessment of environmental micro plastics

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The pervasive presence of microplastics in the environment poses a significant threat to organisms' health. Though microplastics are recognized as an environmental threat, the underlying mechanisms through which exert their biological effects are not well understood. Our laboratory is characterizing and assessing the biological effects of environmental microplastics. The characterized microplastics are in fibers, fragments, film, pellets, and foams forms; with polyethylene, polypropylene, polystyrene, polyamide, polyoxymethylene, and polyester polymeric compositions. The physical and chemical analysis of freshwater ecosystems revealed the presence of coliforms and heavy metals and its condition is hypoxic to organisms. We assessed the biological effects of microplastic-contaminated samples using *Drosophila melanogaster* model organism. *D. melanogaster* reared in microplastic-contaminated water significantly delayed development, reduced fecundity, caused cytotoxicity, induced oxidative stress, and caused genotoxicity. This study provides essential insights into the ecotoxicological impacts of microplastics, offering our understanding of their potential health risks for humans.

ABOUT THE SPEAKER

Dr H. P. Gurushankara did his MSc in Zoology from the University of Mysore and Ph.D. from Kuvempu University, Karnataka. He served as faculty in the Department of Environmental Science at Kuvempu University and the Department of Bioscience at the University of Mysore. His post-doctoral research at the University of Mysore and the Indian Institute of Science, Bangalore. He worked as a Coordinator (Biology) at the Talent Development Centre, IISc. He has been working in the Department of Zoology at the Central University of Kerala (CUK) since its inception (2010). He guided 3 Ph.D. and more than 60 M.Sc. students' dissertation work. He has published more than 30 research papers and authored the book "Understandings in Cytogenetic Techniques." He is a life member of the Indian Immunological Society and many more. He has organized many National and International Scientific meetings. His research interests include the toxicology, eco-immunology of amphibians, and natural peptides.

IL-29

Microplastics in Food and Food Products: Global trend, Health Impact, Analysis and Challenges

Atish T. Paul

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Microplastics are synthetic chemical entities that range from 1 µm to 5 mm in size and are used in toothpaste, face scrubs, nail polish, paints etc. Due to their indiscriminate use across the globe it has registered its ubiquitous presence in the earth's ecosystem. Recent reports on presence of these entities in salt, sugar, beverages, seafood, drinking water, honey, and plant products has raised concern of quality and safety of such commodities. Microplastics are reported to accumulate in tissues of humans namely in human placenta, breast milk, stool samples and blood. Thus they cause chronic health hazards namely disorders of immune system, respiratory tract, gastrointestinal tract and serious disease such as cancer.

Analysis of microplastics is a major task that involves appropriate sampling and sample processing in combination with the use of analytical techniques for qualitative and quantitative determinations. Techniques that are commonly applied for analysis, include FTIR, SEM, TEM, AFM-Raman, DSC, TGA, py-GC–MS etc. The talk will focus on all the above aspect involved in study of microplastics.

ABOUT THE SPEAKER

Dr. Atish T. Paul completed his Bachelor of Pharmacy from University of Pune. He graduated with M.S. (Pharm.) and Ph.D. degrees in Natural Products specialization from National Institute of Pharmaceutical Education and Research (NIPER-S.A.S Nagar, Punjab). After completion of his doctorate, he joined the research group of Prof. Ikhlas Khan as postdoctoral fellow at the National Center for Natural Product Research (University of Mississippi, USA). His area of expertise is Natural Products and Medicinal Chemistry. He is currently working on the research themes of : Lead Discovery (Isolation, In-silico design and synthetic modification) against Obesity, Microbial and Parasite infections; Lead Discovery (In-silico design and synthetic modification of Epigenetic Modulators); and Development of Analytical Methods for Botanicals.

IL-30

RPA: CRISPR/Cas12a-based molecular diagnostic kit for detection of Scrub typhus

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Orientia tsutsugamushi is an obligate intracellular parasitic bacterium and the causative agent of scrub typhus (ST). Further, it is the most common cause of acute encephalitis syndrome (AES) in pediatric patients in India. Thus, rapid and sensitive on-site detection of scrub typhus is essential for timely initiation of control measures. In this study, we developed a rapid, sensitive, and instrument-free lateral flow detection method (called LoCIST) based on CRISPR/Cas12a technology for ST. The detection limit of LoCIST is one copy of ST genomic DNA per reaction, and the detection process takes less than 1 h. The test showed no cross-reactivity with other rickettsial DNA in clinical samples, and was 100% concordant with real-time PCR detection of ST. The sensitivity of LoCIST was 97.6 percent and the specificity was 100 percent. Overall, LoCIST provides a new alternative for ST detection that is portable, simple, sensitive, and specific, and can help prevent and control the occurrence of ST-related AES.

ABOUT THE SPEAKER

Dr. Rajeev Singh is Scientist-D at ICMR- RMRC, Gorakhpur. He received his Master's degree in Biotechnology from Devi Ahilya University Indore and Doctorate degree in Molecular and Cellular Immunology from Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow. Further, he did his post-doctoral research from Osaka University, Japan. He has over 20 years of research experience in inflammation biology, proteomics, public health, viral and bacterial diagnostics. His current research focus is on Japanese Encephalitis and acute encephalitis syndrome, child health, viral research and diagnostics, translational research to develop point-of care test.

He is a member of Indian Immunology society, Indian Academy of Biomedical Sciences Society and Japanese Society for Immunology. He is also the reviewer of many prestigious national and international journals. He has written over 50 peer reviewed papers, 2 book chapters, 25 research abstracts. He is also the reviewer of many national and international journals. He delivered more than 20 invited talks, keynote, and plenary talks in national and international venues. He has received various awards and prizes including ICMR-Intramural Research Excellence award (2023), Kishimoto Foundation Fellowship (2010) and DST-Young scientist award (2014), CSIR-NET JRF (2003) and GATE (2003).

IL-31

Emerging contaminants (PFAS) in Environment – Outlook

Joanne Ho
APAC Food & Environment Market Development Manager
Waters Corporation

Emerging contaminants, per- and polyfluoroalkyl substances (PFAS), also commonly referred as "Forever Chemicals" have gained significant attention in recent years due to growing awareness of their persistence in the environment and potential health risks. Government and regulatory bodies around the world have increased surveillance and monitoring of PFAS in the environment and started implementing stringent guidelines and regulations to control PFAS emissions and contaminations. In this session, we will share the latest insights from scientific research to regulatory updates and how recent technological advancement can help to address the challenges associated with PFAS analysis.

ABOUT THE SPEAKER

Joanne Ho is the APAC Food & Environmental Market Development Manager at Waters Corporation for over 5 years. She works with a diversified team across the globe to translate business strategies into effective regional marketing plans and partner alongside analytical scientists and organizations to understand current regulations and provides solution to solve problems that matter most in food and environmental applications.

Joanne is an active member of AOAC SEA Section Capacity Building and Training of Young Scientists Working Group. Since 2022, she also took up responsibilities as the Strategic Engagement Manager in AOAC SEA Section, part of the team that won the AOAC International Section of the Year Award in 2024.

IL-32

Practical approach/workflow of PFAS analysis in Food & Environment

Daniel Ng
APAC Analytical Professional Services Team Lead
Waters Corporation

Per- and Polyfluoroalkyl Substances (PFAS) are a group of man-made chemicals that have multiple fluorine atoms attached to an alkyl chain and is widely used in many applications, such as packaging, surfactants, and firefighting fluids. However, studies have shown links between bio accumulative PFAS exposure and detrimental health effects, therefore there is a pressing need to reduce its intake.

Due to PFAS being ubiquitous in the environment, special analytical considerations are required in terms of instrumentation but also sample extraction to ensure that PFAS can be accurately quantified. In this presentation, Daniel will share on the instrumentation, tips and tricks and the overall workflow to analyze PFAS in Food & Environment samples.

ABOUT THE SPEAKER

Dr Daniel Ng is the APAC Analytical Professional Services Team lead for Food, Environment and Material Science market segments. His team has been working on PFAS and has developed advanced methods to extract and quantify PFAS in a range of sample types.

Daniel Ng received his PhD from the University of Manchester in mass spectrometry proteomics. He worked at the Waters mass spectrometry headquarters in Wilmslow, UK, specializing in mass spectrometry instrumentation. In 2019, he took up a new role as a principal scientist at the International Food and Water Research Centre (Waters) in Singapore. Since 2023, Daniel has lead the Food, Environmental and Material Science Analytical Professional Service team in the Asia-Pacific Region, developing analytical solutions to meet key challenges that customers face.

IL-33

PFAS in Water and Food: Implementation in CSIR-IITR

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Poly- and perfluoroalkyl substances (PFAS) are a broad class of more than 9200 synthetic, fluorinated organic chemicals. Due to strong carbon and fluorine bonds, these chemicals are slow to degrade and remain in the environment for many decades. That is why these chemicals are called "forever chemicals". These chemicals are widely used across hundreds of consumers and commercial products. The beneficial properties of PFAS, which include tolerance to extreme temperatures and the ability to repel oil and water, are a result of this unusual chemistry. Other applications include the use of cleaning agents and the manufacture and placing on the market of consumer articles such as textiles, upholstery, leather, apparel, rugs and carpets, paints, varnishes, waxes and polishes, food contact materials, and cleaning products from which PFAS are likely to be released into air, water, or soil or directly transferred to humans. Due to PFAS being detected in human blood samples, there has been growing concern about both widespread environmental contamination and human health risks from PFAS exposure. In some longer-chain PFAS, including those already undergoing regulatory processes, adverse developmental effects in laboratory animals were observed. Developed and validated the sensitive analytical method for the analysis of PFAS in water and food by LC-MS/MS at 1-50 ppt level and implemented at CSIR-IITR.

ABOUT THE SPEAKER

Dr. Devendra Kumar Patel is working as a Chief Scientist at CSIR-Indian Institute of Toxicology Research, Lucknow. He has more than 24 years of experience in analytical chemistry and regulatory toxicology. He is involved in method development & validation of newer, simpler, and cost-effective green chemistry-based microextraction techniques for persistent organic pollutants (POPs) in environmental, biological, and food matrices using sophisticated analytical chromatography and mass spectrometry techniques such as LC-Q-TOF, LC-HR MS, and GC-MS/MS. He is Assessor of ISO/IEC 17025, Reference Material Producer (ISO 17034) and Qualified GLP Inspector. He also has vast experience in Laboratory Management & Internal Audit as per NABL. He has mentored 15 PhD Students, published 165 research articles in international journals and handled more than 60 Projects.

IL-34

A 1H NMR-based metabolomics study of advanced stage chronic kidney disease patients

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Chronic kidney disease (CKD) affects 10% of the world population and represents a significant burden on the health care system. Current diagnosis based on serum creatinine level is biased in many clinical conditions which has affected clinical decision making. An adult patient is diagnosed with CKD when they present, for a period equal to or greater than three months, glomerular filtration rate (GFR) lower than 60 ml/min/1.73 m2 (i.e. decreased kidney function), or GFR greater than 60 ml/min/1.73 m2, but with evidence of kidney damage (i.e., albuminuria). A serum creatinine level of 1.5 mg/dl can be found in patients displaying wide GFR values between 30 ml/min and 90 ml/min which shows the limitations of serum creatinine levels for estimating GFR. Other, biochemical biomarkers such as cystatin C have also limitations such as being inaccurate in elderly individuals, with high body mass index and liver disease, besides being more expensive than creatinine test. Accurate determination of renal function is crucial in making clinical decisions. Despite intensive research, these errors in evaluation of renal function have persisted which implies that serum creatinine and/or cystatin C are poor markers of renal function In this context metabolomics has a crucial role to play as it can detect a large number of small molecule metabolites from body fluids or tissues in parallel. Instead of relying on creatinine and cystatin C which are poor markers of renal function, there is an urgent need to focus on multiple biomarkers. It has been shown that single filtration markers have limitations that can be overcome by multiple marker-based GFR estimation. NMR is ideally suited for identifying multiple markers, as it can measure simultaneously the levels of multiple markers. We will present results of our latest 1H NMR based metabolomics study to uncover metabolites which are significantly perturbed in differentiating CKD patients (with Stage 4 and Stage 5) from healthy control. The study offers valuable insights into the metabolic alterations associated with CKD and identifies specific target pathways that could be potentially modified to slow the progression of this serious and debilitating disease

ABOUT THE SPEAKER

Dr. Bikash Baishya is an Associate Professor at the Centre of Biomedical Research (CBMR) in Lucknow, specializing in Advanced Spectroscopy and Imaging. With a Ph.D. in NMR Spectroscopy from the Indian Institute of Science (IISc), Bangalore, he has had an extensive academic career that includes two postdoctoral positions at Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland, and the Weizmann Institute of Science, Israel. His research focuses on liquid-state NMR spectroscopy, NMR-based metabolomics, and the development of new NMR techniques. His work involves clinical and pre-clinical applications of NMR, with particular interest in structure determination and metabolomics. He has authored 44 publications in prestigious international journals. In recognition of his work, Dr.Bikash received the Prof. S. Subramanian's 60th Birthday Lecture Award from the National Magnetic Resonance Society (NMRS) in 2022, and delivered an invited talk at the Indo-Japan NMR workshop at Hokkaido University in 2023.

IL-35

Application of DCFDA dye from Toxicology to Forensic Biotechnology: An approach to Minimizing Occupational health risk and Improving DNA Profiling

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DNA profiling is pivotal in forensic investigations, as it helps determine the inclusion or exclusion of individual in criminal activities. Traditionally, biological fluids must undergo chemical screening before DNA profiling, but many of these involves chemicals are often toxic (genotoxic/carcinogenic) and posing risks to both the environment and forensic professionals. Moreover, these chemicals can lead to DNA degradation, resulting in partial profiles that may compromise the accuracy of the results. To address these issues, we have developed a new blood screening methodology using fluorescein-derived 2',7'-dichlorofluorescein di-acetate (DCFDA) dye. This non-carcinogenic and environmentally friendly dye offers a safer alternative for screening blood samples. Our approach not only effectively screens blood on various surfaces but also preserves the DNA integrity, ensuring more accurate profiling outcomes. This is the journey of DCFDA dye from toxicology to forensic biotechnology represents a fascinating evolution in its applications and impacts on both occupational health and DNA profiling The promising results of our study indicate that DCFDA can mitigate the adverse effects associated with traditional screening chemicals. These findings could pave the way for safer forensic practices and improved environmental protection, reducing occupational risks for forensic experts and ensuring more reliable DNA profiling outcomes. The preliminary success of our approach opens new possibilities for further research to refine and validate this approach for broader application in forensic analysis. This study enhances forensic investigations by improving both their efficiency and safety, demonstrating its potential to accelerate forensic processes and reduce associated risks.

ABOUT THE SPEAKER

Dr. Ritesh K. Shukla is an Associate Professor at the School of Arts and Sciences, Ahmedabad University, Gujarat. With a background in Forensic Science, he has held previous academic positions at the Government Institute of Forensic Science, Nagpur, and Guru Ghasidas Vishwavidyalaya, Bilaspur. Dr. Shukla completed his PhD in Toxicology (Nanomaterial Toxicology) from Jamia Hamdard, New Delhi, in 2013. His research spans Forensic Nanotechnology, Biotechnology, DNA Forensics, Food Forensics, and Toxicology. He has published over 50 research articles and 20 book chapters, and holds an Indian Patent for an on-field blood detection kit. Dr. Shukla has edited several books, including Forensic Nanotechnology (2019), Nanotoxicity (2020), and Forensic Microscopy (2022). He has been recognized with numerous awards, including the Early Career Research Award (2016) from the SERB, Government of India, and recognition among the world's top 2% researchers by Stanford University in 2022. He has received the Young Scientist Medal from the IAAM, Sweden, and teaching excellence awards at Ahmedabad University. Dr. Shukla also serves as a subject matter expert at Tata Consultancy Services, a member of the Board of Studies at RTM University, and actively participates in scientific societies like the Silk Road Forensic Consortium.

IL-36

Ecotoxicological risk assessment of Imidacloprid on Macrobrachium rosenbergii using an untargeted metabolomics approach

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Imidacloprid, a neonicotinoid insecticide, is widely applied in agroecosystems, particularly for pest control in the paddy fields of Kuttanad, located in the Ramsar-listed Vembanad Lake on the southwest coast of India. Despite its agricultural benefits, imidacloprid's environmental persistence and potential runoff into nearby aquatic ecosystems have raised concerns about its ecotoxicological effects on non-target species, especially crustaceans. One such species is Macrobrachium rosenbergii, the giant freshwater prawn, a commercially significant indigenous species that plays a vital role in the local ecosystem and economy. Due to its proximity to treated fields, M. rosenbergii is at heightened risk of exposure to imidacloprid through contaminated water, sediments, and food sources.

This study aims to assess the potential hazards associated with imidacloprid in M. rosenbergii utilizing an untargeted metabolomic approach at a concentration that is environmentally relevant. After a 30-day exposure period, samples of hepatopancreas were collected and analyzed using liquid chromatography coupled with quadrupole-Orbitrap mass spectrometry (LC-Q-Orbitrap MS) to identify changes in metabolites. The analysis identified dysregulation in 47 metabolites spanning major classes such as lipids, amino acids, nucleotides, and energy-related metabolites. These biomarkers were associated with various metabolic pathways including sulfate/sulfite metabolism, pyrimidine metabolism, glycine and serine metabolism, aspartate metabolism, and the citric acid cycle, among others. The findings indicate that even at lower doses, imidacloprid can cause significant disruptions in the metabolism of M. rosenbergii, posing risks to the species' overall health. These results highlight the importance of understanding the sub-lethal effects of pesticides at the metabolic level, which is crucial for developing more sustainable pest management practices and protecting aquatic biodiversity.

ABOUT THE SPEAKER

Dr Niladri Sekhar Chatterjee is an experienced researcher with over 10 years of expertise in precision measurement of small molecules in food, biological, and environmental matrices. Holding a Ph.D. in Agricultural Chemicals from IARI, New Delhi, his research focuses on pesticide metabolism, seafood authentication, and the effects of endocrine disruptors. He established a National Reference Laboratory and developed precision measurement methods for multiclass analysis of pesticides, antibiotics, and endocrine disruptors. His work includes high-resolution mass spectrometry, metabolomics, and data analysis pipelines. He is recipient of ICAR Junior Research Fellowship, IARI M.Sc. Gold Medal, DST INSPIRE Fellowship. He has received grants from SERB, FSSAI, and others, and is actively managing ISO 17025 accreditation. His research interests include Marine Biopolymers, Food Chemistry, Mass Spectrometry.

