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

Seminar

Biophysical routes to study cancer initiation in epithelial tissues

Medhavi Vishwakarma

IISc, Bengaluru

Epithelial tissues are first line of defence for all our organs and are present in our body in varying architectures. Studies on homeostatic epithelial monolayers revealed physical characteristics of epithelial cells and drew parallels with non-equilibrium jammed matter. Our understanding of mechanics of epithelium however remain incomplete, firstly, because the characterisation lack temporal analysis, and secondly, the crosstalk between physical manifestations of jamming, and biochemical signalling remain missing. Here, we investigate spatio-temporal dynamics of epithelial tissues, and study how cellular mechanics could regulate fate of oncogenic cells during cancer initiation. We find that spatial heterogeneity and clustering of biochemical force transducer, actin, dictate fate of HRasV12 oncogenic mutants. Not surprisingly, this spatial actin clustering is linked with clustering of cellular forces, and mark spots of local defects where oncogenic mutants interact with host cells. Interestingly, temporal analysis of cellular forces, and actin reveal an oscillating pattern of a distinct periodicity of several hours. We show that these local oscillations are driven by emergent collective behaviour and allow for oncogenic cell extrusion locally, explaining how a decent fraction of oncogenic mutants evade extrusion, and sustain within the host tissue. When oncogenic mutants are clustered together in bigger groups, tissue specific changes in local mechanics lead to segregation of oncogenic cell clusters, and dictate the fate of these clusters. Together, our studies indicate how changes in the local mechanics of the host tissue may dictate the outcome of cell competition during cancer initiation.

Friday, Sep 27th 2024

16:00 Hrs (Tea / Coffee 15:45 Hrs)

Auditorium, TIFR-H