The Department of Biochemistry

FIDE ET LABORE

ST JOSEPH'S UNIVERSITY

ST JOSEPH'S UNIVERSITY, BENGALURU

Warmly welcomes you to participate

in the *International Webinar*

on

RECENT ADVANCES IN BIOCHEMISTRY

REGISTRATION FREE

FEBRUARY 28, 2025
TO
MARCH 02, 2025

Zoom meeting link will be shared with registered participants

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Agenda

Biochemistry is the chemistry of life and life processes. It is also the cornerstone of modern medicine. A microscopic orchestra of biochemical reactions involving diverse biomolecules coordinates fundamental cellular processes. Advances in the understanding of the chemicophysical logic which underlies several life processes like metabolism, signal transduction, ion flux and electron transfer is the key to understanding the molecular basis of health and disease. New advances in biochemistry can pave the way for ground-breaking innovations and solutions to complex problems such as heart disease, cancer, hypertension and diabetes. This three-day webinar will feature international speakers who have made significant strides in biochemistry research and have contributed richly to their respective fields of expertise. The department of biochemistry at St Joseph's University is proud to host this online webinar, which is expected to spark new thoughts and bring novel insights as well as trigger new ideas and innovations. Join us for an exciting three-day celebration of biochemistry. We envisage that you will gain new insights into the molecular basis of disease from our renowned speakers.

Day 1 - 28th February 2025, Friday

Inauguration - 4:15 pm IST
Opening remarks by Dr Libi Thomas,
Dean, School of Chemical Sciences, SJU

1. Dr Hemalatha Balaram, PhD
President, Biochemical Society of India,
& Professor, JNCASR, Bengaluru, India
Time: 4:30 pm to 5:30 pm IST

2. Dr Maria Corazon A. De Ungria, PhD
REPS University Researcher V
and Career Scientist IV
REPS Chair 2025-2027
National Academy of Science and Technology
Head, DNA Analysis Laboratory, Natural Sciences Research Institute
University of the Philippines Diliman
5:35 pm to 6:35 pm IST
(8:05 pm to 8:55 pm PhST)

Day 2 - 1st March 2025, Saturday

1. Dr Joel James, PhD
Post Doctoral Fellow in Medicine,
Indiana University
School of Medicine, USA
6:00 pm to 7:00 pm IST
(7:30 am to 8:30 am EST)

2. Dr Johan Wouters, PhD
Professor, University of Namur, Belgium
7:05 pm to 8:05 pm IST
(3:35 pm to 4:35 pm CET)

Day 3 - 2nd March 2025, Sunday

1. Dr Harpreet Singh, PhD
Professor, Ohio State University, USA
7:00 pm to 8:00 pm IST
(8:30 am to 9:30 am EST)

2. Dr Romila Mascarenhas, PhD
Assistant Professor,
University of Oregon, USA
8:05 pm to 9:05 pm IST
(6:35 am to 7:35 am PST)

Simple talks for both novices and experts

Day 1 - Friday, 28th February 2025

Time:
4:15 pm
to 5:15 pm IST

Dr Hemalatha Balaram, PhD

Title: Proteins: Structure, function and dynamics

Abstract: Proteins are macromolecules that are an essential constituent of all living systems. They are polymers of amino acids and many have 3-dimensional structures that define their function. In my talk, I will cover the structural hierarchy seen in proteins and illustrate how structure governs function. The 3-dimensional structure of proteins have varied degrees of conformational flexibility (dynamics). I will illustrate through examples, the need for both dynamics and structural rigidity for protein function and stability.

Time:
5:20 pm
to
6:20 pm IST
or
(7:50 pm
to 8:50 pm PhST)

Dr Maria Corazon Abogado De Ungria, PhD

Title: DNA and Forensics: Using the code to advance justice

Abstract: Forensic DNA analysis has revolutionized the criminal justice system, providing a powerful tool for identifying suspects, exonerating the innocent, and solving cold cases. Since its introduction in the 1980s, DNA forensics has become a cornerstone of modern investigations. Recent advancements—including next-generation sequencing, familial DNA searching, and genetic genealogy—have expanded its utility by enabling more detailed analysis of crime scene samples and broader searches using forensic databases. While these developments have proven invaluable to law enforcement, they raise concerns regarding privacy, data security, and potential misuse. Balancing public safety with individual rights remains an ongoing challenge. Key concerns include the risk of government agencies accessing sensitive genetic information without explicit consent, the potential for false matches leading to wrongful accusations, and the disproportionate impact on populations historically overrepresented in forensic databases due to past policing practices. In response, there have been increasing calls for clearer consent policies, stricter data security measures, limitations on database access, and independent oversight to prevent misuse.

As DNA analysis continues to transform the justice system, it is crucial for lawmakers, scientists, and ethicists to work together to develop ethical guidelines, policies, and laws that protect public safety and personal freedoms. By ensuring the responsible use of forensic DNA technology, society can maximize its benefits while minimizing risks to privacy and civil liberties.

Day 2 - Saturday, 1st March, 2025

Dr Joel James, PhD

6:00 pm to 7:00 pm IST or (7:30 am to 8:30 am EST)

Title: Novel insights in pulmonary arterial hypertension

Abstract: Pulmonary arterial hypertension (PAH) is a progressive and often fatal condition characterized by extensive pulmonary arterial remodeling, which increases strain on the right side of the heart and ultimately leads to right ventricular failure and death. It results from the narrowing and thickening of pulmonary arteries, restricting blood flow and impairing oxygen exchange. Common symptoms include shortness of breath, fatigue, chest pain, and dizziness. PAH can arise from genetic mutations, heart or lung conditions, and other contributing factors. Early diagnosis and treatment, including vasodilators, anticoagulants, and oxygen therapy, are crucial for symptom management and improving survival rates. However, further research is needed to elucidate the molecular mechanisms underlying PAH and develop more effective targeted therapies.

