

[Seminar] Encoding mechanical and chemical information in cell membrane organization: a sensory engram by Prof. Satyajit Mayor

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Lab3, C700

September 13, 2024 15:00 - 16:00 at C700, Lab3.

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Warwick Medical School



<https://warwick.ac.uk/fac/sci/med/research/biomedical/labs/smayor/>

<https://www.ncbs.res.in/faculty/mayor>

https://en.wikipedia.org/wiki/Satyajit_Mayor

Title: **Encoding mechanical and chemical information in cell membrane organization: a sensory engram**

Summary:

The surface of a eukaryotic cell interfaces with the external milieu constantly decoding signals in the form of chemical and mechanical inputs. These cues are interpreted primarily by membrane receptors which are embedded in the plasma membrane, a fluid matrix templated by an active cortical actin meshwork. One such membrane receptor, the integrin receptor receives chemical inputs in the form of the extracellular matrix, and mechanical signals from the physical environment. Chemical cues activate intracellular signaling cascades whereas mechanical cues activate mechano-transducers. By studying the mechano-chemical activation of integrin receptors Prof. Mayor's group found that the activation of these two pathways result in the creation of localized membrane domains consisting of nanoclusters of GPI-anchored proteins and lipids, resembling active emulsions. These membrane domains are generated by active processes involving acto-myosin stresses, imprinting the membrane with unique patterns. They hypothesize that this enables the encoding of the chemical and mechanical nature of the external milieu, resulting in the regulation of crucial aspects of integrin receptor function such as cell spreading and migration. Thus, this ATP-fueled

membrane composite behaves as a mechano-responsive medium, serving to integrate chemical and physical cues presented at the cell periphery for the regulation of cell physiology.

Following this seminar, we will have a small workshop at the same venue (16:00 – 16:40). Jitu will talk about “The membrane of a living cell - an ATP-fueled fabric”.

BIO:

Prof. Satyajit (Jitu) Mayor is a cell biologist. He is currently the Leverhulme International Professor at Centre for Mechanochemical Cell Biology, University of Warwick, UK and Distinguished Professor (on lien) at National Centre for Biological Science (NCBS), Tata Institute for Fundamental Research, India.

Prof. Mayor studied Chemistry at the Indian Institute of Technology, Mumbai, India. He obtained his Ph.D. in the Life Sciences from The Rockefeller University, New York, USA, and conducted post-doctoral studies at Columbia University, New York, USA, before starting his own laboratory at NCBS in Bangalore. He studies the fine structure, function and dynamics of the membrane of living cells using methods derived from biology, chemistry, engineering, and physics. His work has provided a new understanding of how membrane structure and composition are regulated in living cells, and a deeper perspective on the mechanism and roles of non-clathrin endocytic pathways.

Prof. Mayor has served as the Director of the NCBS, the Institute for Stem Cell Science and Regenerative Medicine and is the founding Chairperson of the Bangalore Life Science Cluster. He is a member of the US National Academy of Science, the World Academy of Science (TWAS), Trieste, Italy, Indian National Science Academy, New Delhi, India and the National Academy of Science, Bangalore, India, and Associate Member of the European Molecular Biology Organization (EMBO).