IL-37

Evaluation of the toxic potential of Ethyl methanesulphonate (EMS) on Hydra vulgaris

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Hydra is a fresh water polyp, having an ultimate power of regeneration which makes it an ideal model for not only studying developmental aspects, but also the impact of various environmental toxicants. It is used as a as a bio-indicator of the health of fresh water ecosystems. The effect of EMS at final concentration of 0.09, 0.18, 0.27 and 0.37 mM was studied on Hydra vulgaris using morphological, regeneration, oxidative stress markers and DNA damage as parameters. The morphological scores showed a significant dose dependent differences in the Hydra exposed to 0.18, 0.27, and 0.7 mM of EMS for 24, 48, 72 and 96 hrs of duration. The regeneration scores also showed a significant difference in the gastric region of Hydra exposed to 0.37 mM of EMS for 48 hr of duration. A significant difference in the scores of regeneration was observed for the mid body portion exposed to 0.18, 0.27 and 0.37 mM of EMS for 72 and 96 hr of duration compared to control. A dose dependent significant increase in the activities of Glutathione-S-transferase (GST), Catalase (CAT), and superoxide dismutase (SOD) was observed compared to control. The thiobarbituric acid reactive species (TBARS) levels were also significantly increased compared to control. The genotoxic damage was assessed in the cells of gastric region of the Hydra exposed to 0.09, 0.18, 0.27 and 0.37 mM of EMS for 48 hr by performing comet assay. A significant dose dependent increase in the DNA damage was observed compared to control.

ABOUT THE SPEAKER

Dr Yasir Hasan Siddique, currently a Professor in the Department of Zoology at Aligarh Muslim University (AMU), specializes in neurodegenerative disorders, with a focus on Parkinson's and Alzheimer's diseases using transgenic Drosophila models. In addition, he has recently expanded research to Hydra and explored the toxicity of synthetic progestins, anti-cancer drugs, and the protective effects of natural plant products on steroid toxicity and free radical scavenging mechanisms. A Gold Medalist at the postgraduate level, he has received over 20 national awards, including the UGC-Research Award (2012-14), Shakuntala Amir Chand Prize (2013), and ISCB Young Scientist Award (2015). Notable recognitions also include the Prof. G.K. Manna Memorial Award (2019-2020), Young Scientist Award by the Council of Science and Technology (2007-08), and the SPER Young Scientist Award (2015). He has also earned several Best Oral Presentation awards at international conferences. With expertise in research and leadership, he has completed over 12 major research projects, and mentored 7 Ph.D. students, 3 M.Phil. students, and 4 MD dissertations. Dr. Siddique has published over 165 research articles, 43 reviews, 5 books (3 edited), and 13 book chapters, with a total impact factor surpassing 300, 3839 citations and an h-index of 34. He has also organized numerous workshops and symposia, advancing the scientific community's understanding of human toxicology, environmental health, and research models.

IL-38

Integrated mine waste management to reduce water pollution in Liberia: Cleaner production and biotechnological approaches

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Liberia, which is currently in the process of rebuilding after years of civil conflict, has endeavoured to attract foreign investment. The gold and iron ore mining industry has held a significant role in Liberia's economic development; however, this progress has not transpired without notable consequences. For example, a mine in Grand Cape Mount County released cyanide and arsenic into the river, which is a source of potable water and fish for the local population. Currently, the region is experiencing a significant amount of infrastructure development. Effective mine waste management has emerged as a critical issue for mining enterprises, local communities, and governmental entities operating within the country. This study endeavors to discern the requisite conditions for enhancing mine waste management in Liberia's gold and iron ore mining sectors with a dual focus on pollution reduction and the advancement of sustainable environmental practices, including the use of biotechnological approaches for waste management. By synthesizing both qualitative and quantitative data, this research employs the framework of integrated cleaner production to underpin sustainable mine waste management within Liberia's mining domain. The findings of this research substantiate that the application of cleaner production methodologies and biotechnological solutions holds the potential to enhance mine waste management, lower the pollution levels in the rivers and other waterbodies, provide social and economic benefits to the people in Liberia. This enhancement can be achieved through the judicious utilization of decision-making tools such as Environmental and Social Impact Assessments (ESIA), Environmental Management Plans (EMP), and Environmental Management Agreements (EMA), in conjunction with informed policies, regulations, waste management strategies, methodologies, and explicit frameworks. Furthermore, this research advocates for the establishment of an eco-industrial park, predicated upon the principles of a bio-circular economy, as a comprehensive and integrated management strategy.

ABOUT THE SPEAKER

Eldon R. Rene is an Associate Professor at IHE Delft Institute for Water Education, The Netherlands. He obtained his University Teaching Qualification (UTQ) diploma from IHE Delft (The Netherlands) and a PhD in Chemical Engineering from the Indian Institute of Technology Madras (India). Eldon's broad research interests are related to the development of resilient ecotechnologies for wastewater treatment, resource recovery and water reuse, waste-gas treatment, eco-industrial parks, the development of waste to energy conversion technologies, and the use of artificial intelligence tools for environmental monitoring and environmental process control.

IL-39

Fungal-based biorefinery: from residuals to value-added products

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Filamentous fungi have an inevitable role in nature, and without them the world look different. The fungi can assimilate a variety of materials including sugars, carbohydrate polymers, lignocelluloses, fats, proteins, etc. present in forest, agricultural residuals, industrial residuals, food wastes, etc.; and to produce a variety of enzymes and metabolites such as carboxylic acids and alcohols, while the fungal biomass can also be used as feed or food. Therefore, these fungi can be used to develop biorefineries, in order to consume residuals and wastes and to develop food, feed, metabolites, enzymes and/or biopolymers. Our research group is working with filamentous fungi since 1999 and are developing fungal-based biorefineries. In this presentation, the role of fungi in assimilating a variety of wastes and residuals, and producing ethanol, enzymes, bioplastics, fish feed, and human food will be explained. The fungal used were mainly from Ascomycetes and Zygomycetes. In recent years, as alternative protein sources to substitute meat and animal proteins become a hot topic in the world, human food from the fungal mycelium got more focus in our works and we are developing a variety of food products that mimic meat- or chicken-based food. This presentation gives an overview of this development.

ABOUT THE SPEAKER

Dr Mohammad Taherzadeh is a Professor of Bioprocess Technology at the University of Borås in Sweden since 2004. He is also the co-founder of the Swedish Centre for Resource Recovery. Prof. Taherzadeh holds a Ph.D. in Bioscience and M.Sc. and B.Sc. in Chemical Engineering. His research focuses on developing processes to convert waste and residual materials into value-added products, with an emphasis on anaerobic digestion and filamentous fungi biorefineries. With 500 publications to his name and extensive industrial experience, he has been working on the industrial applications of filamentous fungi since 1999. For more information, visit www.taherzadeh.se.

IL-40

Hydrothermal pretreatment with and without oxidant for biogas production from industrial and municipal residues: a case study utilizing sludge from an augmented oxidation ditch

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Nowadays, great attention has been paid to the treatment and disposal of industrial and municipal waste mainly due to their high environmental impacts. Although these residues are highly pollutant, they also have a high potential for energy recovery, and they can be further utilized in anaerobic digestion processes for biogas and biomethane production. In this paper, wastewater treatment secondary sludge, sawdust, and dairy samples were pretreated at 100°C, 150°C, 200 °C, and 250 °C utilizing the hydrothermal pretreatment method, with and without oxidant - H2O2. The results achieved in this study show that high pretreatment temperatures combined with 100% oxidant tend to reduce the amount of biogas produced. All the sludge samples with 100% oxidant have a biogas production inferior to the control samples, while sludge samples with 0% oxidant and pretreated at 100°C and 150°C have biogas yields higher than the control samples. All the dairy samples with and without oxidant have a relatively low biogas production compared to the control samples, which suggests that this pretreatment method is not suitable for dairy samples. Overall, these results demonstrate the efficiency of the hydrothermal pretreatment method in sludge and wood samples without the utilization of oxidants. These results will allow the study and development of strategies for bioresource recovery from industrial and municipal waste in a closed-loop concept and the production of value-added products. This will decrease the amount of residues generated, reduce the handling and disposal costs, and increase the energy and revenue output from the production chain.

ABOUT THE SPEAKER

Dr. Lisandra Meneses received her PhD degree from the Estonian University of Life Sciences (Estonia) in the field of Engineering Sciences. Dr. Meneses has a total of eight years of international work experience as a Scientist, obtained in Poland, Estonia, United Arab Emirates, Canada, Sweden, Australia, and Ireland. Currently, Dr. Lisandra Meneses is an Associate Professor (full-time) at Wrocław University of Environmental and Life Sciences (Poland). She also assumes responsibility as Associate Editor of the journal Agronomy Research (Estonia) and has been involved in the organization of scientific conferences and workshops since 2013. Dr. Meneses was recognized as one of 60 impactful women in Middle East in 2024 in sustainability, climate innovation, and leadership (BCG V60 Award) by the American Company Boston Consulting Group. She is also recipient of the award L'Oréal Baltic program "Women in Science": 2020 Young Talent for Estonia.

IL-41

Chitosan-Based Composite Beads for Toxicity Mitigation: Advanced Adsorption of Heavy Metals and Pharmaceuticals from Contaminated Water

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Chitosan, as a naturally derived polysaccharide, exhibits strong adsorption capabilities due to its bioactive functional groups. The study synthesizes various composite chitosan-based hydrogel beads, modified with plant materials such as walnut, almond shells, peanut hull, and lignin, to enhance adsorption properties. Each composite is characterized using techniques like SEM, FTIR, TGA, and XRD, revealing notable improvements in mechanical and thermal stability, as well as pH resilience. Batch adsorption tests confirm that these hybrid chitosan beads, following pseudo-second-order kinetics and fitting well with Langmuir and Freundlich isotherms, exhibit high efficiency in removing contaminants, including dyes, heavy metals and antibiotics. The findings support the viability of these eco-friendly, low-cost composite beads as a sustainable solution for wastewater treatment, suggesting a promising direction for future optimization and application in environmental pollution control.

ABOUT THE SPEAKER

Prof. Joydeep Dutta is currently working as Professor and Head in Department of Zoology and Botany, School of Bioengineering and Biosciences, Lovely Professional University, Punjab, India. He completed his PhD in 2000 from Rani Durgavati Vishwavidyalaya, Jabalpur, MP in Zoology. His area of work includes Adsorption technology using chitosan based composite hydrogel beads using plant waste. The work is also being done towards removal of dyes s and heavy metals from water environment. As an erudite academician with high caliber and extensive experience of over 21 years across research, administration, professional & academic teaching. He has published more than 50 articles/ 09 Book Chapters in National and International Peer reviewed Journals. He has organized many National and International Seminars/ Conferences. He is also serving in more than 10 journals as Reviewer. So far, Prof. Dutta has trained more than 50 MSc Scholars as project trainees. He has supervised 02 MPhil, 6 PhD, students, 8 currently pursuing.

IL-42

Acetate: A Sustainable Feedstock for Biomanufacturing - Potential, Challenges, and Advances

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Acetate, a promising carbon feedstock derivable from cellulosic materials, organic wastes, and C1 gases (CO, CO2, methane), holds significant potential for industrial biotechnology. This presentation provides a comprehensive overview of acetate's potential, exploring the biochemical, microbial, and biotechnological aspects of its metabolism. It highlights the current state-of-the-art in producing value-added chemicals from acetate, focusing on a modular metabolic engineering approach to optimize homoserine and threonine production. By enhancing acetate assimilation pathways, TCA cycle flux, glyoxylate shunt activity, and CoA availability, this approach achieved the highest reported amino acid production levels using acetate. This demonstrates the potential of acetate as a valuable and sustainable feedstock for biomanufacturing, paving the way for future research and industrial applications.

ABOUT THE SPEAKER

Prof. Sunghoon Park, Invited Distinguished Professor at UNIST, Korea. PhD from UC Davis. Expert in metabolic engineering and synthetic biotechnology. Published 200+ papers, holds 40+ patents. Former Editor-in-Chief, Biotechnology and Bioprocess Engineering. Educated 100+ graduate students. Transferred technologies to industries. Recipient of prestigious awards. Renowned researcher and academician with 30+ years of experience.

IL-43

Prescribing Seawater Quality Standards for heavy metals in Indian Waters using Ecotoxicological Approach

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The oceans, covering nearly three-quarters of Earth's surface and accounting for 99% of its living space, are essential for sustaining life and supporting global economies. As vital carbon sinks, they absorb roughly 25% of anthropogenic carbon dioxide, playing a crucial role in climate change mitigation. However, growing pressures from pollution, over-exploitation, and climate change threaten this vast ecosystem. This study emphasizes the urgent need for region-specific seawater quality criteria (SWQC) in India to address these challenges. Eventhough, environmental levels, risks, and impacts of metals are reported, there is a lack of data on the toxicity effects of metals on native species, essential for deriving accurate SWQC. The present study derived draft seawater quality criteria for the heavy metals copper, zinc and lead following USEPA method and were 7.36, 13.53, and 2.81 µg L^{-1}, respectively. The findings highlight the necessity of toxicity data from native species to establish effective criteria, supported by advanced methods such as real-time monitoring and bioassays. Collaborative efforts involving the National Centre for Coastal Research (NCCR), Ministry of Earth Sciences (MoES), and academic institutions are essential to ensure accurate guidelines, align with Sustainable Development Goal 14 (SDG 14), and enhance public awareness. These results will assist regulatory bodies, including the Central and State Pollution Control Boards and the Ministry of Environment, Forest, and Climate Change (MoEFCC), in refining water quality standards. Implementing these criteria will help manage pollution sources more effectively, supporting the resilience of India's coastal ecosystems and contributing to global marine conservation efforts.

ABOUT THE SPEAKER

Dr. S. Bijoy Nandan, Senior Professor, CUSAT. PhD in Aquatic Biology & Fisheries. Expert in marine biology, ecology, climate science. Former VC, Kannur University. UGC-BSR Mid-Career Awardee, Fulbright Fellow, UNESCO Fellow. Published 220 papers, mentored 32 PhDs. Discovered 12 new species. International collaborations, recognition, and awards. Represented India at BRICS Congress. Honoured with life-time achievement award. Eminent researcher, academician, and administrator.

IL-44

Health risk estimation at landfill site in Nagpur due to bioaerosol exposure

Amit Bafana

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Landfills are crucial for municipal solid waste management, but they also contribute to environmental and public health concerns due to the generation and release of bioaerosols in addition to chemicals (organic and inorganics) and particulate matter. Bioaerosols, which consist of airborne particles of biological origin, can pose risks to nearby communities if they contain pathogenic microorganisms. To address these concerns, this study aimed to quantify the concentrations of inhalable bioaerosols (bacteria and fungi) at a municipal solid waste landfill site and the surrounding residential sites in the upwind and downwind directions in Nagpur, India.

The study conducted at a landfill site of Nagpur city found that the site had a high concentration of bioaerosols, with an average total of 11056 CFU/m3 in winter and 2244 CFU/m3 in monsoon. The bacterial count was significantly higher than fungal count in both the seasons. The dominance of bioaerosols suggests a potential impact on the deeper regions of the respiratory tract, especially if pathogenic bacteria are present. Following the isolation and characterization of microorganisms, certain bacterial isolates, including Bacillus, Staphylococcus gallinarum, and Streptomyces speibonae, exhibited resistance to various antibiotics such as chloramphenicol, netillin, nitrofurantoin, and streptomycin. The health risk assessment conducted on adults revealed that individuals employed at the landfill site are exposed to a significant risk of bacterial aerosols during the winter season, as indicated by a hazard quotient (HQ) greater than one.

In summary, landfills serve as a significant source of bioaerosols due to the decomposition of organic matter in the deposited waste. The generation and emission of bioaerosols can substantially impact the surrounding environment and public health. Proper management of landfill operations, such as implementing effective waste segregation and processing methods, is crucial to mitigate the release of bioaerosols and protect the local communities.

ABOUT THE SPEAKER

Dr. Amit Bafana is a Senior Principal Scientist in the Waste and Chemical Toxicity Assessment Division at CSIR-National Environmental Engineering Research Institute (CSIR-NEERI), Nagpur, and an Associate Professor at the Academy of Scientific and Innovative Research (AcSIR), Ghaziabad. His research focuses on environmental microbiology and health, particularly in the areas of epidemiological studies, biomonitoring, and the development of biomarkers using omics technologies. Dr. Bafana also works on the application of microalgae for CO2 sequestration and microbial solutions to environmental health hazards. He completed his Ph.D. in 2011 from Nagpur University on microbial degradation of synthetic dyes. He has a diverse research background, having worked at institutions like BARC, Hindustan Lever Research Center, CSIR-IHBT, and CSIR-NEERI, specializing in bioremediation, algal biotechnology, and environmental toxicology. As a Ph.D. supervisor, he has guided multiple students and is a member of several academic committees. Dr. Bafana's achievements include numerous scholarships and awards, such as the National Merit Scholarship and the INSA Visiting Scientist Fellowship (2014-15). He has published 56 international papers, contributed to 3 book chapters, and participated in over 30 international conferences. He has handled 40 R&D projects and is a recognized leader in his field.

IL-45

Dioxins and Furans: Perspectives for Environmental Monitoring and Remediation of These Emerging Persistent Contaminants

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Polychlorinated dibenzo-p-dioxins (PCDD) and polychlorinated dibenzofurans (PCDF), belonging to the so-called dirty dozen - a group of dangerous persistent organic pollutants, are environmental contaminants detectable in trace amounts across the global ecosystem. In contrast to other chemicals of environmental concern such as polychlorinated biphenyls (PCB), polychlorinated naphthalenes (PCN), and polychlorinated pesticides like DDT, pentachlorophenol (PCP) or others, PCDD/PCDF were never produced intentionally. They are formed as by-products of numerous industrial activities and all combustion processes, causing drastic environmental concern. The term "dioxins" is frequently used and refers to 75 congeners of PCDD and 135 congeners of PCDF. These are two groups of planar, tricyclic ethers, which have up to eight chlorine atoms attached at carbon atoms 1 to 4 and 6 to 9. Due to their high lipophilicity and low water solubility, PCDD/PCDF are primarily bound to particulate and organic matter in soil and sediment, and in biota, they are concentrated in fatty tissues. In air, they can exist in both the gaseous phase and bound to particles as semi-volatile compounds. The congener's vapor pressure and the ambient air temperature govern the partitioning between gaseous phase and particle. Especially during the warmer (on the northern hemisphere summer) months the lower chlorinated PCDD/PCDF congeners tend to be found predominantly in the vapor phase. These congeners later undergo photochemical conversion with dechlorination process leading to more toxic congeners if octa- and heptachlorinated congeners degrade to tetra- and pentachlorinated and finally to non-toxic compounds with only three or less chlorine atoms. PCDD/PCDF attached to particulate matter seem to be resistant to degradation. Analytical procedures based on high resolution gas chromatography-high resolution mass spectrometry (HRGC-HRMS) are used for analysis of the sample. Moreover, isomer-specific analysis of 2,3,7,8-PCDDs/Fs compounds corroborated good correlation between GC-QITMS/MS and a well-established technique such as high resolution mass spectrometry (HRMS) in intercalibration exercises for successful results in the analysis of fly ashes, soils and sediment materials. This information will be crucial to understand and identify major technicalities relating to the sampling procedure, sample extraction and method validated quantification methods together with the appropriate technologies to reduce PBDD/F emissions and its bioremediation.