Dr Johan Wouters, PhD

7:05 pm to 8:05 pm IST or (3:35 pm to 4:35 pm CET)

Title: Strategies to develop inhibitors of *Mycobacterium tuberculosis* phosphoserine phosphatase, a potential drug target.

Abstract: Phosphoserine phosphatases catalyze the removal of the phosphate group of O-phospho-L-Serine in the last step of the biosynthesis of L-Serine (L-Ser). *Mycobacterium tuberculosis* phosphoserine phosphatase, MtSerB2, is of interest as a new antituberculosis target due to its essential metabolic role in L-Serine biosynthesis and effector functions in infected cells. The identification, by a screening approach, of original trisubstituted harmine derivatives as inhibitors of MtSerB2 will be presented. An alternative fragment-based drug design will also be described. This approach relies on a biophysical screening cascade (DSF, Ligand-based NMR, High concentration enzymatic assay) combined with crystallography and modelling (docking) approaches. MtSerB2 is regulated through an oligomeric transition induced by L-Ser that could serve as a basis for the design of selective allosteric inhibitors. A structural, biophysical, and enzymological characterization of MtSerB2 oligomerization in the presence and absence of L-Ser will be presented. I will show that MtSerB2 coexists in dimeric, trimeric, and tetrameric forms of different activity levels interconverting through a conformationally flexible monomeric state, which is not observed in two near-identical mycobacterial orthologs. This morpheein behavior exhibited by MtSerB2 lays the foundation for future allosteric drug discovery and provides a starting point to the understanding of its peculiar multifunctional moonlighting properties.

Day 3 - Sunday, 2nd March, 2025

7:00 pm to 8:00 pm IST or (8:30 am to 9:30 am EST)

Dr Harpreet Singh, PhD

Title: Intracellular Ion Channels: From discovery to therapeutics

Abstract: Ion channels are integral membrane proteins responsible for ion fluxes across cellular membranes. They regulate ionic homeostasis, which is vital for signal transduction, heart function, muscle contraction, neuronal signaling, and pH regulation. All these functions are attributed to plasma membrane ion channels but recently ion channels have been detected in intracellular organelles. Intracellular ion channels have been associated with Ca signaling, energy production, and cell death. We have discovered intracellular ion channels in mitochondrial-associated membranes and extracellular vesicles. We found that splicing plays an important role in targeting and localization of ion channels to intracellular organelles. We have also discovered that the presence and opening of ion channels are responsible for protecting the heart from ischemia-reperfusion injury. The mechanism is attributed to modulating the mitochondrial function. Although there are significant challenges in studying intracellular ion channels, understanding their identity and function opens up innovative and novel therapeutic interventions in diseases including neurodegeneration, cancer, and cardioprotection.

8:05 pm to 9:05 pm IST or (6:35 am to 7:35 am PST)

Dr Romila Mascarenhas, PhD

Title: Cobalt-sulfur coordination chemistry drives B12 loading onto methionine synthase

Abstract: Vitamin B12 is sequestered, tailored, and delivered via an elaborate trafficking pathway from its point of entry into the cell to the two known enzymes that utilize it as a cofactor: cytoplasmic methionine synthase (MS), and mitochondrial methymalonyl-CoA mutase. Clinical genetics studies on patients with inborn errors of cobalamin (Cbl) metabolism led to the identification of at least nine genes and provided early insights into the B12 trafficking pathway. Mutations in the cytoplasmic methylcobalamin (MeCbl) branch lead to homocystinuria, while mutations in the mitochondrial 5′-deoxyadenosylcobalamin (AdoCbl) branch lead to isolated methylmalonic aciduria. Studies on the mitochondrial chaperones have provided detailed mechanistic and structural understanding into the AdoCbl branch of the trafficking pathway. In contrast, little is known about the MeCbl branch, how vitamin B12 is delivered to MS and the roles of two chaperone proteins–CblC and CblD–in this process.

The function of the CblD chaperone was unknown, and it was previously reported to be incapable of binding B12. However, our laboratory recently discovered that CblD binds B12 and does so via an unusual cobalt-sulfur bond, which is rare in Nature. The existence of this rare coordination chemistry was confirmed by an X-ray crystal structure of the CblD-B12 complex, which also suggested how B12 might be transferred from this chaperone to MS. Herein, we report that a sulfur ligated cobalamin species on CblD can transfer B12 to methionine synthase. Biochemical and mutation analysis on key residues suggest a mechanism for the transfer of B12 from CblD to MS. In summary, this study has been instrumental in assigning a function for CblD, which had been elusive previously. In addition, we have discovered how novel coordination chemistry is used to translocate the cofactor cargo to the cytoplasmic target MS.

Organizing Committee

Dr Sandra Misquith,
HoD of Biochemistry

Dr Libi Thomas,
Dean, School of
Chemical Sciences

Faculty members of the department of Biochemistry

Dr Shraddha K Namannavar
Dr Daniel Andrew M Gideon
Dr Sangita Das

fore more information about our department and St Joseph's University