Bio Phys TO

Lunchtime Seminar Series

WHEN?
April 10, 2025
12:00-1:00PM

WHERE?
McLennan Physical Laboratories
255 Huron Street
Rm. 606

WHY?
Join us for pizza and an opportunity to learn and engage with members of the UofT Biophysics community!

SPEAKER

Sergey Plotnikov

Department of Cell and Systems Biology

A TRPV4-dependent calcium signaling axis governs lamellipodial actin architecture to promote cell migration

Cell migration is crucial for development and tissue homeostasis, while its dysregulation leads to severe pathologies. Cell migration is driven by the extension of actin-based lamellipodia protrusions, powered by actin polymerization, which is tightly regulated by signaling pathways, including Rho GTPases and Ca2+ signaling. While the importance of Ca2+ signaling in lamellipodia protrusions has been established, the molecular mechanisms linking Ca2+ to lamellipodia assembly are unknown. Here, we identify a novel Ca2+ signaling axis involving the mechano-gated channel TRPV4, which regulates lamellipodia protrusions in various cell types. Using Ca2+ and FRET imaging, we demonstrate that TRPV4-mediated Ca2+ influx upregulates RhoA activity within lamellipodia, which then facilitates formin-mediated actin assembly. Mechanistically, we identify CaMKII and TEM4 as key mediators relaying the TRPV4-mediated Ca2+ signal to RhoA. These data define a molecular pathway by which Ca2+ influx regulates small GTPase activity within a specific cellular domain – lamellipodia - and demonstrate the critical role in organizing the actin machinery and promoting cell migration in diverse biological contexts.

SEMINAR SPONSORS

UTSG Departments of
Biochemistry
Chemistry
Physics