Tata Institute of Fundamental Research
Survey No. 36/P, Gopanpally Village, Serilingampally Mandal, Ranga Reddy Dist., Hyderabad – 500 046

Seminar

Curvature-dependent Reorganisation of the Endoplasmic Reticulum during Epithelial Cell Migration

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Epithelial cells exhibit coordinated movement of the cells and use either lamellipodial crawling or contractile purse string in order to seal the wounds in the tissue. Cooperation between these dual modes of migration is fundamental to re-establish tissue integrity and is shown to depend on the geometry of the gap. However, very little is known about how the cells respond to a geometrical cue of their own size. We show that cells polarize differently while migrating at different curvatures, aligning the microtubules perpendicular to the wound at the convex curvature and parallel to the wound in a bundle at the concave curvature. Endoplasmic reticulum, the largest cell organelle, also undergoes a drastic reorganisation showing more tubular structure at the convex curvature and dense sheet-like morphology at the concave curvature. This reorganisation is driven by actin polymerisation and branching mediated protrusive forces at the convex curvature and actomyosin contractility at the concave curvature. Tipping the sheet/tubule balance of the ER structure using genetic manipulation affects the cells' choice of migration where the sheet overexpressing cells form more actin bundles and tubule overexpressing cells form more lamellipodia. We propose a forward feedback loop whereby initial protrusive forces at convex curvature and contractile forces at concave curvature lead to drastic structural changes in the ER which are necessary for promoting lamellipodial crawling and purse string closure respectively. Our findings reveal a previously unknown mechanism by which cells perceive and respond to curvature of wounds and has significant implications for understanding cellular mechanics and wound healing processes.

Wednesday, Jan 21st 2026

11:30 Hrs (Tea / Coffee 11:15 Hrs)

Auditorium, TIFRH