ABOUT THE SPEAKER

Dr. Avneesh Rawat holds a B.Sc. in Life Sciences from Dyal Singh College, University of Delhi, an M.Sc. in Chemistry from G.B. Pant University of Agriculture and Technology, Pantnagar, and a Ph.D. in Chemistry from the same institution. With over 20 national and international publications, he has gained significant experience in the field of chemistry. In 2022, Dr. Rawat joined CSIR-CIMAP as a Project Associate, where research on various scientific challenges was conducted. In 2023, he transitioned to Fare Labs Pvt. Ltd. as Scientist C, working in the Department of Gas Chromatography-Mass Spectrometry and Pesticide Formulations, where expertise in advanced analytical techniques is applied.

IL-46

Fluorogenic Probes for Rapid Detection of Food Contaminants: A New Frontier in Agricultural Safety Monitoring

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The growing concern over food safety and contamination necessitates rapid, sensitive, and cost-effective methods for detecting harmful substances in agricultural products and food samples. Considering these, in last few years, our laboratory has developed various optical probes targeting critical food toxins, such as antinutrients (oxalate, phytic acid), and contaminants (gallic acid, cyanogenic glycosides), common pesticides (paraquat and glyphosate) and the bacterial pathogen E. coli. The developed fluorogenic probes demonstrate high sensitivity and selectivity, even in complex food matrices such as fruits, vegetables, and grains. The detection limits achieved for these analytes are well within the safety thresholds recommended by global regulatory agencies, making these sensors invaluable for routine monitoring in food quality control. The mechanistic investigations were carried out in detail to unveil the specific binding interactions between the analytes and the sensor materials, which would be particularly interesting for future development. In addition, the integration of smartphone-based readout systems enhances the accessibility of these sensors for non-specialists, paving the way for widespread use in agriculture and food safety monitoring. In this talk, I would like to share your ongoing research endeavour in attempt to offer promising platform for expanding the detection of a broader range of food-related hazards in the future.

ABOUT THE SPEAKER

Dr. Nilanjan received PhD degree from Indian Institute of Science Bangalore, India in 2017. After completing his postdoctoral stint in Kyoto university, Japan, He joined as an assistant professor at the Birla Institute of Technology and Science Pilani, Hyderabad campus. His lab focuses on designing optical probes for biomolecule detection, drug delivery, and biomedical applications, while also addressing agricultural and wastewater management issues. He has published 120 papers in international peer-reviewed journals (H index: 30 as on September 2024) and made three patent applications. He has received numerous prestigious awards, including the Telangana Academy of Science Young Scientist Award (2024), NASI-Platinum Jubilee Young Scientist Award (2022), and the DST Young Scientist and Technologist Award (2022). In addition to his research, Dr. Nilanjan serves in editorial roles for several scientific journals, including Frontiers in Chemistry and Tetrahedron Green Chemistry.

IL-47

Optimizing Nutritional and Functional Properties of Millets through Processing Techniques

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Millets are increasingly recognized for their exceptional nutritional value, characterized by high levels of dietary fiber, protein, essential minerals, and a low glycemic index, making them suitable for health-focused food formulations. Despite these benefits, the nutritional and functional properties of millets can be significantly influenced by various processing techniques. This review explores the impact of different processing methods—such as fermentation, soaking, and milling—on the nutritional quality of millets, with a particular emphasis on glycemic index and amino acid profile. LAB-assisted submerged fermentation has been shown to enhance the protein content, antioxidant activity (increasing by 3–49%), vitamin B complex, and amino acid profile of whole grain sorghum. Additionally, this fermentation process results in a reduction of phenolic content, trypsin inhibitors (50%), and tannin content (35%), as well as a decrease in the glycemic index, making these grains more beneficial for health. Processing techniques like fermentation can improve nutrient bioavailability by breaking down anti-nutritional factors that hinder absorption. Moreover, the development of novel millet-based food formulations, which incorporate these processing techniques, holds great promise for addressing nutritional deficiencies prevalent in various populations. By optimizing processing methods, it is possible to create functional foods that are not only nutritious but also palatable, thereby increasing the consumption of millets. In conclusion, understanding the relationship between processing methods and the nutritional and functional properties of millets is essential for the effective development of millet-based products. These insights can contribute to improving dietary outcomes and promoting millets as a staple food in both traditional and modern diets, particularly in regions where millets are already a significant part of the culinary landscape.

ABOUT THE SPEAKER

Dr. Manoj Kumar Tripathi is a Principal Scientist at the Central Institute of Agricultural Engineering (CIAE) in Bhopal, India. He holds a PhD in Biochemistry from G.B.P. University and specializes in food science, biochemistry, and agricultural engineering. His research focuses on medicinal compounds, functional food development, nutraceuticals, and fermented foods. He is also dedicated to advancing food safety and food quality evaluation, ensuring that food products are safe, nutritious, and beneficial for health. Dr. Tripathi's work aims to bridge the gap between scientific research and practical applications in the food industry, contributing to healthier lifestyles and sustainable food production. His contributions continue to shape the future of food science and public health.

IL-48

Ambient MS Approaches For Food Authenticity Testing

Padmakar Wagh
Waters Corporation

Mass spectrometry is a powerful analytical tool used in various types of food analysis. For testing food quality MS is routinely employed for quantification of vital ingredients and for food safety testing MS is used for low level detection and quantification of undesired chemicals in food commodities. Recent times MS is emerging as a tool for quick authenticity check for various food commodities. Ambient MS can be an effective alternative for screening food commodities at the sourcing point where conventional authenticity checks are cumbersome to conduct. The ambient MS provides an easy, cost and time saving option for food manufacturers. The talk introduces a novel ambient MS technology for food authenticity testing.

ABOUT THE SPEAKER

Dr. Padmakar Wagh is working as Associate Director (Applications) at Waters Corporation. He has been working in his present role since last 7 years. He has been responsible for managing Waters demo labs across India and along with his team at Waters, he has been actively involved in developing various applications for Food QC, Safety and authenticity. He has been with Waters since last 19 years and before Waters he worked in various multinational pharmaceutical companies in analytical Research and development area. His has a PhD degree in Chromatography and is passionate about solving analytical challenges.

IL-49

Evaluation of PFAS Contamination in Water Sources of Himachal Pradesh: Human Health Risk Assessment

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Per- and Polyfluoroalkyl Substances (PFAS) are emerging contaminants of concern due to their widespread use and persistence in the environment. The PFAS are originated from man-made products that have been utilized from 19th century. The presence of C-F bond makes them remarkable long lasting, stable and persistent in environment. The PFAS contaminations are growing in environment which is the biggest concerns. Our study aimed to assess the contamination of per- and polyfluoroalkyl substances (PFAS) in drinking water sources in industrial areas Baddi in Himachal Pradesh, India and their risk assessment.

The water samples were collected from various drinking water resources across Baddi into the 250 mL polypropylene bottle fitted with a polypropylene screw-cap then shipped and stores the sample at ≤6°C (not frozen) until extraction. The extraction of samples has been done by using manual vacuum SPE manifold. The final extract was adjusted to 1 mL in 96% methanol for analysis as per US EPA 537.1 guidelines. The analysis of the samples was done using Liquid Chromatography Mass Spectroscopy (LC-MS) techniques. In LC-MS firstly, we analyzed standard sample containing PFAS compounds (PFOA and PFOS). For conducting such analysis, the procedure given by US EPA 537.1 was followed.

Result revealed that analyzed water samples contained PFAS compound such as Per-fluoropropylene oxide dimer acid (PFTrDA), Per-fluoro tetradecanoic acid (PFTA), 11-chloro eicosalfluoro-3-oxaundecane-1-sulfonic acid (11CL-PF3OUdS), Hexa- fluoropropylene oxide dimer acid (HFPO-DA) ,Per-fluoro dodeconoic Acid (PFDOA) ,Per-fluorooctane sulfonic acid (PFOS), Per-fluorobutane sulfonic acid (PFBS), Per-fluoro hexane sulfonic Acid (PFHxA) . Further investigation is in process to carry out for identification and evaluation of the other types of PFAS compounds in the Himachal Pradesh.

The hazard to the environment and public health is highlighted by the many forms of PFAS found in water sources of industrial area. To eliminate this contamination, it is critical to strive towards protecting the health of the people in this area and also reducing potential hazards.

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ABOUT THE SPEAKER

Dr. Nitin Verma is currently serving as the Professor and Principal at the School of Pharmacy, Chitkara University, Himachal Pradesh, India, having over 18 years of experience in teaching, research, and administration. He has published more than 45 research papers and presented at over 65 national and international conferences. His research focuses on toxicology, chemical risk assessment, and the environmental and health impacts of PFAS. He has coordinated industry partnerships with major pharmaceutical companies. Dr. Verma has contributed 20 chapters to academic books and received several prestigious awards, including the SOT Regulatory and Safety Evaluation Specialty Section Best Paper of the Year Award. His work has earned him recognition in Who's Who in Medicine and Healthcare (2011-2012) and the Cambridge Certificate for Outstanding Medical Achievement (2012). He is also a member of the steering committee for the Conundrum of the PFOA Human Half-life international collaboration.

IL-50

Analytical Challenges in Food Safety and Quality

S. K. Raza and D. Mathur

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Food safety and quality are of utmost importance in the food industry, as they affect the health and wellbeing of the consumers. Food safety refers to the measures taken to prevent the contamination of food products, while food quality refers to the attributes of food products that affect their desirability and acceptability to consumers. While the food industry has made significant progress in ensuring food safety and quality, there are still many challenges that need to be addressed to maintain high standards. Food safety and quality are essential for several reasons. Firstly, contaminated food can cause foodborne illnesses that can lead to hospitalization and even death. According to the World Health Organization (WHO), foodborne illnesses affect millions of people every year, and an estimated 420,000 die from these illnesses. Secondly, food safety and quality are critical for the economic viability of the food industry. If a food product is contaminated, it can lead to recalls, legal actions, and damage to the brand's reputation, resulting in financial losses for the food company. Thirdly, food safety and quality are crucial for maintaining consumer confidence and trust. Consumers expect the food they purchase to be safe, nutritious, and of high quality. If they perceive that a food product is not meeting these expectations, they may switch to other brands or reduce their consumption of the product, leading to a decline in sales. Despite the importance of food safety and quality, there are several analytical challenges that make it difficult to achieve these goals. Some of the analytical challenges in ensuring food safety and quality are:

- Sampling including Sample Extraction, Sample Clean-up and Concentration;
- Methodology including Method Validation;
- Analytical Instrumentation; and
- Analyst

In order to ensure food safety and quality and overcome the analytical challenges there is need for the establishment of accredited testing laboratories as per ISO/IEC 17025 to undertake quality testing as per the regulatory requirements having state of the art analytical facilities with qualified and trained personnel.

ABOUT THE SPEAKER

Dr. S K Raza holds a Ph.D. in Chemistry from Aligarh Muslim University (AMU). He began his career at the Defence Research and Development Organisation (DRDO) in Gwalior in 1985, before serving as a Visiting Scientist at the University of London as a Nehru Centenary British Fellow in 1992-93. He later served as the Director of the Institute of Pesticide Formulation Technology (IPFT) under the Ministry of Chemicals and Fertilizers. Since 2020, he has been the CEO of FARE Labs Pvt. Ltd., Gurgaon. He has held significant leadership roles, including Chairperson of the Technical Committee on OECD Principles of GLP (2012-2016), Chairman of the Scientific Advisory Board (SAB) at NDTL, New Delhi (2024-), and member of the SAB and Research Review Committee of the OPCW (2014-2019). He was also part of the OPCW's Technical Working Group on SAB (2017-2019). Recognized for his contributions to science, Dr. Raza received the DRDE Scientist of the Year Award in 2006 and the Eminent Mass Spectrometrist Award from ISMAS in 2004. He has published 93 research papers, delivered over 100 invited talks, contributed 14 chapters in books, and holds 14 international and national patents.

IL-51

Day without night: The consequence of the illuminated night environment on behaviour and physiology in diurnal birds

Shalie Malik

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Natural light plays a crucial role in regulating the circadian rhythms of organisms, helping them align their physiological processes with the 24-hour day-night cycle. This synchronization, often referred to as entrainment, affects a range of biological functions such as sleep-wake cycles, hormone production (like melatonin and cortisol), metabolism, cognition, and even reproduction. However, in current times, the dark nights have become illuminated due to the presence of light at night (LAN), which negatively impact the behaviour and physiology of the organisms. In our laboratory, we have done several experiments on resident as well as migratory birds to demonstrate the impact of artificial light at night (ALAN). The results obtained demonstrate that ALAN alters the perception of daylength and affects the physiology and behaviour including endocrine, migratory behaviour, sleep-wake cycle, and metabolic function of these birds. The above findings can be extrapolated to understand the consequences of disruption of circadian clock functions which is detrimental to organismal health.

ABOUT THE SPEAKER

Dr. Shalie Malik is a Professor in the Department of Zoology at the University of Lucknow and is the Director of the Dr. Giri Lal Gupta Institute of Public Health & Public Affairs. She is a Visiting Scientist at Alabama State University, having visited in 2023 and 2018, and was awarded the prestigious UGC Raman Fellowship (2016-2017) to conduct research at Alabama State University. Additionally, she received the DST-DAAD exchange scholarship (2001-2002) for work at the Max-Planck Institute for Ornithology in Germany and the Indian Society of Chronomedicine Fellowship Award in 2022. Dr. Malik is currently the Vice President of the Indian Society for Chronobiology (2023-2025) and previously served as Treasurer (2019-2022). She has received multiple university awards for her contributions to Chronobiology and Seasonal Biology (2016-2023) and has published over seventy widely cited peer-reviewed articles. She has presented her research at numerous national and international conferences. Her research is funded by several organizations, including SERB, UGC, DST, CST, COE, and R&D (Govt. of U.P.). Dr. Malik's interests focus on how altered night environments, daily light, food availability, temperature, and social factors influence daily and seasonal behaviors regulated by endogenous clocks. Currently, her lab investigates the ecological impacts of artificial night lighting and anthropogenic noise on bird behavior and physiology.

IL-52

Laccase: enzyme for various industrial applications

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Laccases are industrially important enzymes due to several characteristics: a) they show broad specificity toward many substrates, such as phenolic and non-phenolic compounds; b) they are multicopper glycoproteins whereas covalently bound carbohydrate component contributes to higher stability of enzyme; c) they are isolated from many microorganisms, plants and insects where they have been shown to be involved in both anabolism and catabolism.

Laccases have been studied for various purposes, e.g. for the removal of environmental pollutants from soils and industrial effluents, they have been used as biocatalysts in green synthesis (e.g. polymer synthesis), for delignification in the pulp and paper industry, for the stabilization of wine and beverages or as ingredients in cosmetics. This work present: a) the results of the process development for laccase production by cultivation of Trametes versicolor under solid-state conditions on a variety of lignocellulosic substrates; b) application of laccase in oxidation of various phenolic compounds (phenol, catechol, L-DOPA, gallic acid, ...) to produce polymers in batch, repetitive batch and continuous systems (microreactors); c) application of free and immobilized laccase for aniline-based dye decolorization.

ABOUT THE SPEAKER

Dr Marina Tisma is a full professor of biotechnology at the University of Osijek, Faculty of Food Technology, Croatia. In 2022, she completed the Executive Programme of Circular Economy & Sustainability Strategies at Judge Business School, University of Cambridge, UK. Prior to her academic career, she worked in the malting and brewing industry. Her main research interest is valorization of lignocellulosic biomass for the production of high-value products with a focus on enzyme production through solid-state fermentation, enzyme reaction engineering, biogas and biodiesel production. In last 10 years she has led or collaborated in several research and development projects in the field of industrial biotechnology, four of which were funded by the European Union Structural Funds. She is currently working on two scientific projects: a) bilateral Slovenian-Croatian research project "Valorization of residues from the vegetable oil industry based on a biorefinery approach - VALREO", funded by the Slovenian Research and Innovation Agency and the Croatian Science Foundation, and b) Horizon Europe project "Bioeconomy excellence alliance for stimulating innovative and inclusive green transition – BEAMING". She is a reviewer for Horizon Europe projects and many national and international scientific projects and journals. She is a member of the Thematic Innovation Council for Food and Bioeconomy of the Republic of Croatia and initiator and head of the Postgraduate Specialist Studies Programme Sustainable and Circular Bioeconomy at the University of Osijek, Croatia. From 2024 she is Vice President of the Croatian Society of Biotechnology. She was awarded the President's International Fellowship Initiative (PIFI) for the year 2024 by the Chinese Academy of Sciences.

IL-53

Effects of diverse organic feed on microbiota dynamics in field-scale anaerobic digesters as revealed by metataxonomic and predictive metabolic function analysis

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The operational temperature and feed compositions are two critical parameters in determining the functional microbiota structure and influencing the biogas productivity of anaerobic digesters. Their impact is more significant on an industrial scale because of the volume and operational cost involved in the large-scale field anaerobic digesters. Understanding microbial dynamics and ecological niche because of parametric (temperature, pH, substrate variability etc.) variations is critical for efficient process management, improving the process stability and digestion efficiency of large field-scale anaerobic digesters. In this study, we studied seventeen field-scale digesters treating food waste leachate, municipal wastewater sludge (MWS), and manure at ten different locations in the Republic of Korea to determine how variations in feed composition, co-digestion of various substrates, and seasonal variation, affect compositional dynamics of the digester microbiota and consequently, the biogas productivity. The 16S rRNA metagene sequencing and predictive metabolic pathway profiling indicated substantial changes in the phylogenetic composition of the digester microbiota between digester types determined by the presence of MWS in the substrate ($p < 0.005$). The MWS and non-MWS substrate groups of the digesters showed a significant microbiota compositional divergence, with a high relative abundance of Firmicutes members and versatile organic matter-degrading genera in the non-MWS digesters, resulting in a considerably high biogas output. Acetoclastic methanogenesis was important in all the digester groups as suggested by predictive metabolic pathway profiling. This study suggested that metataxonomics and microbiota dynamics are good indicators of the process stability and efficiency across the parametric variations in field anaerobic digester systems.

