



Indian Institute of Science
Centre for BioSystems Science and Engineering



SEMINAR

at 11:00 on 28 September 2017 (Thursday)
Main Auditorium, Biological Sciences

Mechanics in cell and tissue organization and function

Prof. Marino Zerial

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Abstract

Our group has been studying the molecular mechanisms underlying endocytosis. A key finding has been the discovery that Rab5 is necessary for the biogenesis of the entire endo-lysosomal pathway. Rab5 regulates endosome fusion via the recruitment of tethering effectors such as EEA1. Upon binding, Rab5 induces an allosteric conformational change on EEA1, from extended to flexible, generating an entropic collapse force that helps pulling the membranes together. Focusing on the liver tissue, we are now using a multi-scale approach, i.e. from the molecular to the tissue scale, to unravel the mechanisms underlying liver tissue organization and regeneration. By confocal imaging and image analysis, we have reconstructed the 3D structure of mouse liver tissue and performed a morphometric analysis of hepatocytes, bile canaliculi (BC) and sinusoidal networks. The resulting geometric model has revealed rules whereby the hepatocytes and endothelial cells interact to form the architecture of the liver tissue. Using a combined experiment-theory approach we found a requirement of BC contractility for bile flow and discovered that the mechanical properties of the BC network play a role in liver regeneration.

Biography of the Speaker

Prof. Marino Zerial is known for his pioneering work in endocytosis and intracellular trafficking. He did his Ph.D. in Biochemistry at the University of Trieste, followed by Postdoctoral stints at Institute J. Monod, Paris and EMBL Heidelberg. He joined MPI-CBG as a Group Leader in 1991 and was appointed as Director in 1998. Prof. Zerial has been the recipient of several prestigious awards, including the FEBS Anniversary Prize and the Gottfried Wilhelm Leibniz Prize. The vision of his research group is to develop a systems understanding of liver structure and function.

