

SUMMER SEMESTER 2025

RTG 2756 CYTAC SEMINAR SERIES

TUESDAY, MAY 13
17:00 IN HS5

CYTAC

RTG 2756

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ORGANELLE MECHANO-SIGNALLING AND

ERROR CORRECTION IN THE EARLY EMBRYO

The body plan and shape of an organism emerges from dynamic processes at the single cell level. To robustly build multicellular structures and tissues of defined form and function, cells need to efficiently process both biochemical and physical signals and adapt to noise and stress factors. We employ an interdisciplinary approach that comprises live cell in vivo imaging and bottom-up in vitro methods to identify mechanisms that control morphodynamic processes in development and regulate functional plasticity at the cell and tissue level. We previously identified that the nucleus is an intracellular mechanosensing hub and the activation of cell mechano-transduction pathways at the nuclear envelope controls cell mechanics and migration plasticity. By this mechanisms cells can rapidly adapt to mechanical forces in their tissue environment. I will present our recent progress in the quantitative mapping of intracellular organelle structures in vitro and in vivo and discuss our work on mechanical stress protection. We identified a rapid remodelling of nucleus-mitochondrial organisation, associated with mechano-metabolic changes in the nucleus to promote DNA damage repair and cell fitness. I will further discuss the role of mechano-signalling pathways in regulating actin cytoskeleton dynamics and cellular error correction in vivo. Our work supports that 'mechano-plasticity' at the cellular and tissue level confers stress adaptability relevant for robust development and tissue homeostasis.