

Students' Annual Seminar

Curvature-dependent reorganization of the endoplasmic reticulum determines the mode of epithelial migration

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During epithelial gap or wound closure, cells predominantly use lamellipodial crawling at the convex edge and a purse string like mechanism at the concave edge. However the underlying mechanism that drives this differential response to the geometric cues remains elusive. We perform a cartography of intracellular elements and show that the endoplasmic reticulum (ER) undergoes an edge curvature dependent morphological and functional reorganisation. At the convex edge, both actin and microtubule promote ER tubules expansion whereas at the concave edge, actin alone promotes ER sheet accumulation. Theoretical modelling predicts that edge curvature dependent ER morphology lowers strain energy state of the ER. ER tubules at the convex edge promote the formation of dynamic and perpendicularly oriented focal adhesions, supporting lamellipodial crawling. In contrast, at the concave edge, ER sheets promote stable parallel focal adhesions and promote purse string closure. Together these results reveal that ER reorganisation in response to edge curvature determines mode of collective cell migration of epithelial cells.

Friday, Jan 19th 2024

14:30 Hrs (Tea / Coffee 14.15 Hrs)

Seminar Hall, TIFR-H