Institute of Molecular Genetics
of the Czech Academy of Sciences

Regular Wednesday IMG seminar

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"Homologous recombination – from repair of DSBs to processing stalled replication forks and human diseases"

Homologous recombination (HR) is a central genome maintenance pathway that safeguards DNA integrity during both double-strand break (DSB) repair and replication stress. A key intermediate of HR is the nucleoprotein filament formed by RAD51 on single-stranded DNA, which mediates homology search and strand invasion. During DSB repair RAD51 filament assembly is tightly regulated by mediator proteins, including BRCA2, and RAD51 paralogs, ensuring accurate repair using a homologous template and preventing genome instability. Beyond canonical DSB repair, HR plays a crucial role at stalled replication forks, where RAD51 stabilises nascent DNA, protects forks from nucleolytic degradation, and promotes fork reversal and restart. The dynamic regulation of RAD51 filament formation and disassembly at replication forks is essential for balancing protection and timely recovery of DNA synthesis. Dysregulation of these processes leads to pathological outcomes, including chromosomal instability and tumourigenesis. Defects in HR factors, particularly those controlling RAD51 filament dynamics, are strongly linked to human diseases such as cancer predisposition syndromes. Understanding how RAD51 orchestrates HR across different DNA damage contexts provides critical insights into genome stability mechanisms and offers therapeutic opportunities, including synthetic lethality-based cancer treatments.

The seminar will be held

on Wednesday 8 April 2026 at 15:00

in the Milan Hašek Auditorium at IMG

(Institute of Molecular Genetics of the Czech Academy of Sciences, Vídeňská 1083, Prague 4)