ABOUT THE SPEAKER

Prof. Byong-Hun Jeon is an eminent scientist and educator, currently working as a full Professor at the Department of Earth Resources and Environmental Engineering, Hanyang University (HYU), South Korea. He holds a distinguished recognition of the 'Highly Cited Researcher (HCR-2023)' conferred by the ClarivateTM and has been consecutively placed in the World's Top 2% scientists' year wise and career wise list published by Standford University. He received his MS and Ph.D. degrees in Environmental Engineering at Pennsylvania State University, USA. His work broadly focuses on environmental biotechnology including bioenergy and bioremediation, biogeochemistry, and electrochemical applications employing 2D materials and Metal-Organic Framework (MOF). He has authored/co-authored over 500 publications (Citations 23,300; h-index 78) in peer-reviewed journals, 30 patents, 4 technology transfers, and 2 books. He was awarded the best Hanyang Professor award, chair of the reviewer's board for the National Research Foundation of Korea (NRF), and an outstanding researcher award in the field of international research at Hanyang University. Since 2018, he has been a member of the National Examination of Professional Engineers in the mining process in Korea.

IL-54

Treatment of landfill leachate using extracellular polymeric substances (EPS) and electrocoagulation (EC)

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Landfill leachate, a complex and highly contaminated wastewater, poses significant environmental challenges due to its high concentrations of organic and inorganic pollutants. This study examines a new landfill leachate treatment technology that uses electrocoagulation and microorganism-produced extracellular polymeric substances (EPS). EPS, known for its ability to adsorb and agglomerate particles, was used to selectively remove contaminants from leachates. Electrocoagulation was used to precipitate and remove suspended particles, heavy metals, and other pollutants. Measurements of chemical oxygen demand (COD), total suspended solids (TSS) and heavy metal concentrations were carried out after treatment using EPS and electrocoagulation. Tests were also performed by using a combination of EPS and chemical coagulants. Removal of nitrates and nitrites (85%) was higher with S-EPS alone as compared to the treatment combining S-EPS and FeSO4. However, COD removal (75%) was higher while using S-EPS combined with FeSO4 (compared to S-EPS alone). The combination of EPS and electrocoagulation surpassed individual treatments. EC process using Al electrodes at 2A, in combination with EPS, resulted in maximum removal of 92% of N-NH4 in 40 minutes of reaction time. The EPS increased tiny particle aggregation, creating larger flocs and increasing electrocoagulation contaminant removal. EPS combined with electrocoagulation could be the basis of a process to remove simultaneously organic and inorganic pollutants from different types of leachates (landfill leachates, composting leachates, etc.).

ABOUT THE SPEAKER

Dr Patrick Drogui is professor and researcher at the Institut national de la recherche scientifique's Centre Eau Terre Environnement in Canada. He is an internationally recognized expert in electrochemical and membrane technologies, and oxidative processes for different applications in water treatment from industrial wastewater to potable water. His research interests include decentralized sanitation and sustainable water management concepts (in rural, urban and peri-urban areas), by focusing on removal at the source of refractory emerging pollutants, wastewater re-use and nutrient recovery, etc. He has more than 288 articles published, 55 book chapters, 4 books and co-author of 8 patents.

IL-55

Tolerance and biodegradation of high concentration of phenol by a bacterial consortium enriched from the Hurricane Ida sediments.

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The purpose of this study was to measure the efficiency of a bacterial consortium's ability to degrade high concentration of phenol. The consortium was obtained from sediment that was deposited on the residential properties in southeastern Louisiana after Hurricane Ida in August 2021. A bacterial consortium was developed through an enrichment technique which used phenol as the sole carbon source. Phenol degradation followed concentration gradient. The consortium was able to remove more than 95% of phenol within 14 days when the phenol concentration was 100 mg/L. However, phenol degradation efficiency decreased when the phenol concentration was increased in the culture medium. The consortium removed 30% of phenol at the highest concentration tested, 1,000 mg/L. The consortium was dominated by three distinct phyla and nine distinct genera. The dominant phylum was represented by proteobacteria and the dominant genus in the consortium was Shigella. The consortium removed phenol via β-ketoadipate pathway with the production of the following metabolites, cis,cis-muconic acid, succinate, and fumarate. The novelty of this study was the high tolerance of phenol concentration of 1,000 mg/L by the bacterial consortium and its ability to degrade phenol without a lag phase. This is one of the highest phenol concentrations reported in the literature.

ABOUT THE SPEAKER

Dr Ramaraj Boopathy is an Alcee Fortier Distinguished Service Professor of biological sciences at the Nicholls State University, USA. He received the Jerry Ledet Foundation Endowed Professorship in Environmental Biology in 2002 and John Brady Endowed Professorship in 2012. In 2008, Dr. Raj Boopathy received the Nicholls State University's Presidential Award for Teaching Excellence. He has research experience in the area of bioremediation and bio-processing. Dr. Raj Boopathy reviewed research grants for National Science Foundation, Department of Defense, US Environmental Protection Agency, Department of Energy, and numerous private agencies etc. He is the editor of the journal, Environmental Quality Management, Current Pollution Reports, Applied Nano, and Applied Sciences (Section, Environmental and Sustainable Science and Technology). Dr. Raj Boopathy received Fulbright scholarship and also received European Union-US biotechnology Fellowship and Leverhulme commonwealth fellowship. He has been elected as a Fellow of various societies including International Union of Pure and Applied Chemistry (IUPAC), Society for Industrial Microbiology and Biotechnology (SIMB) and the International Forum on Bioprocessing (IFBioP).

IL-56

Estrogen receptors mediated osteogenic role of promising phytochemicals

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Postmenopausal osteoporosis in women is a metabolic pathological condition occurs due to deficiency of estrogen and resulting in low bone mineral density, induced fracture risk which further affects the working ability, loss of independence and life expectancy. Estrogen deficiency causes imbalance of homeostasis in differentiation, proliferation and apoptosis of osteoblastic and further osteoclastic functions leading to osteoporosis. Most common available treatments for osteoporosis viz. estrogen replacement therapy, selective estrogen receptor modulators (SERMs), bisphosphonates, calcitonin etc. have multiple side effects. Therefore, efforts require to find out alternate safe therapeutic agents for the treatment of osteoporosis. Studies suggest that some promising phytochemicals having ability to mediate estrogen receptors ERα and ERβ and exhibit osteogenic properties by modulating regulatory markers ALP, BMP-2, osteocalcin, osteopontin, Runx-2, TGF-β1, TRAP and cathepsin K in osteoblast and osteoclast cells. Phytochemicals genistein, daidzein, resveratrol etc. exhibit osteogenic property by modulating estrogen receptors via triggering osteoblastic maturation and expression of osteogenic genes. Studies on animal models support anti-osteoporotic potential of selected promising phytochemicals via inducing bone forming markers in serum viz. bone specific ALP, osteocalcin, osteopontin and bone mineral density (BMD).

ABOUT THE SPEAKER

Dr. Md. Arshad is presently working as professor in the department of Zoology, AMU, Aligarh. Thrust area of his research is endocrinology and bone cell biology. His research focuses on hormonal regulation of bone metabolism, cellular and molecular mechanism of bone remodeling, cross talk of bone and cartilage cells, characterization of promising therapeutics for postmenopausal osteoporosis, diabetic osteopathy, osteoarthritis and endocrine cancer. Dr. Arshad has published more than a hundred research articles in journals of national and international repute and edited four books. He has been a Principal investigator/Co-investigator of several major research projects funded by the DST, ICMR, UGC and UP-CST. He is life member of several scientific society and review editor and reviewer of many journals of high repute.

IL-57

Novel Mechanistic Insights into Non-Alcoholic Fatty Liver Disease Development

Mohan Kamthan

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Non Alcoholic Fatty Liver disease (NAFLD) is a chronic disorder where there is excessive deposition of lipids in the liver without any history of alcohol abuse. Appallingly, despite its prevalence and serious consequences, no direct medicinal remedies are available for the treatment of fatty liver. Very recently using in vitro and in vivo approaches our group has shown that downregulation of sorcin, a cytosolic adaptor partner of ChREBP causes nuclear transactivation of ChREBP leading to dysregulated hepatic lipogenesis. We offer proof of an unidentified connection between elevated DNL and nuclear factor kappa-light chain enhancer of activated B cells (NF-κB) activation. Our findings suggest that a high-carb diet/heavy metals can suppress sorcin transcript levels, a cytosolic interaction partner of ChREBP, and enforce nuclear shuttling of hepatic NF-κB p65. In vitro and in vivo, increased DNL and intrahepatic lipid accumulation resulted from reduced sorcin levels, triggering ChREBP nuclear translocation. We also demonstrate that pharmacological inhibition of NF-κB hindered ChREBP nuclear translocation, which in turn reduced hepatic lipid accumulation in vitro and in vivo by reversing sorcin repression induced by a high-carb diet. Furthermore, sorcin knockdown reduced the NF-κB inhibitor's capacity to lower lipids in vitro. All of these findings point to a hitherto unidentified function of NF-κB in controlling ChREBP nuclear localisation and activation in response to a high-carb diet, which may be investigated further in the development of NAFLD treatment lines.

ABOUT THE SPEAKER

Dr. Mohan Kamthan is an Assistant Professor at the School of Chemical and Life Sciences, Jamia Hamdard, New Delhi. He has a strong background in metabolism, toxicology, microbiology, and clinical biochemistry. He earned his Ph.D. from Jawaharlal Nehru University, New Delhi, in 2011 and holds an Advanced PG Diploma in Bioinformatics from the University of Hyderabad, where he achieved first position. His research focuses on the molecular mechanisms underlying metabolic syndrome and metal detoxification. He has previously held roles such as Chief Program Manager for the JV-CSIR-IITR/SSMED project on biomedical waste disinfection and Quick-hire Scientist at CSIR-Indian Institute of Toxicology Research, where he studied the effects of heavy metals on gut microflora and insulin intolerance in mice. He has contributed to significant research publications in peer-reviewed journals with high impact factors, including work on heavy metal-induced systemic inflammation, lipid metabolism, and histone regulation. Dr. Kamthan has ongoing projects funded by DHR and SERB-CRG. He has received several honors, including the CSIR Senior Research Associate award and the National Eligibility Test (NET) qualification. He has published over 20 research papers and contributed to multiple patents, and his research is widely cited in the scientific community.

IL-58

Public health Improvement through Aromatics: Aroma to therapeutics

N. P. Yadav

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Aromatics (essential oils) and aroma molecules have been used as remedies since ancient times for the treatment of numerous illnesses on account of their wide range of biological activities. Aromatherapy utilizes essential oils for therapeutic purposes, promoting well-being and relaxation. The volatile compounds present in essential oils, such as ketones, aldehydes, and aromatic compounds, play crucial roles in aromatherapy by reducing mental and physical stresses when inhaled. Essential oils find applications in various therapeutic purposes, including massage aromatherapy, psychoaromatherapy, and olfactory aromatherapy. Traditional Chinese medicine incorporates aromatic substances to balance energy and treat ailments. Ayurvedic medicine in India employs aromatic plants and oils for healing and spiritual purposes. Recent pre-clinical and clinical studies have shown varying pharmacological responses in the nervous system leading to anxiolytic, antidepressant, sedative, and anticonvulsant effects.

Council of Scientific and Industrial Research (CSIR) under AROMA MISSION is working nation-wide for the promotion of cultivation, processing, entrepreneurship development and value addition of aromatic crops and aroma molecules. CSIR-CIMAP as the nodal lab for AROMA MISSION has developed new varieties of aroma crops and promoted its cultivation among the farmers for income enhancement. Additionally, 20 sustainable clusters of tribal farmers have been developed in different parts of the country like Anamalai Tiger Reserve (Tamilnadu), Dudhwa Tiger Reserve (Uttar Pradesh), Malgaon (Chhattisgarh) and Majuli (Assam) etc. The life of these tribal communities has been improving significantly through cultivation of high valued aromatic crops using agricultural practices developed by CSIR-CIMAP.

CSIR-CIMAP has also developed various drug leads based on aromatics. CSIR-CIMAP has filed an Indian patent to utilize the lavender oil based leads for the treatment of psoriasis. Similarly, essential oil based polymeric beads have been utilized for the mosquito larvicidal action and filed an Indian patent and licensed the technology for its commercialization. A number of formulations have been developed by CSIR-CIMAP based on essential oils for their utilization in pain, hair-care, aroma-therapy, skin-care, acne and protection against mosquitoes to improve the public health and well-being of humans

ABOUT THE SPEAKER

Dr. N. P. Yadav is a Senior Principal Scientist at CSIR-Central Institute of Medicinal and Aromatic Plants, Lucknow (U.P.) India. He has done Ph. D. in Pharmaceutical Sciences from Dr. H. S. Gour University, Sagar (M. P.) and Post Doc in Drug Delivery/Nanomedicine from Northeastern University, Boston, USA. He is working in the area of Phytopharmacology and Herbal formulation development from last 20 years and developed herbal formulations which also have been licensed to Industry. For his contribution in the area of Herbal Drug Technology, recently Dr. Yadav has been awarded prestigious ICMR Prize for Biomedical Research Scientist. His areas of research are diabetes, psoriasis, hepatoprotection and wound healing. He has published more than 70 papers in peer reviewed Journals of National and International repute. Dr. Yadav was awarded ICMR International Fellowship for one year to work in Boston, USA. He also has been awarded with outstanding research publication award as team leader by CSIR-CIMAP, Best Paper award by Academy of Pharmaceutical Sciences, Great Britain, Technology award in appreciation of preparing know how of Mosquito Repellent Cream, which has been licensed to Industry. He has four patents to his credit. He is the life member of many scientific societies. He has presented his work in more than 50 National and International conferences/seminars.

IL-59

Toxico-epigenetic approach to understanding Renal Dysfunction: Potential Facet for Early Risk Assessment of Chronic Kidney Disease

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The incidence of chronic kidney disease (CKD) is expanding worldwide and becoming a major global health burden irrespective of age. Toxicants exposure during early development could endow the risk of renal dysfunction by dynamic rewiring of epigenetic makeup during the kidney development. Presently, we assessed the impact of prenatal arsenic exposure on the Balb/c mice development, renal dysfunction and epigenetic alterations in the offsprings. The association of mouse model data and human arsenic exposed populations data were analyzed by meta-analysis. The morphological alterations in the uterine horn and reduced embryo's number were observed for arsenic exposed dams. Increased thickening of tubular region of kidney tissue at six weeks suggested the early progression of CKD. The differential expression of kidney development genes, inflammatory genes as well as epigenetic modifiers were observed. The meta-analysis of the differential expressed genes (n-708) of prenatal arsenic exposed huma populations for fetal and adult kidney tissue were performed using Python, visual studio code and WashU Epigenome database. The TNF-α, the cytokine-receptor interaction and NF-kappa B signaling pathways were activated. Adult human kidney tissues exhibit greater variability of histone modifications (e.g., H3K36me3, H3K4me3) compared to fetal kidney tissues at the upstream regulatory regions. Higher fold change in histone modifications in fetal kidney upstream regions suggest more active chromatin and gene transcription in fetal tissues. Activating marks (H3K36me3, H3K4me3) showed higher enrichment as compared to repressive histone mark (H3K9me3). Further, we validated the decreased enrichment of Polycomb repressive complex 2 (PRC2) member EED and H3K9me3 mark at the upstream of the inflammatory genes (TNF- α signaling pathway). The higher expression of the inflammatory genes suggests the gene specific selective nature of EED repression which was also associated with increased binding of the activator KDM4c (demethylase). This study encapsulated the effect of prenatal arsenic exposure on kidney dysfunction, their epigenetic regulation and potential epigenetic targets in therapeutics.

ABOUT THE SPEAKER

Dr. Vineeta Sharma is an Associate Professor at Manav Rachna International Institute, Faridabad. Expert in Epigenetics, Genetics, Toxicology, and Translational Research. Researches Environment-Epigenome interactions' impact on human health. 10+ years experience in academics and research. Published in reputed journals. Recognized as 365 Women in STEM . Awardee of DST-Women Scientist, DBT-Research Associateship. International travel grants from CSIR, DBT. Mentor for Biotech startup ALIGNTRACK.

IL-60

Renewable Stem Cells & Their Extracellular Products as Screening Platforms for Toxicological Studies

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The application of stem cells in toxicological screening represents a groundbreaking shift in how chemical safety and efficacy are evaluated. This approach leverages the unique properties of stem cells, including their pluripotency and ability to differentiate into various cell types, to create in vitro models that accurately reflect human biological systems. These models offer a significant advantage over traditional animal testing, both in terms of ethical considerations and scientific precision. Renewable stem cells enable the development of high-throughput screening platforms, which can assess the impact of numerous toxicants on various cellular systems simultaneously. By differentiating stem cells into specific tissue types—such as cardiomyocytes, hepatocytes, or neurons—researchers can study the effects of chemicals on distinct organ systems and cellular functions. This not only reduces the need for animal testing but also enhances the relevance of the findings to human health. Additionally, these advanced models allow for the investigation of toxicological mechanisms at a molecular level, facilitating the identification of biomarkers for exposure and adverse effects. The capacity to generate patient—specific or genetically modified stem cells further personalizes toxicological assessments, paving the way for tailored safety evaluations and more precise therapeutic interventions. Extracellular products of stem cell such as micro vesicles, exosomes put them at the center stage. These are increasingly becoming vital in toxicological studies due to their unique properties. They serve as biomarkers for detecting toxic responses, reflecting cellular states through their molecular content. By analyzing these vesicles, researchers can gain mechanistic insights into toxin effects, such as oxidative stress and inflammation. They are also useful in drug development for screening potential toxicities and accelerating safety assessments. Moreover, they help model toxicity in vitro and assess individual responses in personalized toxicology. In regenerative medicine, they evaluate the safety of therapeutic materials, enhancing overall research and safety evaluations.

