SUMMER SEMESTER 2025

RTG 2756 CYTAC SEMINAR SERIES

THURSDAY, JUNE 26
09:00 IN HS3

CYTAC
RTG 2756

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ILLUMINATING FORCES IN LIVING TISSUES

How can epithelial tissues withstand large forces and support deformations that drastically increase their length? Adult epithelia regularly experience forces that stretch them by up to 50 %, and to retain their physiological barrier function they must accommodate such large deformations without fracturing. Consequently, cell-cell adhesion must be finely tuned, or pathologies like skin blistering or cancer metastasis can occur. However, the physical principles governing tissue integrity remain difficult to study, as tissue fracture is an inherently multi-scale process that spans up to 10 orders of magnitude in both size and force. Millimetre-sized tissues can withstand millinewton forces, but tissue fracture results from the local failure of single nanometre-sized adhesion complexes that bear piconewton forces. Similarly, tissue homeostasis requires new molecular bonds to form and become load bearing at new cell-cell junctions, linking up the cytoskeleton of neighbouring cells and ultimately enabling the tissue to act as a mechanical continuum. New tools are needed to bridge the scales of molecular, cellular and tissue-level tension, to understand what molecular processes support tissue integrity. Here we develop a new experimental tool to study tissue integrity and force propagation across scales. We engineer living model tissues where DNA-based molecular force sensors in chimeric cell-cell junctions provide a molecular-scale force readout, illuminating how forces propagate in mechanically challenged living tisses.