MEETING REPORT

Intrinsically disordered proteins*

The Indian Institute of Science Education and Research Mohali, marked its tenth year of establishment by organizing an international conference on intrinsically disordered proteins (IDPs). IDPs are a functionally important class of proteins involved in a wide spectrum of physiological functions and human diseases like Alzheimer's and Parkinson's diseases, cancer and type-2 diabetes. IDP research is new in India and the conference successfully brought together the emerging community of Indian scientists working in the area.

There were lectures by world-renowned scientists such as Christopher Dobson (University of Cambridge, UK), Peter Wright and Jane Dyson (The Scripps Research Institute, California, USA), Daniel Otzen (Aarhus University, Denmark), Matthew Chapman (University of Michigan, USA), Elizabeth Komives (University of California, San Diego, USA), Rohit Pappu and Timothy Lohman (Washington University in St. Louis, USA), Richard Kriwacki (St. Jude Children Hospital, Memphis, USA), Vladimir Uversky (University of South Florida, USA), Peter Tompa (VIB, Brussels, Belgium), Monika Fuxreiter (University of Debrecen, Hungary), Frances Separovic (University of Melbourne, Australia) and many more. New and emerging topics like cellular functions and dysfunctions, chemical biology and drug design, disease models and therapeutic strategies, were among the few topics that were discussed.

The keynote lecture was delivered by Dobson. He spoke about the significance of protein misfolding and amyloid formation in disease and medicine. A pioneer researcher in the field of IDPs, his lab focuses on a variety of amyloid proteins responsible for neurodegenerative diseases such as Alzhemier's. He discussed how his research group is working on strategies to suppress protein aggregation, to combat the progression of these diseases.

Dyson spoke on how cells and viruses benefit from disordered proteins. IDPs are closely involved in the signal recognition process in cells. Viruses take advantage of this and divert cellular metabolism activities to favour viral infections and to produce new viruses. The same mechanism underlies the development of cancers related to viral infections. Her team is currently studying the mechanics of IDP interactions in the hope providing new insights for developing therapeutic approaches towards combating viral infections and cancer. Wright discussed allosteric regulation of cellular signalling pathways by IDPs. Kriwacki presented a talk on the biological functions of IDPs. He spoke about the multidisciplinary strategies used by his team towards understanding the roles of protein disorder in the regulation of cell apoptosis – the natural process of cell death, cell division and its interaction with small molecules. Many IDPs have an exceptional ability to be responsive to changes in their environment and to undergo induced folding and unfolding, to gain different structures by binding to different partners. Uversky spoke about his work on unusual biophysical properties and strange biological properties of IDPs. Pappu and Tompa discussed the new emerging areas of intracellular phase separation and membrane-less organelles.

Jayant Udgaonkar (National Centre for Biological Sciences, Bengaluru and IISER, Pune) discussed his work on the mechanism of conformational change that occurs in the intrinsically disordered protein tau, which is associated with Alzheimer's disease. He spoke about his ongoing work on investigating the mechanism behind the conversion of tau proteins from monomer state to misfolded amyloid fibrils. Sudipta Maiti (Tata Institute of Fundamental Research, Mumbai) discussed the strategies for designing ligands for IDPs.

P. Balaram (Indian Institute of Science, Bengaluru) was also one of the keynote speakers at the conference. His talk was on the research contributions of G. N. Ramachandran, a pioneering scientist in the field of protein and peptide conformation in India. A student of the Indian Nobel laureate C. V. Raman, Ramachandran played a pivotal role in setting up biophysics research facilities at the University of Madras in the 1950s. His fundamental work led to the Ramachandran map, a cornerstone in modern structural biology.

In addition to the talks, over 100 posters were displayed by students and young researchers, from institutes within the country and abroad.

A sequel to this conference is being planned for the year 2020.

*A report on International conference on 'Intrinsically Disordered Proteins' held during 9–12 December 2017.

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