



SEMINAR ANNOUNCEMENT

We would like to invite you to attend this seminar hosted by Dr Philipp Kaldis:

Date: 27 February 2019, Wednesday

Time: 11:00AM – 12:00PM

Venue: Level 3, IMCB Seminar Room 3-46, Proteos, Biopolis

Speaker: Dr Teemu Miettinen, Sir Henry Wellcome Postdoctoral Research Fellow, Lloyd lab at University College London & Manalis lab at Massachusetts Institute of Technology

Title: Energetic landscape of mammalian cell division: High resolution monitoring of mitotic cell growth and mitochondrial metabolism on a single-cell level

The process of cell division has been extensively studied for decades with focus on signaling processes controlling mitotic entry and progression. Bioenergetically, cell division is commonly viewed as an energy consuming process during which energy production is increased and energy consuming processes, such as cell growth, are inhibited. However, this energetic view of mitosis relies heavily on indirect population-based measurements of growth and metabolism. We have utilized high precision mass measurements with suspended microchannel resonators together with protein synthesis assays, fluorescence-based metabolic reporters and modeling of mitochondrial energetics, to quantify cell growth, translation and mitochondrial ATP synthesis rates between mitotic stages on a single-cell level. Our experiments in mammalian cells reveal a highly dynamic control of growth rates during mitosis, as well as a partial inhibition of mitochondrial ATP synthesis during mitosis, both processes being controlled by Cyclin Dependent Kinase 1. By combining our single-cell monitoring approaches with small-molecule inhibitors and chemical genetics, our work provides insights into the regulation of mitotic progression and division symmetry, as well as into antimetabolic cancer chemotherapies which arrest cells into metabolically altered cell state. More broadly, these results represent our first steps towards a quantitative view of the energetic landscape of mitosis.

Biography:

Teemu Miettinen is a cell biologist with background in biochemistry and molecular biology. Teemu received his PhD on studies connecting mammalian cell size and metabolism at the University of Dundee in Scotland in 2015. In 2016 Teemu was awarded the Sir Henry Wellcome research fellowship, which established Teemu as an independent researcher. Working at Massachusetts Institute of Technology Teemu focuses on single-cell level studies on the regulation of cell growth and metabolism at different cell cycle stages in mammalian cells. A key long-term goal of the research is to build a systematic view of the energetic landscape of mitosis that quantifies ATP consuming and producing activities in different mitotic stages. To achieve these research goals, Teemu collaborates closely with the Manalis lab, which has developed microfluidic tools for continuous monitoring of cell's biophysical features together with fluorescence based markers.

ALL ARE WELCOME (No registration required)

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Thank you.