

Department of Biological Sciences

VISITOR'S TALK

Speaker: Dr. Bipul R. Acharya, PhD

Institute for Molecular Bioscience,

University of Queensland, Brisbane, Queensland, Australia

Date/Time: Tuesday, September 19th, 2017 at 12:15 pm

Venue: L8, LHC

Title: A force sensitive biochemical pathway protects epithelial integrity and barrier function under mechanical stress

Epithelial tissue, the lining of exterior body surface and interior organs, function as a selective barrier between human body with its surrounding environment. Our knowledge of epithelial biology has been revolutionized by the realisation that the epithelium is mechanically coherent tissue that transmits forces between neighbour cells via intracellular adhesion. The intracellular force is finally distributed within whole epithelial tissue structure. This force transmission is essential for homeostasis and morphogenesis of postnatal epithelium. In steady state, the dynamic coupling between contractile Actomyosin and E-cadherin at the epithelial zonula adherens (ZA) generates junctional tension that reinforces tissue integrity and barrier function. Being a protective tissue layer epithelia always experience myriad magnitude of mechanical forces, sometimes as a part of normal physiological processes. The mechanistic insights that explain how epithelia sense this increased mechanical stress and therefore respond to them is yet to be unraveled. Our investigation has identified that a biochemical signaling pathway is activated at epithelial ZA when mechanical stress is applied on epithelial monolayer. This stress stimulated signal increases junctional tension and safeguards tissue integrity. Selective inhibition of this force sensitive signaling pathway enormously disrupts epithelial tissue integrity and barrier function. A thorough mechanistic characterization unfolds a unique unconventional myosin that acts as an upstream mechanosensor for activating this stress stimulated signaling pathway.