ABOUT THE SPEAKER

Dr Dipak Kumar is a Senior Assistant Professor in the Department of Zoology, Munger University, Dr Kumar holds a PhD in Science from the Academy of Scientific and Innovative Research (AcSIR) at CSIR-IITR, Lucknow, India. With extensive experience in toxicology and stem cell biology, Dr Kumar's research has contributed to understanding the cellular mechanisms involved in neurodegenerative diseases and developmental neurotoxicity. He has conducted advanced studies on stem cells, including human hematopoietic stem cells (hHSCs), mesenchymal stem cells (hMSCs), and induced pluripotent stem cells (iPSCs). Dr Kumar has earned recognition for his research and contributions, including the Young Scientist STOX Gold Medal from the Society of Toxicology, India.

IL-61

Need of point-of-care testing (POCT) devices to assess drug concentration: Clinician's perspective

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Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, India

Point-of-Care Testing (POCT) devices in healthcare are having aims to provide rapid and real-time test results at the site of patient care. These devices are easy to operate, typically by clinical personnel whose primary training is not in the clinical laboratory sciences. Despite the continued advancement in POCT devices, therapeutic drug monitoring (TDM) has been limited due to challenges with available techniques, which include chromatographic strategies that may be coupled with immunoassays or other detection methods. These laboratory devices are large, expensive and requires significant infrastructure.

In clinical practice, TDM is required to optimize dosing to target a therapeutic plasma drug concentration while minimizing toxicity. TDM is being suggested for the drugs which have either one or more of the following: known relationship between dose and blood/serum/plasma concentration, narrow therapeutic window, high patient variability in pharmacokinetics, potential for severe adverse effects. The common drugs for which TDM is suggested are: antibiotics (like amikacin, gentamicin, teicoplanin, vancomycin), antiepileptics (like carbamazepine, phenytoin, valproic acid), antiarrhythmics (like digoxin, amiodarone, lidocaine), bronchodilator (like theophylline), immunosuppressants (ciclosporin, tacrolimus, mycophenolate mofetil), anti-cancer (like all cytotoxins, methotrexate), pshychotropic drug (like lithium) etc.

In the current era of intelligent POCT, there is need of newer advancement in TDM, which might include mobile mass spectrometry, electrochemical or optical based detection method devices.

ABOUT THE SPEAKER

Dr Mohan Gurjar is a distinguished Professor in the Department of Critical Care Medicine at Sanjay Gandhi Postgraduate Institute of Medical Sciences, Lucknow, India, where he has been serving since 2005. He is a medical doctor with an MD in Anaesthesiology, and a PDCC in Critical Care Medicine. With nearly 20 years of teaching experience, he has contributed significantly to the field of critical care, having authored over 210 research publications and has also edited key textbooks, including Textbook of Ventilation, Fluids, Electrolytes and Blood Gases and Manual of ICU Procedures. In addition to his academic and clinical work, Dr. Gurjar is an innovator, holding a patent for an Automated Subglottic Aspiration Device, developed in collaboration with the Indian Institute of Technology (IIT), Kanpur.

IL-62

DNA targeted drug development based on repurposing remodeling against cancer

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DNA has been considered as the therapeutic target for the anticancer drug development. Drug repurposing is a strategy of using existing drugs to identify new therapeutic use. This technique brings the drugs with established safety directly to preclinical and clinical trials and thus reduces risk of failure and cost effective. The objective is to develop different novel DNA targeting molecules utilizing known compound of having FDI approved clinical drug followed by remodeling with DNA-targeting moiety, and validate their anticancer activity through in vitro and in vivo studies.

A series of naphthalimide and phenothiazine DNA targeting moiety have used in the conjugation with anti-malarial drug artesunate and antibiotics norfloxacin. The synthesized molecules have been screened through in vitro lymphoma cell line and anti tumor activity was reported against DL-induced solid tumor. Through DNA binding studies we observed that the compounds were intercalated with DNA. Tumoricidal effects of the synthesized compound were performed against DL and RAJI cell line with significant results observed in DL. The FITC attached molecule showed higher uptake at lower concentration. Significant reduction in tumor volume, metastasis and increased overall life span with the use of synthesized compounds in DL-induced BALB/c. The hybrid drug is a new aspect in lymphoma treatment with broad range of tumoricidal properties including low toxicity and enhanced survival and prevention of metastasis.

ABOUT THE SPEAKER

Dr Ugir Hossain Sk is a highly accomplished scientist with extensive experience in the fields of chemistry, chemical biology, and drug delivery systems, particularly in cancer therapeutics. He completed his Ph.D. at Jadavpur University, Kolkata, India. He has also gained international exposure as a Visiting Researcher at Osaka Prefecture University, Japan, and as a Postdoctoral Research Associate at Penn State Hershey College of Medicine and Wayne State University, USA. Prior to his current role as a Senior Scientific Officer at Chittaranjan National Cancer Institute (CNCI), Kolkata, he has served as a Quick Hire Scientist Fellow at CSIR-Institute of Himalayan Bioresource Technology, Palampur, India. With over a decade of research leadership, Dr. Hossain has been involved in pioneering work in nanotechnology-based drug delivery systems, including the development of targeted and stimuli-responsive systems for cancer treatment. He has published close to 50 papers. His ongoing projects include developing novel drug delivery nanocarriers for cancer treatment and exploring new therapeutic strategies for liver cancer and breast cancer.

IL-63

Introduction to lifestyle diseases

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The rising prevalence of metabolic and dietary disorders poses significant global health challenges, contributing to morbidity and mortality worldwide. Conditions such as coronary artery disease (CAD), obesity, non-alcoholic fatty liver disease (NAFLD), and lactose intolerance are particularly concerning due to their shared risk factors and interconnected pathophysiology. CAD, responsible for 17.9 million deaths annually worldwide, has shown a troubling rise in India, with prevalence rates reaching 10–14% in urban areas and 5–7% in rural populations.

Obesity, a major risk factor for several non-communicable diseases, affects over 40% of urban Indians and is increasingly prevalent in rural areas. Key contributors include sedentary lifestyles, high-calorie diets, and urbanization. Closely tied to obesity is NAFLD, which affects 25–30% of the general Indian population and up to 60% of individuals with diabetes or metabolic syndrome. NAFLD exacerbates systemic inflammation and metabolic dysfunction, increasing the risk of cardiovascular disease. Lactose intolerance, prevalent in 60–70% of the Indian population, also shapes health outcomes by influencing dietary patterns. Reduced consumption of dairy products often leads to calcium and vitamin D deficiencies, indirectly affecting bone health and metabolic homeostasis. This condition is often overlooked in public health discourse but remains a significant factor in dietary imbalances.

Key shared risk factors among these conditions include physical inactivity, unhealthy diets high in processed foods and trans fats, smoking, excessive alcohol consumption, and genetic predisposition. These factors interact synergistically, amplifying the burden of metabolic disorders. By understanding these relationships, the study highlights the need for integrated public health strategies to address these interconnected challenges.

ABOUT THE SPEAKER

Dr Suchit Swaroop is Associate Professor in the Department of Zoology, University of Lucknow, India, where he is heading The Experimental and Public Health Lab. He majorly works on the Epidemiological and Biochemical aspects of different Lifestyle/Metabolic, Infectious and Non-infectious diseases. He has done his Doctorate (Ph.D.) from Sanjay Gandhi Post Graduate Institute of Medical Sciences Lucknow, and has served in various CSIR and other research institutes like IITR, CDRI, BSIP and K.G.M.U in different capacities. With more than 20 years of Research & Teaching experience, he has run Research projects of different funding agencies like UGC (Delhi), Centre of Excellence (Govt. of UP), Research and Development (Govt. of UP) and has several research papers in reputed National and International Journals to his credit. He has also been a faculty in the Girilal Gupta Institute of Public Health and Nutrition, New Campus, University of Lucknow.

IL-64

Exploration of diverse ecological niches for genes to gene products and their benevolence to society

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The objective of our research is to explore the diverse ecological niches for the discovery and characterization of novel gene encoding stable and efficient biocatalysts, which can be employed for enzymatic transformation of low-cost feedstocks into functional biomolecules of rare occurrence in nature, is a demand of present day. The present lifestyle and dietary habits have generated many health-related risks in society, such as obesity, type 2 diabetes, which subsequently give rise several health-related issues. Sugar molecules with health beneficial functions and low glycemic response are gaining attention due to their applications in food and pharmaceutical sectors. Our group has generated metagenomic resources from the extreme habitats and subsequently novel genes encoding promising enzyme systems have been discovered and characterized, such as D-allulose 3-epimerase, amylosucrase, and trehalose synthase. These enzymes are useful in enzymatic production of rare sugar molecules, such as D-allulose, turanose, trehalose, and trehalulose.

ABOUT THE SPEAKER

Professor Sudhir Pratap Singh is currently Head, Department of Industrial Biotechnology, Gujarat Biotechnology University (DST, Govt. of Gujarat), Gandhinagar, Gujarat, India. The focus of his research is gene mining, biocatalyst engineering and characterization to produce high-value rare sugar and functional biomolecules, such as D-allulose, trehalose, turanose, prebiotic oligosaccharides, resistant starch, etc. Prof. Singh has published more than 75 research articles in SCI journals, 07 review papers, 09 books (edited), and 12 granted patents to his credit. The scientific contributions of Prof. Singh have been recognized by several prestigious scientific honours: TATA Innovation Fellowship by DBT, Govt. of India; INSA Associate Fellowship by Indian National Science Academy; Professor Hira Lal Chakravarty Award by the Indian Science Congress Association, DST, Govt. of India. His team has been awarded the Gandhian Young Technological Innovation Award by the SRISTI (Society for Research and Initiatives for Sustainable Technologies and Institutions), India. Prof. SB Chincholakar Award and SBS-MKU Genomics Award by Biotech Research Society, India; and Young Scientist Award International Bioprocessing Association, France. Prof. Singh is an elected Fellow of the National Academy of Agricultural Sciences (FNAAS) and the International Society of Energy, Environment, and Sustainability (FISEES).

IL-65

From Ingredients to Insights: Leveraging Large Language Models for Innovation in Food and Agriculture

Rishemjit Kaur

CSIR-Central Scientific Instruments Organisation, Chandigarh.

Large Language Models (LLMs) are revolutionizing how we tackle complex challenges, including personalized nutrition and food substitution. With their vast contextual understanding, LLMs can address the multifaceted aspects of dietary choices, encompassing not only nutritional needs but also taste preferences, cultural traditions, religious practices, and ingredient availability. These advanced models, combined with machine learning techniques and crowd-sourced data, enable a deeper exploration of food systems and their intricate dynamics.In this work, we focus on developing food recommendation algorithms specifically tailored to the Indian population. By leveraging LLMs, machine learning, and crowd-sourced insights, we integrate diverse factors to create recommendations that align with individual health goals while respecting cultural authenticity. Our approach also involves the construction of comprehensive food-nutrient databases and the development of an annotated data (anndata) portal.

ABOUT THE SPEAKER

Dr Rishemjit Kaur is working as a Principal Scientist at CSIR-Central Scientific Instruments Organisation, Chandigarh in the area of artificial intelligence and big data analytics. Her research involves understanding and modeling social phenomena by developing agent-based models and natural language processing techniques for social good (mostly in the domain of agriculture, nutrition and food). She is working on the development of large language models for Indian farmers in local languages. She has worked with several private companies for consultancy and collaborative projects. She is a member of NASI and Indian National Young Academy of Sciences (INYAS). She is also a recipient of BRICS Young Scientist, Japanese Govt MEXT fellowship and IEI young Engineer award.

IL-66

Stored grain insect management: Current scenario and future prospects

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Food and nutrition security are the major concern of developing countries. In India, loss of food grains during storage conditions, accounts to 4.5 to 6%, of its total grain production. Stored grain insect management needs highly selective approach and requires application of curative fumigants and prophylactic agents. Since 2020 many prophylactic agents such as Dichlorvos, Malathion for prevention of stored grain insect pests are banned in India. However, application of these chemical insecticides is quite challenging. In addition, over reliance of phosphine-fumigant had increased the concerns of *rph1*, *rph2* resistance development in most of the stored grain insect pests (*Sitophilus, Tribolium, Rhyzopertha*). At present, due to limited availability and impositions on usage of conventional insecticide, there is a need for deployment of safe and selective insecticides for the management of stored grains. Considering the above facts, management of stored grain insect pests need appropriate storage system, which is economically viable and environmentally safe. In this context, new storage methods need to be explored for feasible storage of food grains which includes Bin/silo storage, hermetic storage, biofumigation systems and modified atmospheric storage as an improved technique for efficient storage of food grains, providing an effective protection from majority of the stored grain insect pests.

ABOUT THE SPEAKER

Dr C.S. Vivek Babu is a Principal Scientist at the CSIR-Central Food Technological Research Institute (CSIR-CFTRI) in Mysuru, Karnataka, specializing in food protection, infestation control, and mitigation of mycotoxins in food grains. His research focuses on the development of novel biorational fumigants for stored grain insect management, hermetic storage methods for millets, and approaches to reduce mycotoxins like aflatoxins in food grains. He has a robust career spanning over two decades, with previous roles including Senior Scientist at CIMAP Research Center, Bangalore, Associate Scientist at ITC Corporate R&D, and postdoctoral research at the Indian Institute of Science, Bangalore. He serves as a member of several prestigious scientific committees, including the Food Safety and Standards Authority of India (FSSAI) and the Bureau of Indian Standards (BIS). He has multiple publications and several patents, including compositions for insecticide production and plant protection, to his credit. He is also involved in product development, with several herbal sanitizers and disinfectants that have been successfully transferred to industry. Dr. Babu is recognized for his contributions to food safety, pest management in storage, and the development of innovative technologies for the food industry.

IL-67

AI-Powered Toxicity Prediction: Transforming Chemical Risk Assessment with Machine Learning Models

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In the current era of chemical innovation, ensuring the safety of chemicals through accurate toxicity prediction is critical. Traditional toxicity assessment methods, such as laboratory experiments and animal testing, are often time-consuming, expensive, and ethically challenging. Emergence of Artificial Intelligence (AI), particularly Machine Learning (ML) models, has transformed toxicity prediction by offering faster, more efficient, and more accurate approaches. These models analyze extensive datasets of chemical properties and biological outcomes to identify patterns that might be overlooked by humans. Advanced ML techniques, including deep learning, random forests, and support vector machines etc, have demonstrated the ability to predict chemical toxicity with high accuracy, sometimes surpassing traditional methods. AI-powered toxicity prediction enhances chemical risk assessment by enabling real-time screening of new compounds. ML models can assess thousands of chemicals simultaneously, evaluating potential hazards such as carcinogenicity, genotoxicity, and organ toxicity. As these models continuously learn from new data, they refine their predictive capabilities, making chemical risk assessments more dynamic and data-driven. Advantages of AI-based toxicity prediction are numerous. AI models offer faster predictions, evaluating chemical risks in a fraction of time compared to traditional methods. They are cost-effective, reducing reliance on expensive laboratory tests and minimizing animal testing. Furthermore, AI models are highly accurate, and capable of identifying potential risks early in the development cycle. Additionally, AI models help predict environmental impact of chemicals, assisting in regulatory decisions that can prevent harmful pollutants. Despite its potential, AI-based toxicity prediction faces challenges such as data availability, model interpretability, and regulatory acceptance. However, with the continuous generation of data and the development of explainable AI, integration of AI into chemical risk assessment will likely expand, shaping the future of chemical safety.

ABOUT THE SPEAKER

Dr. Prachi Srivastava is an Associate Professor at Amity Institute of Biotechnology, Amity University, Uttar Pradesh, Lucknow, with over 25 years of experience in teaching and research. She is a leading expert in bioinformatics, specializing in gene identification, genomic data analysis, and neurological studies, with over 100 published research papers.

Dr. Srivastava has organized and chaired numerous conferences and seminars, earning prestigious awards such as the JNS Award and the Progressive U.P. Award 2021. As a dedicated mentor, she has guided many students to achieve national and international recognition. Her extensive contributions to biotechnology and bioinformatics continue to inspire and advance the field.

IL-68

Computational methods/models for the development of Digital Interfaces and Predictive Toxicology (DIPTox)

Vaibhav A. Dixit

Department of Medicinal Chemistry, NIPER Guwahati.

Despite multiple advances in experimental toxicology, drugs (old/new) continue to exhibit toxic responses during the treatment of various diseases/disorders. These toxic responses often force dose/freq reduction, change in routes of administration, withdrawal, and prescribing alternatives all reducing efficacy. Other times, alternatives are not available, or toxicity is beyond repair causing serious damage to vital organs (liver, heart, brain, kidney etc) eventually precipitating into multiple organ failures or death. Many studies have shown that drug metabolism is the root cause of toxicity. Thus, novel methods are continuously sought to improve drug metabolism and toxicity predictions.

In this talk, for student benefit, I will start by defining basic concepts like modeling, informatics, AI/ML, medicinal chemistry, and toxicity mechanisms. A novel, drug toxicity index (DTI), will be introduced followed by its applications in Liver toxicity predictions, drug discovery and clinical toxicity. Later, I will showcase SOS Predictor, a drug metabolism prediction software and web tool, developed for Phase II SULT-mediated metabolism. Green chemistry has recently been advocated for reducing environmental impacts and toxicity. Our recent work on the development of novel green chemistry metrics: Cumulative Green Chemistry Principle (CGCP score) will also be discussed.

ABOUT THE SPEAKER

Dr. Vaibhav A. Dixit earned his Ph.D. from NIPER SAS Nagar (Mohali) in 2012, followed by a postdoctoral stint at IISc Bangalore under Prof. Mugesh. He then moved to AstraZeneca, UK (2013-2015), where he worked on the design of novel azaborole heterocycles. Dr. Dixit's academic career advanced with his move to SVKM's NMIMS, where he began research in drug metabolism and toxicity prediction, later continuing this work at BITS Pilani with funding from RSC, NSM, DST, and IIT Delhi. In 2021, he joined NIPER Guwahati, where his research expanded into anti-cancer drug design and machine learning-based methodologies. Dr. Dixit specializes in drug metabolism, toxicity predictions, and medicinal chemistry, using tools like computational chemistry, quantum mechanics, QSAR, machine learning, and molecular modeling. His work focuses on understanding the chemistry and biochemistry of Phase I and II drug-metabolizing enzymes, particularly cytochrome P450 (CYP450) and sulphotransferase (SULT), using density functional theory (DFT) and other advanced modeling techniques to predict metabolic pathways and selectivities. He has published extensively in high-impact journals and developed key methodologies, including a Drug Toxicity Index (DTI) for hepatotoxicity prediction and machine learning models for anticancer activity. His current funded projects focus on Phase II drug metabolism prediction models, reorganization energies for CYP450-catalyzed reactions, and the development of accurate anticancer predictive models. Dr. Dixit's innovative approach combines computational and machine learning techniques to improve drug safety and efficacy assessments.

