

Speaker name: Rickard Sandberg, Karolinska Institute

Title: “Deciphering transcriptional kinetics from single-cell RNA sequencing”

Short abstract:

The advancement of single-cell RNA-sequencing (scRNA-seq) has opened up for global analyses of transcription regulation and dynamics. My lab has developed various full-length scRNA-seq protocols (e.g. Smart-seq2) that provide detailed transcriptomes from individual cells which are suitable for allele-resolution analyses. Here, we have used a combination of experimental and computational strategies to estimate transcriptional burst kinetics for endogenous genes using allele-sensitive scRNA-seq. The analyses revealed a genomic encoding of transcriptional burst kinetics in promoter and enhancer elements, which opens up for mechanistic dissection of transcriptional dynamics. Together with mRNA degradation rates and turnover estimates, we have obtained further temporal insights into the allele-level transcriptional dynamics, and how it differs for different kinds of genes. Altogether, transcriptome-wide single-cell measurements of gene expression is enabling a more quantitative understanding of the episodic transcription of our genes, and opens up for the inquiries to its cellular and phenotypic consequences.

Short bio:

Rickard Sandberg is Professor in Molecular Genetics at the Karolinska Institutet, leading a research group focusing on understanding the mechanisms of gene regulation through improved measurements of gene expression at single-cell and allelic resolution. His lab is developing experimental and computational methods that are being used to address questions such as allele-specific expression, the allelic regulation of autosomes and sex chromosomes and transcriptional dynamics. Rickard received his PhD from Karolinska Institutet in 2004 (working with Ingemar Ernberg) and thereafter pursued a postdoc with Christopher Burge at MIT working on post-transcriptional gene regulation. In 2008, he got funding to start his own lab at Karolinska Institutet and later the Ludwig Institute for Cancer Research. He became an EMBO Young Investigator (2012), a Vallee Scholar (2015) and received Nordic prizes including Jahres Prize for younger researchers and Göran Gustaffson prize in molecular biology. In 2015, he became a full Professor at the Karolinska Institute.

Link lab website: <https://sandberg.cmb.ki.se>