TIFR Centre for Interdisciplinary Sciences
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Seminar

Leading bacteria to the death chamber: A kinder face of Cholesterol

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Cells of our immune system engulf pathogens by enclosing them in a lipid membrane compartment called the phagosome. The phagosome undergoes programmed maturation, where the pathogen is degraded by acidification. Intimately linked to this degradation is active transport of the phagosome inside cells by motor proteins. These motors are nanoscale porters that can walk along protein filaments inside the cell. As they walk, they carry the phagosome as "cargo". Early phagosomes move in back-and-forth manner near the cell periphery, and mature by fusing with other compartments during this period. In contrast, late phagosomes move in almost unidirectional manner towards the cell centre where they fuse with lysosomes (the death chamber). This early-to-late phagosome switch is important for the degradation of pathogens. Tuberculosis bacterium and Salmonella survive by aborting this switch.

We have investigated the mechanism of this switch by precisely counting the number of motor proteins on individual motile phagosomes. This counting is done by using an optical trap which measures the force generated by motors on a phagosome as they move. Our results suggest that the "switch" in a phagosome's fate is because of the formation of cholesterol-rich domains called lipid rafts on the phagosome membrane. Motors cluster into these raft-like microdomains, and by doing so are able to work cooperatively in large teams. I will discuss the biophysical evidence for this clustering, the biochemical mechanisms by which it may be effected and what it implies for phagosome biogenesis.

Tuesday, Jun 16th 2015

11:30 AM (Tea/Coffee at 11:15 AM)

Seminar Hall, TCIS