Functional Genomics and Metabolism

Distinguished Seminar

Thursday, October 24 from 13.00-14.00
in BMB Seminar room (V18-501-1)

"Chromatin Replication and Epigenome Maintenance"

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Host: Assist. Prof. Kedar Natarajan

Abstract

In dividing cells, faithful duplication of the genome must be accompanied by reproduction of the chromatin landscape on newly synthesized DNA. Our research focuses on how human cells replicate chromatin and ensure transmission of genetic and epigenetic information during cell division. We are interested in understanding i) how histones are handled during DNA replication in order to propagate histone-based information, ii) how DNA replication impacts on the chromatin landscape and cell fate decisions, and iii) the interplay between chromatin replication and genome maintenance.

We previously developed Nascent Chromatin Capture (NCC) for proteomic analysis of chromatin replication (Alabert et al., 2014 Nature Cell Biol) and used NCC to investigate inheritance of histone modifications during cell division (Alabert et al., 2015 Genes Dev). In addition, we have taken a structure-function approach to understand mechanistically how new and old histones are handled at the replication fork (Huang et al., 2015 Nature Struct Mol Biol). Recently, we developed tailored genomic approaches allowing us to study recycling of modified parental histones and restoration of the histone modification landscape across the cell cycle

(Petryk et al., 2018 Science; Reveron Gomez et al., 2018 Mol Cell). I will discuss our current understanding of how the histone modification landscape is reproduced after DNA replication. In addition, I will discuss how several key regulators of homologous recombination recognize H4K20me0, a signature of post-replicative chromatin (Saredi et al., 2016 Nature). Our data explains how cells to choose DNA repair pathway according to the replicative state of a genomic locus and the presence of a sister chromatid substrate for error-free DNA repair.