



Seminar with Jakub Sedzinski

Monday, March 18th, 2024 / 9:00-10:00 / Skou Building Seminar Room (1115-151B)

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at the University of Copenhagen



Patterning Basal Bodies: Unraveling the Blueprint for Functional Multiciliated Cells

Abstract:

Motile cilia are integral for effectively distributing mucus and other cell secretions within the respiratory tract. The initiation and anchoring of these motile cilia are orchestrated by centriole-like structures known as basal bodies at the cell cortex on the apical side. Despite their crucial role, the simultaneous execution of the complex processes involved in nucleating and patterning basal bodies, while expanding the apical domain of the cell, remains poorly understood.

In our study, utilizing a combination of imaging techniques, we identify actin as the primary driver behind these intricate processes. We observe actin reorganizing into cables and meshwork to fulfill diverse tasks: transporting basal bodies from the basal to the apical side via cables, and distributing basal bodies across the apical domain while expanding it through meshwork. Our high-resolution and high-speed imaging analyses reveal a correlation between basal body dynamics and actin meshwork reorganization. Furthermore, while basal bodies display diffusive behavior locally, they exhibit directional motion at the scale of the apical domain. We propose that this complex behavior may stem from actin polymerization and cross-linking, generating the pushing force required for apical domain expansion.

Biographical sketch: Associate Professor Jakub Sedzinski leads the Mechanics of Tissue Homeostasis group at the NNF Center for Stem Cell Medicine (reNEW), University of Copenhagen, Denmark. With a background in biology, physics, and computational biology, he completed his PhD at the Max Planck Institute for Cell Biology and Genetics in Dresden, Germany, focusing on cytokinesis. Awarded an EMBO postdoctoral fellowship, he advanced his research at the University of Texas at Austin, USA, identifying a novel cell behavior, apical emergence, during his study on cell shape regulation in embryos. Since March 2017, he has been leading his research group on the development, regeneration, and homeostasis of respiratory epithelia.