IL-69

Steps and methods for the development of an epidemiological risk score for early prediction of outcomes: A discussion through a published article

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Epidemiological risk scores play an important role in evidence-based medicine as it can be developed using symptoms, co-morbidities and other factors that are commonly known to patients. Diagnostic investigations on the other hand are time consuming and or invasive and it is difficult to wait for their results especially in an emergency. In the present discussion, the steps and research methods involved in the development of an epidemiological risk scoring system are discussed. Demographic variables such as age, sex, clinical symptoms and comorbidities were used to develop a risk score for early prediction of outcomes. Higher scores indicate greater risk with good discrimination quality demonstrated by the area under the receiver operating characteristic curve (AUROC). Multivariable binary logistic regression and cluster analysis were used to develop and stratify risk severity of study patients. Clinical characteristics including older age of the patient, breathlessness, diabetes and other co-morbidities were the primary independent predictors of outcomes. The risk score showed good sensitivity and specificity, and an admirable overall diagnostic accuracy and similar results were also found in the validation group. The risk score shows a confident relationship between a higher score and proportion of event of interest, indicates it is useful for the prediction of risk of event in patients at an early stage.

ABOUT THE SPEAKER

Dr. Prabhaker Mishra is presently serving as Additional Professor at Department of Biostatistics and Health Informatics, Sanjay Gandhi Post Graduate Institute of Medical Sciences, Lucknow, India. He completed his doctorate (PhD) degree from Utkal University, Bhubaneswar (India). He has received prestigious fellowship "Senior Research Fellowship" from Indian Council of Medical Sciences, New Delhi, India during pursuing his PhD. He is the author of more than 300 peer review publications, including original papers, reviews, systematic review and meta-analysis. Two PhD student is working under his supervision whereas another Five PhD students are working under his co-supervision. More than 100 MD and DNB students are either completed or working under his co-supervision. Despite this, he is part of many research projects of DM/MCh students. He is co-investigators in 08 ongoing intramural & 4 Extramural researchs project. His working area is applied statistics / biostatistics/Epidemiology.

IL-70

Exploring Phytochemicals as Novel MTH1 Inhibitors: A New Approach in Oxidative Stress and Toxicity Management:

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MTH1 plays a pivotal role in protecting cells from oxidative damage, preserving DNA integrity, and supporting survival under oxidative stress. Tumor cells, often exposed to heightened oxidative conditions, rely heavily on MTH1 to manage the increased load of oxidized nucleotides, aiding their survival and proliferation. Elevated MTH1 levels have been linked to protection against various diseases, including cardiovascular, neurological, and inflammation-related disorders. In this study, MTH1 was selected as a drug target for oxidative stress management, with a focus on identifying potential phytochemical inhibitors. Using molecular docking and virtual screening, natural compounds from the IMPPAT library were screened to explore their inhibitory potential against MTH1. Among 18,000 compounds, rigorous filtering based on the Lipinski rule, ADMET properties, and molecular dynamics simulations led to the identification of two potent phytochemicals: Vinburnine and Norstephalagine. These compounds demonstrated strong binding affinity, stability, and favorable pharmacokinetic profiles as MTH1 inhibitors. Additionally, selected dietary phytochemicals, including Thymoquinone (TQ), Baicalin (BC), Resveratrol (RV), and Quercetin (QT), were evaluated for their binding interactions with MTH1. Molecular docking analysis confirmed that these compounds bind to MTH1 through common amino acid residues in the protein binding pocket. QT exhibited the highest binding affinity (3.8 x 10), followed by TQ, RV, and BC. Furthermore, *in vitro* studies showed that these phytochemicals significantly inhibited MTH1 activity and demonstrated cytotoxic effects against breast cancer cells. Overall, this study provides evidence that natural compounds targeting MTH1 offer promising therapeutic potential for managing oxidative stress and combating cancer progression.

ABOUT THE SPEAKER

Dr. Md. Imtaiyaz Hassan stands as an eminent figure in the area of structural biology and drug discovery, currently holding the position of Full Professor at the Center for Interdisciplinary Research in Basic Sciences, Jamia Millia Islamia, New Delhi, India. The hallmark of Prof. Hassan's academic prowess lies in his prolific publications, numbering around 521, which have found a home in prestigious, high-impact, peer-reviewed journalsNotably, his recent election as a Fellow of the Royal Society of Chemistry (U.K.) and Fellow of the Royal Society of Biology (U.K.) serves as a testament to his globally recognized excellence in the field of drug discovery.. These publications have garnered significant attention, accumulating over 18,000 citations and establishing an impressive h-index of 63.

IL-71

From Discovery to Delivery: Ensuring Efficacious Safe Pharmaceuticals for Public Health

Anirban Pal

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Pharmaceuticals form the backbone of modern healthcare, offering solutions to numerous public health challenges. However, ensuring their efficacy and safety from discovery to delivery is a complex and multi-dimensional process that requires robust scientific methodologies, regulatory oversight, and innovation. The short talk explores the journey of pharmaceuticals, especially Medicinal Plant based formulations beginning with the discovery of bioactive(s) and progressing through preclinical and clinical evaluations to post-market surveillance. Emphasis is placed on the critical role of safety assessments at each stage, including preclinical toxicity tests, clinical trials, and real-world pharmacovigilance. Emerging technologies such as AI, personalized medicine, and sustainable production practices are highlighted as transformative tools in ensuring safety while addressing public health needs. As public health remains a shared responsibility, this presentation advocates for a collaborative approach in delivering safe and effective pharmaceuticals to society.

ABOUT THE SPEAKER

Dr. Anirban Pal is a seasoned researcher with over 23 years of experience in bioprospecting and product development, specializing in the evaluation of bioactive compounds for therapeutic efficacy and toxicity. Dr. Pal leads international collaborations as the Incharge of the International Science and Technology Affairs Group and supports startups through the Technology Business Incubation Centre at CSIR-CIMAP. He has published 95 papers, holds 11 patents, and was awarded the CSIR-Technology Award in 2016 for the development of an anti-diabetic formulation.

IL-72

Efficacy and Toxicity paradox of Beta-Asarone: A Bioactive Molecule of *Acorus calamus*

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Evaluation of the efficacy of novel beta-asarone from *Acorus calamus* in isolated rat resistance arteries for potential vasorelaxation response in *ex-vivo* model and its toxicity in rodent model.*Acorus calamus* has highly active components which possess tranquilizing, antimicrobial, antidiarrheal, antidyslipid, antidiabetic, and anti-inflammatory activities, etc. The present study investigates the vasorelaxation potential of beta-asarone, a key biomarker of *Acorus calamus*. The compound was evaluated for its vasoreactivity in *ex-vivo* system with isolated superior mesenteric atrial rings including elucidation of mode of action. It was also evaluated for the cytotoxicity and *in-vivo* toxicity in rodent models.The experiment followed the Institutional Animal Ethics Committee-approved protocol for *ex-vivo* vasorelaxation studies with isolated rat superior mesenteric artery. Wistar rats (180−250 g; 6–8-week-old) were used for the tension experiment and Swiss albino mice were used for acute oral toxicity studies.Superior mesenteric arteries were pre-constricted with the U46619 (0.1μM) which produced a sustained and stabilized contraction response. BA-induced concentration-dependent relaxation responses in rat mesenteric artery and was highly sensitive in modulating calcium channel function in vascular smooth muwscle cells suggesting L-type VDCC as major putative target in vasorelaxation response induced by β asarone in isolated rat superior mesenteric artery. In-vitro toxicity of beta-asarone suggested its safety upto 30 μM in MTT assay. However, β asarone enriched extract and essential oil showed cytotoxicity and inhibition of cell proliferation at 30μg/ml when incubated for 12 hours. The results of in-vivo toxicity suggests that β asarone enriched extract and essential oil exhibited potential toxicity and produced complete mortality in all the treated animals when given from the range of 300 mg/kg upto 2000 mg/kg. This data suggests a classic case of efficacy-toxicity paradox in the medicinal plant suggesting further study so as to retain efficacy and enhance safety.

ABOUT THE SPEAKER

Dr Debabrata Chanda is currently working as a Principal Scientist at CSIR-CIMAP. He has done his PhD at IVRI, Bareilly and Postdoctoral research at King's College, London, UK and University of Pittsburgh, USA. He specializes in the field of cardiovascular and smooth muscle pharmacology and toxicology. His research group is exploring the anti-hypertensive activity of novel medicinal plant derived molecules using ex-vivo, in-vitro and in-vivo models. Role of potassium channels, calcium, protein kinases etc. are explored as a mechanism of action studies. Additionally, I am involved in the safety profiling of important herbs with the objective to looking for the adverse effects of the most frequently used herb in Indian System of Medicine in small laboratory animals with special emphasis on herbal drug development particularly, in relation to antioxidant, anti-inflammatory and hepatoprotective properties. We use chemically fingerprinted herbs for our study in acute and subacute toxicity model in experimental animals using classical observational, biochemical and pathological parameters. He has secured grants from prestigious agencies such as DST, DBT and ICMR. He has published 60 research articles, 7 patents and 2 book chapters to his credit.

IL-73

Nutraceuticals for Healthy Aging: Promoting Longevity and Skin Health

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Nutraceuticals are increasingly recognized as a powerful tool in combating aging and promoting overall health, driven by the global desire for longevity and wellness. Key bioactive compounds, including resveratrol, collagen peptides, coenzyme Q10, astaxanthin, and curcumin, have demonstrated significant potential in addressing the underlying mechanisms of aging, such as oxidative stress, inflammation, and cellular damage. These compounds promote skin health, enhance cellular regeneration, and reduce the visible signs of aging, including wrinkles and fine lines. The present work delves into the role of nutraceuticals in anti-aging, reviewing the clinical evidence supporting their effectiveness in extending lifespan and improving skin vitality. It also addresses the regulatory landscape surrounding nutraceutical products, noting the challenges related to claims, safety standards, and the lack of standardized testing protocols. Furthermore, advanced techniques such as high-performance liquid chromatography (HPLC) are critical in ensuring the purity, potency, and bioavailability of these active ingredients. HPLC enables precise detection, quantification, and identification of bioactive compounds, ensuring product consistency and safety in anti-aging formulations. Looking to the future, the anti-aging nutraceutical market is poised for significant advancements. Innovations such as gene therapies, personalized nutrition, and AI-driven formulations are set to revolutionize the field, enabling tailored solutions for aging populations. Stem cell-based therapies and regenerative medicine are also on the horizon, potentially offering groundbreaking treatments for reversing age-related damage. By integrating cutting-edge science with natural bioactives, nutraceuticals are poised to play a transformative role in extending health span, improving quality of life, and slowing the aging process in the coming years.

ABOUT THE SPEAKER

Dr. Racheal John is a dedicated and accomplished analytical chemist specializing in qualitative and quantitative analysis. With a PhD in Chemistry from ICAR-National Bureau of Plant Genetic Resources, New Delhi, and over five years of professional experience in research and development, Dr. John's contributions to the field include advanced NIRS prediction modeling, chromatographic estimations, and more than 25 scholarly publications in reputed journals such as Frontiers in Nutrition and Legume Science. Her research has been recognized internationally, earning her the "Young Investigator Excellent Abstract Award" at the 22nd IUNS-ICN in Tokyo, Japan. Currently serving as a Scientist 'C' at FARE Labs Pvt. Ltd., she focuses on project handling, method refinements, and food quality estimations under ISO 17025 standards.

IL-74

Molecular link between stress and cancer: Molecular biology to intervention

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Human lifespan is extended due to improved hygiene, health care, and medical systems in the 20th and 21st centuries. However, industrialization in every aspect of modern living has brought new challenges to maintaining Quality of life. Environmental stresses are commonly associated with complex age-related pathologies, including neurodegenerative disorders and cancer.However, the target molecules and their molecular mechanisms are not clearly understood. Given that normal cells age in culture and show stress phenotypes, the cell culture system provides a powerful platform for basic and applied research on stress and aging.We initially cloned CARF (Collaborator of ARF)/CDKN2AIP) as a tumor suppressor protein ARF binding partner. It was increased in cells subjected to premature aging by oxidative stress. Cells compromised for CARF expression undergo apoptosis, endorsing its essential role in cell survival. Dose-dependent expression of CARF further revealed that its super-expression causes malignant transformation of cancer cells, and indeed, it is enriched in a large variety of clinical cancers. Extensive analysis of CARF levels in cells exposed to various stresses, including physiological, environmental, oxidative, radiation, and chemotherapeutics in vitro cell systems, endorsed its role in regulating cell fates (apoptosis, growth arrest, or malignant transformation) in dose-dependent expression levels. Whereas CARF-compromised cells undergo apoptosis, CARF overexpression and superexpression lead to premature senescence and malignant transformation, respectively. We present experimental evidence of (i) the bridging role of CARF in stress, aging, and cancer phenotypes (ii) its application in pharma-and nutraceuticals as a diagnostic and prognostic marker for chronic stress-related pathologies, including cancer and premature aging, and (iii) intervention using natural compounds including ingredients from honeybee propolis, soya, and natural antioxidant-lipoic acid.

ABOUT THE SPEAKER

Prof. Renu Wadhwa is currently Prime Senior Research Scientist and Laboratory Head at the National Institute of Advanced Industrial Science & Technology (AIST), Tsukuba, Japan. She first cloned a novel member of the hsp70 family of proteins in 1993 and named it "mortalin".She has more than 275 publications in international peer-reviewed journals with many invited/plenary talks at international conferences. She is a Fellow of Geriatric Society of India, Indian Academy of Neurosciences, Biotech Research Society, India and Foreign Fellow of National Academy of Science, India. She is also a Professor at the School of Integrative and Global Majors (SIGMA), University of Tsukuba, Japan.

IL-75

Why Ashwagandha for oral cancers?

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Oral cancer is one of the most common malignancies, especially in South Asian and Southeast Asian countries, including Bangladesh, India, Pakistan, and Sri Lanka. Despite the current treatment modalities, the survival rate of the patients has not improved due to chemoresistance, tumor recurrence and metastasis, and severe adverse side effects of the drugs. Hence, there is an urgent need to identify novel molecular targets and develop new drugs for their therapy. We investigated the clinical relevance of a stress chaperone, Mortalin, in oral cancer. Expression of Mortalin in HNSCC was evaluated using the TCGA database and validated through immunoblotting, immunohistochemistry, and real-time PCR in cell lines and patient samples. Survival, correlation, and single-cell RNA-sequencing analyses were conducted utilizing TCGA database and NCBI GEO repository. *In vitro* cell-based assays, including MTT, colony formation, PI FACS, annexin V, JC-1, autophagy, EMT, migration, and Boyden chamber assays, were performed in control and mortalin-compromised cancer cell lines. We found a significant correlation between mortalin upregulation and the disease progression, stages, and prognosis. In *in vitro* assays, Mortalin knockdown caused growth arrest/apoptosis of cancer cells. Of note is the low level of knockdown attenuated migration and invasion of cells, which suggests its role in cancer metastasis. Molecular studies further revealed the association of mortalin with Akt/mTOR signaling cascades that play a key role in oral oncogenesis and disease progression. We further explored if Withaferin-A (Wi-A, a key withanolide from Ashwagandha) could target mortalin and be useful in treating oral cancer. Based on the extensive molecular analyses, we report that the anticancer activity of Wi-A is particularly useful for treating oral cancer.

ABOUT THE SPEAKER

Dr. Ajaikumar B. Kunnumakkara is a distinguished full Professor in the Department of Biosciences and Bioengineering at the Indian Institute of Technology Guwahati (IITG), located in Assam, India. Additionally, he has been awarded Honorary Chair Professor in Nanoscience and Nanotechnology. Dr. Kunnumakkara's research interests center on elucidating the role of inflammatory pathways in cancer development and identifying novel molecular therapeutic targets. Dr. Kunnumakkara has authored over 300 articles encompassing original research, reviews, and book chapters. His contributions to the field have been acknowledged through numerous awards in India and abroad.

IL-76

Translational Aspect of Apigenin in Prevention of Carcinogen-Induced liver cancer

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Hepatocellular carcinoma (HCC) is now the fifth most common cause of cancer and the third leading cause of cancer death worldwide. Sorafenib is an FDA-approved oral multi-kinase inhibitor- used to treat liver cancer with limitations such as associated toxicity and drug resistance. Apigenin, 4',5',7'-trihyroxyflavone is a naturally occurring flavonoid having several medicinal properties such as anti-inflammatory, antioxidant, and anticancer properties. The objectives of the study are to investigate the anticancer effects of Apigenin; experimental procedures were done *in silico*, *in vitro*, and DEN-induced HCC in Swiss albino mice, and toxicological studies were done to explore the adverse effects of Sorafenib and its possible amelioration by Apigenin. Electronic databases were searched to fetch the relevant articles, and the anticancer effects of Apigenin were systematically analyzed by meta-analysis. Antitumor efficacy of the combined treatment of Apigenin and Sorafenib in inhibiting carcinogen, DEN-induced HCC. Cell viability assays, SEM, liver function tests, cytokine assays, histopathological/ immunohistochemical studies, DNA interaction studies, genotoxicity tests, analyzed multiple stress parameters, etc., were performed. The study confirmed that i) Apigenin reduced tumor volume, weight, tumor number, and tumor load. Apigenin exerted antitumor effects mainly by inducing apoptosis/cell-cycle arrest ii) enhanced efficacy of combination treatment in reducing the frequency of DEN-induced HCC as compared to both Apigenin and Sorafenib alone iii) reduction in the Sorafenib-induced toxic effects (genotoxic, oxidative and gross damage) indicated by a decrease in the frequency of DNA damage, free radical generation, oxidative and tissue/organ damage. In conclusion, the combination treatment of Apigenin and Sorafenib could be used to enhance Sorafenib's anticancer therapeutic efficacy and reduce the Sorafenib-induced toxic effects in DEN-induced HCC.

ABOUT THE SPEAKER

Dr Hifzur R Siddique is currently working as a Senior Assistant Professor (Stage-III) in the Department of Zoology, Aligarh Muslim University, India. His research interests are in the area of toxicology, biomarker identification and nanomedicine. He has an experience in both teaching and research for over more than 2 decades. He has done his postdoctoral research at Louisiana State University and as a research associate in several prestigious Universities of USA. He has published 103 peer reviewed articles and 16 book chapters to his credit and has a h-index of 32. He has supervised several PhD students and Masters/Bachelors students towards their dissertation.

