

Seminar

Epidermal morphogenesis during development and regeneration

Nitya Ramkumar

Duke University, NC

Coordination of cell behaviours is essential for growth in embryonic and juvenile animals, as well as during regeneration of tissue lost by damage or disease. This is particularly challenging for stratified tissues, such as skin, during rapid phases of growth in embryonic development and adult regeneration. Here, multiple cell layers would have to communicate effectively and grow together to ensure stratification remains unaffected. How skin cell layers behave and coordinate their growth when challenged with rapid expansion requires research attention but has been limited by the availability of tools and platforms for quantitative live imaging. Using zebrafish periderm, the outermost layer of the bilayer epidermis, we aim to understand how epidermis behaves and coordinates its growth when challenged with rapid embryonic axial expansion. Using novel tools to visualise cell behaviours and signalling in the periderm and a platform to perform quantitative live imaging of the elongating embryonic epidermis, we find that the periderm experiences increased tension along the anterior-posterior axis, leading to oriented cell divisions, which facilitate directed growth of the tissue. Further, with chemical and optogenetic perturbations, we show that Mitogen-activated protein kinase (MAPK) signalling activity is instructive and sufficient for cells to proliferate in the periderm. Using the established tools, I aim to generate a blueprint of cell behaviours and signalling in the embryonic and adult epidermis and determine features that are conserved across tissues during adult regeneration upon injury. This comprehensive analysis of cell behaviours and signalling in the epidermis will inform strategies for control of repair in human conditions of tissue damage or disease.

Tuesday, Jun 25th 2024

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

Auditorium, TIFR-H