University of Stuttgart

Stuttgart Research Center Systems Biology (SRCSB)

Systems Biology Seminar Talk

„Decoding and Re-encoding MAPK Fate Decision Signaling “

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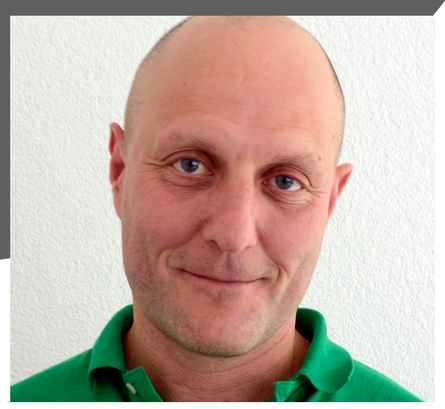

Thursday
November 19, 2020
11 a.m. – 12 a.m.

Log in:
https://unistuttgart.webex.com/unistuttgart-en/j.php?MTID=m6b102ebc1c4126b6bec098b49e23324c

Abstract:

Cells dynamically sense and respond to ever changing external stimuli through sophisticated signaling networks. Accordingly, signaling dynamics rather than steady states control fate decisions. For many signaling pathways, heterogeneous dynamic signaling states occur within distinct cells, explaining fate variability observed within a cell population. Measuring single cell signaling dynamics is therefore key to understand how cellular responses correlate with specific cell fate decisions. Here, we combine biosensor imaging, optogenetics and mathematical modelling to map how different MAPK signalling network circuitries fine tune ERK activity dynamics at the single cell level.

We apply these technologies to study fate determination system in collectives of MCF10A breast epithelial cells. In a process called epithelial homeostasis, this cell collective constantly senses the state of the epithelium, and reacts by spatially tuning survival and proliferation fates to ensure a critical cell density necessary for proper barrier function. Here, we observe two single-cell ERK signalling modes that consist either of stochastic pulses (in presence of growth factor stimulation), or of co-ordinated ERK waves across multiple cell layers that originate around apoptotic extruding cells (in absence of GFs or in presence of cytotoxic stress).

CV:

Olivier received a PhD in Biophysical Chemistry from the Biocenter of the University Basel. He then performed his Postdoc at the Scripps Research Institute in La Jolla, CA, where he developed new technologies to image signaling dynamics in single living cells. Before joining the Institute of Cell Biology at the University of Bern, he was a Swiss National Science Foundation Professor at the Department of Biomedicine of the University of Basel. In the lab, he tries to convince people to produce ever more images of cellular signaling, and to setup new computational approaches to make sense of these complex datasets.

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