IL-77

Harmful Algal Blooms: Causes, Ecological Impacts and Mitigation Strategies

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Harmful Algal Blooms (HABs) are proliferations of certain types of algae in aquatic ecosystems that can produce toxic compounds or cause significant ecological and economic damage. These blooms have become a global concern, occurring in both marine and freshwater environments. Key factors driving HAB formation include nutrient enrichment (eutrophication), primarily from agricultural runoff and wastewater discharge, as well as the effects of climate change, such as rising water temperatures and altered precipitation patterns. HABs have severe consequences, including the production of toxins that pose risks to human and animal health, the creation of hypoxic (low oxygen) zones that threaten aquatic life, and economic impacts on fisheries, aquaculture, tourism, and public health systems. Mitigation strategies focus on reducing nutrient inputs, implementing early detection and monitoring systems, and exploring physical, chemical, and biological control methods. Recent advancements in technology, such as satellite monitoring and predictive modeling, have improved our ability to forecast and manage HAB events. However, the increasing frequency and intensity of these blooms, driven by anthropogenic activities and climate change, highlight the need for a more integrated and sustainable approach to addressing this issue. This review explores the causes, ecological and socioeconomic impacts, and potential mitigation strategies for HABs, with case studies illustrating the challenges and successes in managing these blooms globally.

ABOUT THE SPEAKER

Dr Shivakumar Magada has done his masters and doctoral degree in Aquaculture. He has 32 years of experience in the profession where 30 years in academics and 2 years as Aquaculture Consultant dealing with marine shrimp and freshwater prawn seed production and farming. In his career, Dr Magada handled 28 research projects funded by DBT, NADP, European Union, NFDB and RKVY. He has written 16 books, 24 handbooks and 22 research papers, hundreds of popular articles. Dr Magada is a popular science writer and motivational speaker and he has delivered 380 talks covering more than one lakh farmers and youths, organized 53 training programs covering 7800 beneficiaries and organized several professional events.

IL-78

Microplastics in drinking water: A case study of Thailand

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Plastic-contaminated drinking water is an emerging global issue due to the potential impact of microplastics (MPs) on human health. This study analyzes MPs in drinking water from various sources in Thailand, including tap water from Thammasat University and 10 brands of single-use PET-bottled water. Additionally, a set of glass-bottled water was analyzed to compare MP concentrations between different packaging types. MPs were enumerated using fluorescent tagging with Nile Red and optical microscopy. ATR-FTIR and confocal Raman spectroscopy were employed for polymer identification. The MP concentration was 140 ± 19 p/L in plastic bottles and 52 ± 4 p/L in glass bottles, with plastic bottles showing significantly higher MP quantities. The 6.5–50 µm range dominated, with fibers accounting for 62.8% of particles. PET, PE, PP, and PA were the dominant polymers, indicating contamination mainly from packaging and possibly during manufacturing. In the tap water, the average MP counts were 56.0±14.0 particles per liter (p/L) for 6.5-53 µm and 21.0±7.0 p/L for 53-300 µm. Optical microscopy revealed 13.0±5.0 p/L for 300-500 µm and 6.0±3.0 p/L for ≥500 µm, with the highest concentration observed in the 6.5 53 µm fraction. Fibers dominated the samples, accounting for 58% of the particle count. ATR-FT IR spectroscopy identified polymers such as PE, PVC, PET, PA, PTFE, PP, and PAM in particles ≥300 µm, indicating potential sources from the treatment plant or water distribution network. The presence of MPs in drinking water poses potential health risks due to direct plastic intake by humans. The findings emphasize the need to control MP contamination in water supply systems and further investigate smaller-sized MPs in drinking water due to their toxicity.

ABOUT THE SPEAKER

Dr. Sandhya Babel is a full professor at the School of Biochemical Engineering and Technology, Sirindhorn International Institute of Technology, Thammasat University, Thailand. Her main research focus has been on development of low-cost technolgies for the protection of enviornment. She has published over 160 scholarly articles in reputed international journals, three edited books and several book chapters. Her h-index is 34 with a total citation of over 9700 based on Scopus database as of May 2024. She has been listed in the top 2% scientists in the world by Stanford University and Elsevier BV for 4 consecutive years in the field of Enviornmental Sciences for whole career and single year. Recently, she has been awarded as distinguished professor by Thammasat University, Thailand.

IL-79

A Himalayan Lifeline at Jeopardy: Nepal's struggle against climate change

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Nepal, a Himalayan nation, ranks among the top ten countries in climate change global vulnerability index. In recent years, the country has experienced a surge in extreme and erratic weather events. This study delves into the existing literature and secondary data, including scientific articles and official government reports, to examine the current climate change patterns in Nepal and their subsequent environmental and public health impacts. Long-term hydrological and meteorological data spanning several decades reveals a concerning trend in Nepal's climate. Mean annual temperatures have increased by 0.06°C annually, while annual average rainfall has decreased by 1.3mm per year. Concurrently, there has been a significant rise in the frequency of heavy rainfall events exceeding 100mm per day. Furthermore, a notable decline in the number of cold days and nights has been observed. Projections indicate a substantial increase in mean annual temperature, ranging from 1.7 to 4.1°C, by the 2060s. Despite contributing a negligible 0.027% to global greenhouse gas emissions, Nepal is highly vulnerable to climate-related disasters. The nation is increasingly exposed to a range of extreme weather events, including floods, droughts, landslides, avalanches, temperature extremes, and glacier lake outburst floods (GLOFs). Over 80% of the population resides in areas susceptible to at least one of these hazards, with marginalized and disadvantaged communities facing the most severe risks. Climate change and global warming have accelerated glacial retreat in Nepal at a rate 65% faster than the global average during the decade 2010-2019 compared to the previous decade (2000-2009). This accelerated melting has resulted in an increase in the number, size, and water storage capacity of glacial lakes, posing a significant risk of glacial lake outburst floods (GLOFs). Additionally, the permanent snowline has experienced an upward shift. Vector-borne diseases, once endemic to low-lying areas, are now spreading to higher altitudes due to climate change-induced conditions that are conducive to vector breeding. A 1°C increase in ambient temperature and a 1 cm increase in annual rainfall have been correlated with a 4.39% and 0.28% rise in diarrheal disease incidence, respectively.Nepal's high vulnerability to climate change, despite its minimal contribution to global greenhouse gas emissions, highlights the inherent injustice of climate change. The country's limited resources necessitate urgent global and regional support and cooperation to effectively address the multifaceted challenges posed by climate change.

ABOUT THE SPEAKER

Dr Ajay Kumar Rajbhandari is currently working as an Associate Professor at the Department of Community Health Sciences, Patan Academy of Health Sciences (PAHS), Nepal. He has been instrumental in coordinating the innovative Community-Based Learning and Education (CBLE) program at PAHS, actively engaging communities in the undergraduate medical curriculum. Additionally, Mr. Rajbhandari serves as a module coordinator for the module entitled Public Health Worldview and Determinants of Health in the PAHS MPH program.

IL-80

Microalgae-integrated resource recovery from waste streams for bioremediation and sustainable production

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Microalgaeare photosynthetic microorganisms that have emerged as a sustainable biomass feedstock, gaining significant attention due to their inherent benefits in comparison to conventional sources. Microalgae possess higher photosynthetic efficiencies, superior capacity of carbon fixation, and the ability to thrive in non-arable land, which makes them an ideal alternative for biomass generation. Remarkably, microalgae are renowned for the diverse biosynthesis of metabolites namely lipids, proteins, and carbohydrates, alongside a broad spectrum of high-value bioactive compounds,such as carotenoids, polyunsaturated fatty acids,phycobiliproteins, and polysaccharides, among others. Hence, microalgae have been distinguished as a valuable biotechnological tool amongst numerous industrial sectors, includingbut not limited to food/feed, nutraceuticals, pharmaceuticals, and energy. Despite the extensive exploration of microalgal biotechnologies for various applications, its commercialization is still hindered by the cost-intensiveness of upstream processing, especially due to the requirement of excess quantities of nutrients. Moreover, nutrient supplementation at a large scale increases the depletion of finite abiotic resources, which in turn significantly reduces the overall sustainability of microalgae cultivation. Therefore, the current paradigm in researchhas shifted towards microalgae-integrated resource recovery from waste streams, namely wastewater, flue gas, and solid waste. Additionally, this strategic approach would contribute to the simultaneous bioremediation of waste streams within the framework of a circular economy and sustainability, whichis a promising mitigatory action for environmental pollution. Nevertheless, the advancement of zero-waste and carbon-neutrality in waste-integrated microalgae bioproductionnecessitatesfurther research and technological development, which includes in-depth studies to assessthe techno-economic feasibility and sustainability of biorefineriesand optimize product yields,whileadhering tosafety standards.

ABOUT THE SPEAKER

Dr. Thilini U. Ariyadasa is a Senior Lecturer at the Department of Chemical and Process Engineering, University of Moratuwa, Sri Lanka. She obtained her Ph.D. in Genetic Engineering and Biotechnology from the International Centre for Genetic Engineering and Biotechnology (ICGEB) New Delhi-Component. Her primary area of research interest is on algal technologies, including the synthesis of novel bioproducts and biofuels from microalgal feedstock within the framework of biorefining and circular bioeconomy. To this end, she founded the Microalgae Research Group at the University of Moratuwa, where extensive research is carried out on the screening of microalgae for identification with species with high biotechnological potential, the design of novel microalgae cultivation systems, bioprocess optimization to maximize product yields, development of novel product extraction methods, and microalgae-based bioremediation.

IL-81

Industrial Potential of PETase from Microbial Sources for Sustainable Plastic Recycling

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Polyethylene terephthalate is a widely used synthetic polymer used in beverage and other packaging industries, and it is challenging to recycle using traditional methods. The incessant use of PET has led to pollution of land and water bodies; hence, searching for technologies to contain the menace is imperative. In the last decade, an efficient PET degrader bacterium, Ideonellasakaiensis, was discovered, revolutionising the research in plastic valorisation. The microbe secretes an enzyme PETase that plays a crucial role in breaking down polyethene terephthalate (PET) into its basic components, terephthalic acid and ethylene glycol, offering a promising solution to the global challenge of plastic waste. Further research was more focused on its structural and function elucidation, focusing on its unique catalytic domain and substrate-binding properties. Protein engineering and directed evolution further enhanced its effectiveness and stability, expanding its potential for industrial applications. Other than Ideonellasakaiensis, several other bacteria and their associated enzymes have been identified as capable of PET degradation, e.g.Bacillus spp., Pseudomonas putida, Clostridium thermocellum and Thermobifidafusca. Pseudomonas putida can use PET as a carbon source, and its degradation mechanism involves a complex metabolic pathway. Clostridium thermocellumandThermobifidafusca can degrade PET at high temperatures, which could be advantageous for industrial applications.Furthermore, species of Fusarium, Penicillium, and Aspergillus have demonstrated the ability to degrade PET using fungal enzymes, presenting a diverse range of biological approaches to plastic waste management. The integration of these microorganisms and their enzymes into a developing microbial consortium for biotechnological processes holds significant promise for sustainable plastic waste management. Ongoing research is dedicated to optimising these microbial systems to enhance efficiency and scalability, thereby paving the way for practical solutions to reduce plastic pollution.

ABOUT THE SPEAKER

Dr. Monica Sharma is an Assistant Professor in the Department of Biotechnology, School of Life Sciences, Babasaheb Bhimrao Ambedkar University, Lucknow, India. Dr Sharma has 15 years of experience and has published 40 papers in peer-reviewed journals and has secured ICMR and CST grants. She has supervised 50 PG dissertations, 6 MTech dissertations and 4 PhD Thesis. She has been a lifetime Member of the Association of Microbiologists of India (AMI) since 2005 and a lifetime Member of the Organization for Women in Science for the Developing World (OWSD) since 2020.

IL-82

Nanotechnology Meets RA Therapy: Targeted Delivery of Methotrexate and RELA siRNA using Folate-Liposomes

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Rheumatoid arthritis (RA) is a significant global health concern, affecting millions and resulting in long-term disability and premature mortality rates. The impact of RA is expected to grow by 80% over the next 30 years. While the exact origins of RA remain unclear, reports indicate that an imbalance between pro-inflammatory and anti-inflammatory factors plays a role. Balancing the macrophage subtypes is crucial for controlling inflammation. Despite Methotrexate (MTX) being a gold standard in RA treatment, its limitations, such as high plasma peaks and lack of sustained release, persist. These issues often lead to dose escalation, which can cause side effects due to MTX's low bioavailability and short half-life. This study rationalizes a synergistic therapeutic strategy by combining MTX with RELA siRNA, which targets the NF-κB pathway and delivers the therapies using folate-liposomes. These liposomes specifically target macrophages, which play a central role in RA's inflammatory process. In vitro,tests on RAW264.7 cells indicate that this folate-liposomal formulation is stable and gets internalized in the cells. It promotes a shift from the M1 to the M2 macrophage phenotype, demonstrated by increased levels of ARG-1 and CD206, and decreased levels of iNOS, CD80, and CD86. Additionally, there was a reduction in pro-inflammatory cytokines such as TNF-α, IL-2, IFN-γ, and IL-17A, along with an increase in anti-inflammatory cytokines like IL-4, IL-6, and IL-10. In the collagen-induced arthritis (CIA) rat model, this combination therapy significantly reduced synovial inflammation and improved mobility. The therapy also effectively lowered inflammatory cytokines, rheumatoid factor (RF), and C-reactive protein (CRP). This research highlights a promising new approach for RA treatment, targeting the inflammatory cascade to prevent further joint damage.

ABOUT THE SPEAKER

Dr Ashutosh Kumar is an Associate Professor in the Division of Biological and Life Sciences at the School of Arts and Sciences, Ahmedabad University, Gujarat, India. His research group works at the intersection of biology and nanotechnology, with a specific emphasis on advancing nanomedicines tailored for the therapy of breast cancer and rheumatoid arthritis. He and his students have received numerous awards and fellowships, and the team has published more than 75 international publications in several reputed journals. Additionally, Dr. Ashutosh serves as a reviewer and member of multiple journals and committees.

IL-83

Stem Cell Therapy for Ischemic Stroke: Are We There Yet?

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Stem cell therapy offers significant promise for ischemic stroke treatment, yet its clinical application faces critical obstacles. The main challenges include: (i) inadequate targeting and homing of stem cells to the ischemic site and (ii) low post-transplant survival of these cells. Advancing this therapeutic approach requires a deeper understanding of stem cell migration, behaviour, and functionality within ischemic conditions. Using our in ovo ischemia-reperfusion (I/R) model, we are trying to explored how stem cells navigate to their target sites. This model entails occluding the right vitelline artery in a 3-day-old chicken embryo to simulate ischemic conditions. We further investigate the survival challenges stem cells encounter in ischemic brain tissue and the impact on endogenous stem cells in the subventricular zone (SVZ) and dentate gyrus (DG). To address oxidative and inflammatory stressors in ischemic environments, we applied oxygen-glucose deprivation (OGD) to human stem cells. Additionally, insights from the middle cerebral artery occlusion (MCAO) model in rats allow us to examine the response of endogenous stem cells in ischemic regions. By studying these stress responses, our goal is to enhance stem cell resilience and functional integration in ischemic conditions, complementing advances in therapeutic models and regenerative strategies for neurological diseases. Our research not only addresses clinical barriers but also enriches our understanding of cellular dynamics in complex pathological environments.

ABOUT THE SPEAKER

Dr. Syed Shadab Raza is a Professor of Biotechnology at Era's Lucknow Medical College and Hospital, Era University, Lucknow. He also serves as the Incharge of the Department of Neuroscience at Era University. He is also a visiting faculty member at the American University of Barbados in Latin America. Dr. Raza did his PhD in Toxicology from Jamia Hamdard, New Delhi, in 2012. Subsequently, he became a postdoctoral fellow at the Cleveland Clinic, USA, on stem cell therapy for neurodegenerative disorders, followed by another postdoctoral fellow at the University of Utah, USA, on stem cell therapy for multiple sclerosis. He then started his lab at Era's Lucknow Medical College and Hospital in June 2015 as a group leader. He is the inventor of three technologies, namely: (i) the spinal needle-hook technique for inducing ischemic-reperfusion injury; (ii) the Endothelin-1-induced permanent ischemic technique in a 3-day-old chick embryo; and (iii) an asphyxia apparatus to induce hypoxia in Drosophila melanogaster. He has 75 publications in reputed journals.

IL-84

New insights into the regulation of a catabolic dsz operon for biodesulfurization of organosulfurs

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Sulfur emission due to fossil fuel combustion is a global problem. Sulfur is the third most abundant element in crude oil. Biodesulfurization is the process of removal of sulfur from organosulfurs using microorganisms. The process is highly useful for removal of sulfur from diesel and other petroleum fractions in refinery and thus is useful for industry. Biodesulfurizing microorganisms find varied applications in environment particularly in crude oil remediation. The dsz operon responsible for biodesulfurization consists of three genes dszA, -B and -C which are present together and controlled by a promoter which is repressed in the presence of inorganic sulfur and switched on in the presence of organosulfur. The detailed mechanism of regulation of this operon is not known. We had identified an activator protein called DszGR which binds to the far upstream region of the promoter between -385 to -305 and activates the operon. A general DNA binding protein IHF was identified which binds to the promoter DNA and induces a bend in the promoter region. The overall mechanism of the long-distant transcription activation by DszGR remained unknown. We hypothesized that for activation, DszGR may interact directly with RNA polymerase or via other proteins. A protein-protein pull-down assay was performed. The proteins interacting with DszGR were eluted and subjected to proteomic analysis. Interestingly, many proteins belonging to the transcription assembly were identified along with other proteins relevant to the organosulphur catabolism. Using bacterial two hydrid assay, DszGR was found to directly interact with RNA Polymerase subunits. The results suggest that the DszGR has two domains, a DNA binding domain which interacts with promoter and an activation domain, which interacts with the RNA polymerase subunits. It is likely that the interaction of the activator DszGR with the RNA polymerase subunits strengthens the binding and recruitment of the transcription machinery to the promoter DNA, thereby bringing about the activation of the operon.

