IMCB Invited Speaker

Speaker : **Prof. Tom Kirchhausen**
Professor of Cell Biology and Pediatrics, Harvard Medical School
Senior Investigator, Program in Cellular and Molecular Medicine,
Boston Children's Hospital, USA

Date : 19 April 2013 (Friday)

Time : 4:00PM - 5:00PM

Venue : IMCB Seminar Room, 3-46, Level 3, Proteos, Biopolis

Host : Prof. Wanjin Hong

Seminar :

Dynamics of Endocytosis

A significant portion of our work concerns how macromolecules, macromolecular complexes, and pathogens enter or exit cells, from small proteins to viruses and bacteria. The molecular cargos are too large to simply cross the membrane barrier surrounding cells; instead, they are captured by subcellular membrane-bound containers, whose formation requires the concerted action of dozens to hundreds of proteins, interacting with each other within a very short time frame, typically seconds to minutes.

I will describe how we combine high-resolution snapshots from structural biology with lower-resolution fluorescence microscopy time-series recorded from cells or from reconstituted model systems to generate images, molecular movies and molecular 3D animations to inform us on mechanisms responsible for endocytosis. The talk will be based on our efforts to 'see' in three dimensions the molecular events responsible for assembly of clathrin-coated pits and coated vesicles -- a conserved "nano-machinery" for generating intracellular vesicular carriers in all animals and plants.

The talk will illustrate use of powerful visualization technologies, spanning the range from high-resolution x-ray crystallography and electron cryomicroscopy to single-molecule or subcellular real-time imaging by fluorescence microscopy.

About the Speaker :

Our research focuses on the processes that mediate and regulate the movement of membrane proteins throughout cells. In particular we study the molecular mechanisms that underlie the cell's sorting machineries mediated by the clathrin pathway, the principal route responsible for receptor-mediated endocytosis and for secretion, a route critical for reuptake of membrane at synapses, and a mode of entry usurped by many viral and bacterial pathogens. We also study how during cell division, cells control their size and organelle architecture.

We have defined the structure, interactions, and assembly-disassembly mechanisms of clathrin and many of its associated proteins, through studies extending over three decades. Our work has been characterized by use of emerging technologies -- from the early days of molecular cloning to contemporary live-cell imaging. We use the tools of x-ray crystallography, electron cryomicroscopy, and single-molecule biophysics to create a "molecular movie" of clathrin-mediated endocytosis, and in this way related these molecular events to functional properties of the surfaces of living cells. We also use frontier optical-imaging modalities to examine other cellular membrane remodeling processes.

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