

Changing paradigm of biochemical sciences: molecular networks in health and disease

The 23rd meeting of TRendys in Biochemistry was held recently. TRendys is a national forum to discuss frontier areas and concepts in biochemistry. The meeting was inaugurated by S. K. Srivastava (North-Eastern Hill University (NEHU), Shillong) who also presented the TRendys Oration Award to Hemanta K. Majumder (CSIR-Indian Institute of Chemical Biology, Kolkata). Ramesh Sharma (NEHU) gave the welcome address. A. K. Kondapi (University of Hyderabad) briefed the audience on how this national meeting was first initiated by T. Ramasarma (IISc, Bengaluru) to enable students to interact with scientists on novel discoveries and breakthroughs in the subject. Ramasarma recounted how he was invited by CSIR to join a programme to motivate young scientists. The inaugural programme concluded with the vote of thanks by A. K. Singh (NEHU).

The first session started with the Oration Lecture by Hemanta K. Majumder on 'The small and minicircle DNAs in kinetoplastid parasites'. Kinetoplastid parasites exist in two forms – promastigotes in the gut of sandfly and amastigotes as intracellular circular form residing inside the host macrophage. The mitochondria of this parasite are huge and contain the kinetoplast DNA (kDNA). *Leishmania donovani* causes leishmaniasis, the visceral form of which is highly prevalent in India. One of the possible mechanisms of eradicating leishmaniasis is by targeting the kDNA network, which may be achieved by targeting the 'cell magicians', DNA topoisomerases. D. N. Rao (IISc) delivered a lecture on '*Helicobacter pylori* – versatile survival artiste'. Although the bacteria contribute to the gut microbiome, they can be virulent and cause diseases like gastritis and ulcers. They can even be carcinogenic. Ramasarma gave a lucid presentation on 'Know your "customers", the analytical method', wherein he reminded students that despite the advancement in technology, one must understand the basic concept of biochemistry like enzyme assays. He ad-

vised students to standardize experiments so that it works best for them and stated 'analysis is the best strength for you'. The first session ended with a talk by Nashreen S. Islam (Tezpur University) entitled 'Metal complexes as enzyme inhibitors – a mode of action for inorganic drugs', wherein she highlighted the importance of enzyme inhibition by metal complexes as a therapy in various diseases such as platinum complexes for anti-cancer treatment, gold (I) thiolate complexes in anti-arthritis application and antimony complexes used for anti-parasitic (leishmaniasis) treatment.

The first lecture of the second session was delivered by Kondapi on 'Neuronal models in understanding neurodegeneration and therapeutics activity'. He elaborated on the existing *in vitro* and *in vivo* models for Parkinson's disease (PD). While neurotoxins like MPTP and 6-OHDA are used to induce PD, rotenone induces aggregation of α -synuclein in neurons. Curcumin has been shown to protect the neurons from toxicity of rotenone. N. Siva Kumar (University of Hyderabad) spoke on 'Lysosomal biogenesis in the invertebrates – alternate pathways', wherein he described the specialized acidic organelles, lysosomes and enzymes present within that function at pH 5. These enzymes have to be glycosylated and phosphorylated before they are packed inside the lysosomes. These enzymes are targeted to the Golgi complex through the interaction with specific receptors called the MPR (mannose-6-phosphate receptor). MPR-46 and MPR-300 are present on the Golgi apparatus and are conserved in all invertebrates from fish to mammals. Ramesh Sharma in his talk entitled 'Geroscience: then and now', focused on various theories of aging and how they lead to recent developments in gerontological research of network of events, particularly of nutrient sensing pathways controlling the aging and longevity of an organism. He stressed that age is a risk factor for many diseases, and reactive oxygen species is one of the most important factors that contributes to aging. Dietary restriction is one of the most widely known interventions for healthy aging. DR mimetics like resveratrol increase healthy lifespan for those who are unable to restrain from

eating more. He emphasized that a long healthy life could be achieved by following a right kind of lifestyle. S. Nagini (Annamalai University, Chidambaram) delivered the last lecture of the day. She spoke on 'Moonlighting proteins: implications in biology and medicine', and mentioned that these proteins are ubiquitous in nature, ranging from plants to mammals, and can perform multiple, autonomous and unrelated functions. There are more than 288 known multitasking proteins and the different subcellular localization can render different functions. She also highlighted that moonlighting proteins add to cellular complexity as well as to diseases such as cancer.

P. Kondaiah (IISc), on 'A fate worse than death: apoptosis as an oncogenic process'. He explained that dysregulation of apoptosis causes several disorders, including neurodegeneration and autoimmune diseases. Apoptosis can be brought about by both intrinsic and extrinsic factors, and can be used as an index of metastasis. Many apoptotic proteins are recognized, one of which is Bcl-2, which is a reliable marker of cancer prognosis. He concluded that 'apoptosis is central to cancer therapy but also a failure to treatment'. A. N. Rai (NEHU) delivered a talk on 'Cyanobacteria as biofertilizer for rice cultivation: towards associative nitrogen fixation and biotrophic nitrogen transfer'. He focused on the beneficial symbiotic interaction of cyanobacteria with the host and the commercial use of cyanobacteria as a biofertilizer for cultivation of rice. The last lecture of the session was by R. N. Sharan (NEHU) on 'Can cancer be conquered?'. He emphasized that cancer is curable if detected early. Emerging hallmarks of cancer include the dysregulation of cellular energetic and reprogramming energy metabolism. Cancer cells prefer glycolysis even under aerobic condition and Glut-1, a glucose transporter, that slows down glycolysis can be targeted for cancer treatment. After every lecture there was a lively discussion.

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