ABOUT THE SPEAKER

Dr. Preeti Srivastava obtained PhD from Department of Biochemical Engineering and Biotechnology, Indian Institute of Technology, Delhi. Currently, she is working as Professor, Department of Biochemical Engineering and Biotechnology, IIT Delhi. She did postdoctoral research work in the area of chromosome dynamics at National Cancer Institute (NCI), National Institutes of Health (NIH), Bethesda, Maryland, USA. She has been granted 4 patents and is the recipient of the prestigious Innovative Young Biotechnologist Award in 2013 and TATA innovation fellowship in 2024.

IL-85

Arsenic and Global Health: An integrated approach towards mitigation

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Globally more than 200 million individuals across 70 countries are exposed to arsenic either through drinking water or food sources. Being system toxicant, arsenic damages multiple systems including skin, lung, kidney, bladder etc. Arsenic methylation generates reactive oxygen species (ROS) during the biotransformation pathway, which in turn causes DNA damage. Not only DNA damage, an array of DNA repair enzymes function significantly gets lowered and results in persistence DNA damage. Further studies identified structural and numerical chromosomal aberration due to arsenic toxicity. Alteration in genes' expression was noticed due to change in promoter methylation. Epigenetic alterations were another driving forces that regulated histone modification and chromatin regulation in chronic arsenic toxicity. Our study for last 20 years in arsenic exposed critical areas of West Bengal revealed the mode and consequence of toxicity at clinical, cellular and molecular level. The study identified the pattern of epigenetic alteration were quite similar for both children and adult. Therefore, it is anticipated that early detection of susceptible population will reduce the disease burden. An integrated approach i.e clinical and molecular screening together can be adopted to identify the susceptible population. In addition to this, dietary interventions are required to combat the toxic insult of arsenic. The mitigation strategy includes the access to safe water; alternative dietary sources (less water loving crops like millet or crops with less water requirement). Epitherapeutic drugs have the potential to reverse the arsenic-induced damages by epigenetic re-programming and thus further studies in this direction are awaited.

ABOUT THE SPEAKER

Dr. Pritha Bhattacharjee is an Assistant Professor (Stage III), and Former Head, Department of Environmental Science, University of Calcutta. Her expertise lies in Environmental health, Toxicology, Genetics and Epigenetics. She did her PhD from CSIR-IICB. She served as Pool scientists for two years in IICB and then joined CU. She has number of collaborations and so far has 85 papers (including research article, review and book chapters; mostly International, H-index 27). She is also an author of Environmental Studies at Graduate level. Mentored 11 PhD candidates so far. Trained more than 50 MSc Interns (across India).

IL-86

Challenges of Indoor Air Pollution

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Rapid growth of infrastructure, industry, trade and tourism etc. has enhanced the living standards and demand for enclosed air conditioned buildings in our cities. The urban population is now spending more hours in the indoor environment and exposed to indoor air pollution. IAQ is governed by the pollutants generated indoor as well as those entering from the outdoor environment. IAQ is deteriorated due to presence of fine particulates (PM_{10}, $PM_{2.5}$), gases (SO_2, NO_2, CO, CO_2, VOCs etc.), biological agents (bacteria, fungi, moulds, mites etc.) and comfort parameters (temperature, humidity and wind flow speed/). Material used for construction, utility items, indoor activities and occupancy levels determine the IAQ levels. Many research studies on IAQ have been conducted in the country, however, more efforts are needed to explore IAQ in various indoor environment as well as setting up IAQ standards for the country. The presentation will cover levels of IAQ in different buildings, factors affecting IAQ and comparison with IAQ standards from other countries to provide comprehensive overview in Indian context.

ABOUT THE SPEAKER

Er. Altaf Husain Khan is an Environmental Engineer (ME Environmental Engineering). He is working in the field of Environmental Science and Engineering for since last 33 years spanning different govt. bodies. At IITR, he is leading a team of scientist, technicians and associates to regularly conduct environmental pollution and regulatory studies serving different mining, thermal power plant, automobile and other major manufacturing industries. He has completed more than 60 consultancy and sponsored projects on different types of environmental studies for various industries. Alongside, majorly contributing to generating resources for institute through consultancy, he has more than 40 publications in the journals of national and international repute. He has been actively involved in NABL accreditation and GLP certification of CSIR-IITR since inception

IL-87

Ecotoxicity, removal efficiency, and molecular response of freshwater microalgae to Bisphenol AP exposure

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Bisphenol AP (BPAP), an analog of bisphenol A (BPA) and endocrine disruptor, is increasingly detected in water, highlighting its emergence as an environmental contaminant similar to BPA, known for its health risks. This study explored the ecotoxicity of BPAP in four freshwater microalgae species (Chlorella sorokiniana, Chlamydomonas mexicana, Scenedesmus obliquus, and Chlorella vulgaris), as well as their removal efficiency and biotransformation capabilities. A de novo transcriptomic analysis followed to elucidate the molecular response to BPAP exposure. The toxicity (120 h-EC_{50}) of BPAP for these species ranged from 1.509 mg/L to 6.509 mg/L. C. mexicana demonstrated the highest removal efficiency at 86.5% after 12 days, followed by C. vulgaris (86.0%), S. obliquus (78.9%), and C. sorokiniana (56.5%) at 1 mg/L. Eight biotransformed BPAP products were analyzed, and their toxicity was predicted to be lower than that of BPAP, using the Ecological Structure Activity Relationships software. Transcriptomic analysis of C. mexicana revealed differential expression of 4611 genes involved in metabolism, cellular activities, and stress responses. Genes encoding methyltransferases, glycosyltransferases, and various oxidoreductases, including electron-transferring flavoprotein dehydrogenase and glutaredoxin, were significantly upregulated in response to BPAP exposure, suggesting that C. mexicana can detoxify BPAP through glycosylation and transmethylation. These findings provide novel insights into the ecotoxicity, removal potential, and biotransformation of BPAP in freshwater microalgae, highlighting the molecular mechanisms of BPAP detoxification for effective environmental remediation.

ABOUT THE SPEAKER

Dr. Bikram Basak is an Associate Professor at the Department of Earth Resources and Environmental Engineering, Hanyang University (HYU), South Korea. He earned his M.Sc. in Microbiology from the University of North Bengal and his Ph.D. in Biotechnology from the National Institute of Technology Durgapur, India. Dr. Basak has published over 45 articles in high-impact international journals and holds one patent. His work has been recognized by the Biological Research Information Center of South Korea.

IL-88

Preventing systemic drug-induced ocular toxicity using non-therapeutic eye drops.

Nirmal Jayabalan, Manisha Malani

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Despite the ocular barriers, systemic drugs such as Cyclophosphamide accumulate in the eye and cause toxicity, leading to blindness. Organic Cation Transporter 1 (OCT1) in the blood tear barrier (lacrimal gland and conjunctiva) shuttling endogenous molecules (from blood to tear) can non-specifically facilitate drug entry into the ocular surface, causing drug-induced toxicity. The blockade of transporters to prevent the systemic drug's entry using therapeutic molecules could lead to unwanted drug-drug interactions. We hypothesize that topical formulations containing excipients (non-therapeutic) can be used as OCT1 blockers to prevent the systemic drug's entry into the eye. Transiently, human OCT1 transfected HEK293 cells were used for screening the excipients as OCT1 blockers. Tear kinetics were performed using rabbits for intravenously administered Cyclophosphamide (OCT1 substrate) in the presence and absence of topically administered therapeutic (Atropine/Quinidine) and non-therapeutic OCT1 blockers. The tear was collected using a Schirmer strip, and the drug was analyzed by Liquid Chromatography Mass Spectrometry. Cell uptake studies indicate Tween20 (IC50 2.26±0.82 µM) as a potential OCT1 blocker as compared to Poloxamer407 (IC50 1410±230 µM). Tear secretion of Cyclophosphamide decreased significantly in the presence of topical OCT1 blockers and excipients, $p<0.01$. In the Atropine (124.01 µM*h), Quinidine (82.52 µM*h), Tween20 (109.9 µM*h), and Poloxamer407 (122.17 µM*h) pre-treated group, the AUC(0-2h) were 1.7, 2.5, 2, and 1.7 fold less than the control group (213.04 µM*h), respectively. Hence, excipients-based eye drops can be used locally to block the uptake transporters and prevent the entry of systemic drugs into the eye. However, further studies are required to understand the potential of excipients to prevent toxicity while maintaining the systemic pharmacological activity of the drug.

ABOUT THE SPEAKER

Dr Nirmal Jayabalan is currently working as Associate Professor at Birla Institute of Technology & Science, Pilani, Hyderabad Campus. His research interests include Anti Microbial Resistance (AMR), Ocular Drug Delivery, Ocular pharmacology, Pre-Clinical Evaluation. He has over 60 publications in reputed journals and over 6 patents to his credit. He has 8 ongoing projects as PI and has received various national and international awards.

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Technology Transferred (Upto 2023-24) : 89

Scimago Overall Institution Rankings (2024) : 17

Patents Granted : 147 (From 2019-20 to 2023-24)

Publications in 2023-24 : 262 Average IF: 5.71

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For Partnerships & Collaborations

Contact Us: The Head, Business Development & Information Management, CSIR-Central Salt & Marine Chemicals Research Institute, G.B Marg, Bhavnagar - 364 002, Gujarat; Phone: +91-278-2567760/6280; Email: kamlesh@csmcri.res.in ; Website: www.csmcri.res.in

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- SB-CDRI4-105 (Neuropathic pain)

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- Chebulinic acid enriched fraction for BPH
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- Nintedanib
- Nitazoxanide
- Centhaquin
- Niclosamide
- Centbucridine

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CSIR-Central Drug Research Institute

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- Technology Business Incubation Facility for start-ups

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For further information, please contact:

DIRECTOR

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राष्ट्रीय वनस्पति अनुसंधान संस्थान लखनऊ
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मानव स्वास्थ्य देखभाल हेतु हर्बल उत्पादों का विकास
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पारंपरिक एवं आधुनिक प्रजनन द्वारा पादप सुधार एवं आनुवंशिक अभियांत्रिकी
वनस्पति उद्यान, पादप संरक्षण एवं पुष्प कृषि हेतु पौधों की नवीन किस्मों का विकास
ऊसर एवं अन्य बंजर भूमि के सतत् विकास हेतु कृषि-प्रौद्योगिकियाँ
कौशल विकास कार्यक्रम एवं समाज कल्याण हेतु गतिविधियाँ
संस्थान की राष्ट्रीय सुविधाएं एवं सेवाएं
वनस्पति उद्यान
पादपालय
प्राकृतिक जड़ी बूटी/औषधि संग्रहालय
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केंद्रीय उपकरण सुविधा
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संस्थान द्वारा कृषि प्रौद्योगिकियाँ
हमारे सोशल मीडिया प्रोफाइल को फॉलो करें

सी एस आई आर-नीरी

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अपशिष्ट जल प्रौद्योगिकी


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- Inflammation Management: Targeted Relief Through Green Nanotechnology
- Green Nano Cancer Therapy: Precision-Targeted Oncology Breakthroughs
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Association of Toxicologists and Risk Assessors (ASTRA)

Science for Safety, Health and Environment

Head Quarters : CSIR-Indian Institute of Toxicology Research Main Campus, 31 MG Marg, Lucknow, 226001

Objectives : Advancement of all aspects of science and technology relating to the field of toxicology and health risk assessment

Mission : To provide opportunities for the dissemination and exchange of knowledge and experience primarily among professionals of toxicology and risk assessment and also among the public and society at large.

Membership Category		fee (INR)	
		Up to 31st December, 2024@	1st January, 2025 onwards
For Individuals	Life Members (Faculty / Staff)	7,000/-	10,000/-
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For more details, please contact/write to: astraindia2024@gmail.com

CSIR-Indian Institute of Chemical Biology

4, Raja S. C. Mullick Road, Kolkata - 700 032

CSIR-Indian Institute of Chemical Biology (IICB), originally established as the Indian Institute of Experimental Medicine (IIEM) in 1935, later became a part of the Council of Scientific & Industrial Research (CSIR). The institute was founded with the noble mission of eradicating cholera, culminating in the development of an oral cholera vaccine. Today, CSIR-IICB serves as a beacon for future scientific advancements. Currently, our institute is at the forefront of scientific research, tackling major diseases and advancing the field of biomedical science. The institute operates through six research divisions and is spread across two campuses, at Jadavpur and Salt Lake, in Kolkata, with excellent infrastructure for pioneering research and innovation.

Major Divisions and Trust Areas:

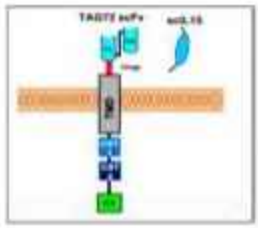
The institute plays a vital role in advancing knowledge across multiple disciplines, including chemical biology, cell biology, structural biology, bioinformatics, organic synthesis, and medicinal chemistry. Our cutting-edge research addresses both fundamental and applied challenges in biological and biomedical sciences, focusing on communicable and non-communicable diseases, as well as metabolic disorders relevant for the Nation. We identify the structural and mechanistic features of disease-causing proteins and disease-related cellular pathways. Our medicinal chemists design and develop innovative therapeutic lead molecules, while our synthetic chemists craft cost-effective process chemistry for producing life-saving drugs and agrochemicals. Collectively, our efforts lead to significant advancements in the healthcare sector, demonstrating our commitment to improving public health and addressing pressing medical challenges

Generating Knowledge Globally

- Average Published Papers / Year > 170
- Average Impact Factor > 5.3

Transforming Knowledge into Wealth (IP)

- Patent filed / Year > 4
- Patent Granted / Year > 4



Development and pre-clinical validation of CAR-T constructs targeting ovarian cancer

Potential Technologies Developed Recently

- Novel Thermostable insulin formulation
- Potent TLR9-selective and TLR9 and 7 dual antagonists for Autoimmune diseases
- Novel amphotericin B liposomal formulation against Leishmania and fungi.
- Novel Process for Manufacturing TROPISETRON
- Rapid Tests (Kit) for Diagnosis of Human and Canine Visceral Leishmaniasis (VL) and Post Kala-azar Dermal Leishmaniasis (PKDL)
- An easy-to-use point-of-care system for RNA-based detection of Dengue
- Diagnostic Kit for detection of Rheumatic Heart Disease
- Improved process for the manufacture of Tilorone and its salts
- Novel paramomycin liposomal formulation against Leishmania
- 'Indian MistleToe' Therapy for Management of Cancer
- Management of Prostate Hyperplasia/Urinary disorders (Prostalyn^R being commercialised)

Rapid Diagnostic Kits for Leishmaniasis

Rapid Diagnostic Kits for RHD

Hemostatic Pad for rapid blood clotting

Prostalyn^R

Medha Plus

Contact: Director, CSIR-IICB, Kolkata,
Phone: 033-24995700 (Pilot No.), 033-24995701 (Director), Email: director@iicb.res.in, **Website: https://iicb.res.in**

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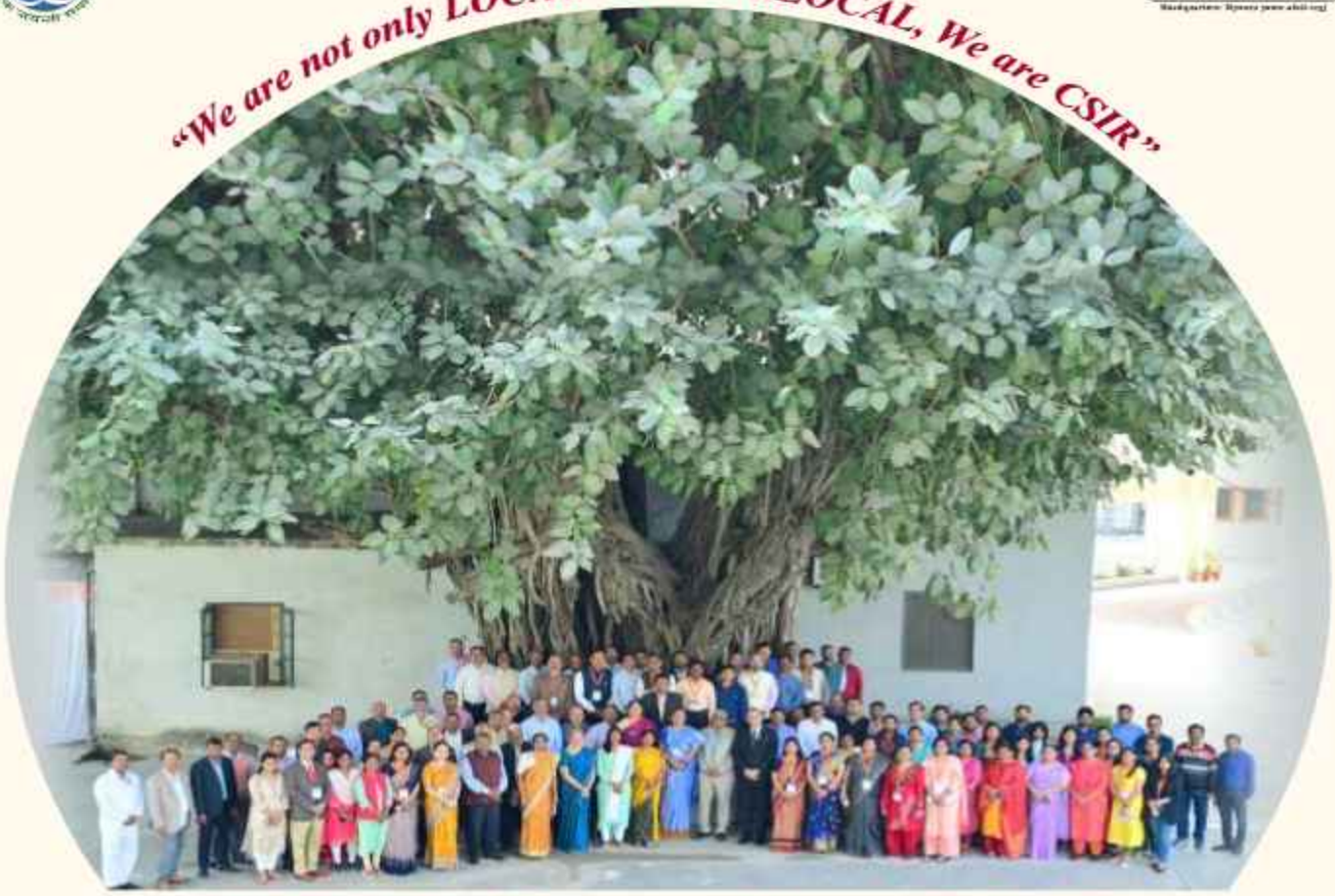

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