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MPI-NAT SEMINAR SERIES

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Human mitochondrial DNA and its expression

The human mitochondrial genome must be replicated and expressed in a timely manner to maintain energy metabolism and supply cells with adequate levels of adenosine triphosphate. In this presentation, we will describe some of the layers of regulation that cooperate to fine-tune levels of mitochondrial DNA (mtDNA) transcription and replication in human cells. Central to this process is the idea that replication primers and gene products both arise via transcription from a single light strand promoter (LSP). Primer formation can influence gene expression, with no consensus on how this is regulated. We discuss the recent discovery of a second light strand promoter (LSP2) in humans and explore how this promoter may enable replication and gene expression to be orchestrated from two distinct sites. We will also discuss how newly formed, mitochondrial genomes are separated after replication and describe how structural changes to the mitochondrial isoform of topoisomerase 3A enables it to act independently of its nuclear role as a component of the Holliday junction-resolving BLM-Top3α-RMI1-RMI2 (BTR) complex.
Throughout the presentation, the importance of the basic processes discussed here will be highlighted through observations in patients with mitochondrial diseases caused by pathogenic variants in proteins central to mtDNA replication and transcription.

Monday, 20.11.2023, 10:30 am

Host: Stefan Jakobs

Large Seminar Room
Faßberg-Campus

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