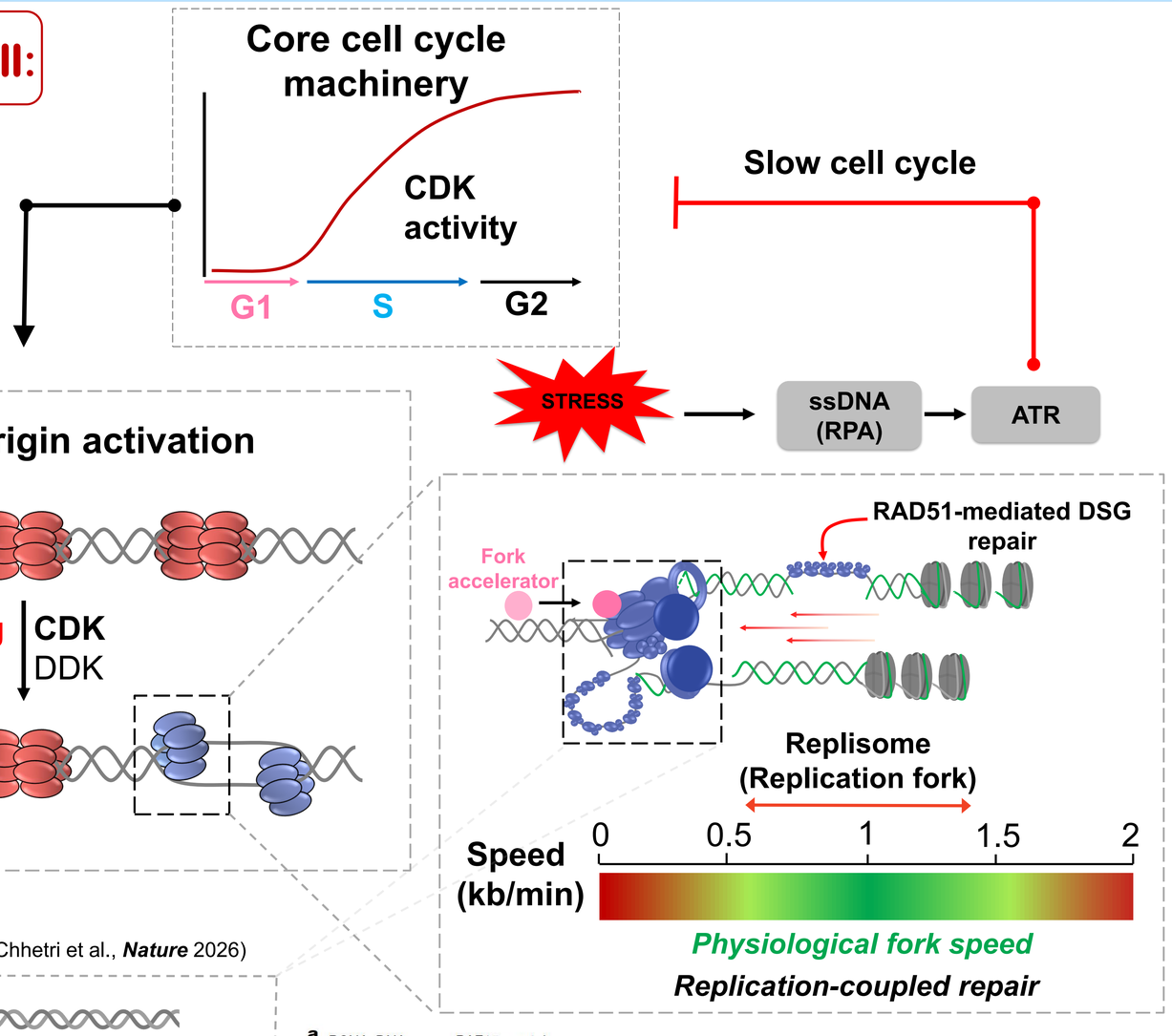
Cell Cycle & Genome Surveillance in patho-physiology

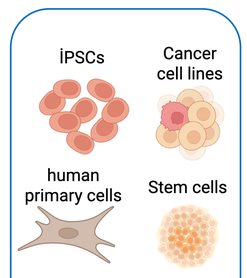
Welcome to DNA replication & Cell cycle dynamics Lab

SOMYAJIT LAB

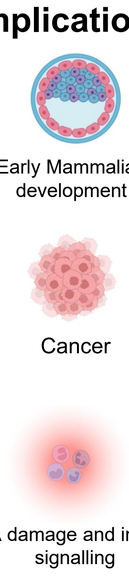
Research in nutshell:



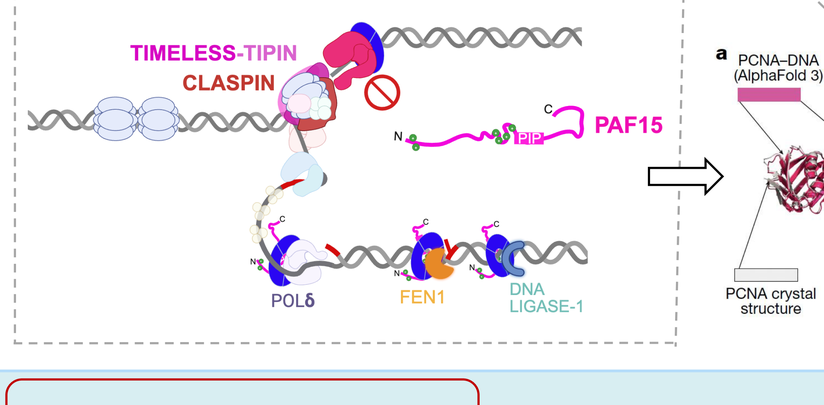
Model system



Implications



Recent discovery (Chhetri et al., ***Nature*** 2026)



Projects directions:

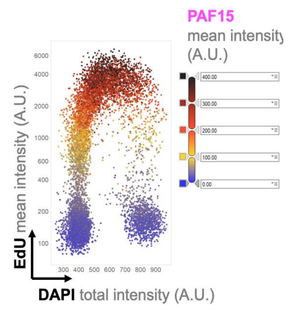
- **Genome-epigenome cross-talk in neuro-pathophysiology:** ***role of oncohistone and oncohistone-mimic in children brain cancer***
- **DNA repair and DNA replication compartmentalization in chromatin space:** ***implications in BRCAness and cancer therapy***
- **How do human replisome achieve optimal replication velocity in a metabolically fluctuating environment?:** ***implication for early development vs cancer cell cycles***
- **Replisome based rate-limitations in genome integrity and shaping DNA methylation landscape:** ***Fundamental regulation of genome integrity and aneuploidy formation***

Major analytical approaches:

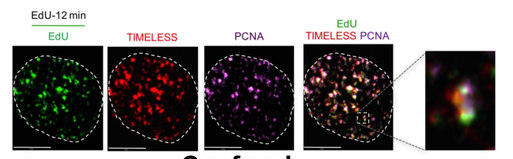
Mechanistic state-of-art Microscopy

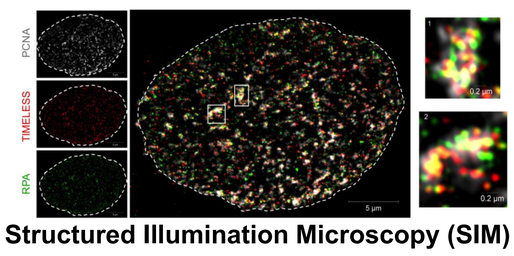
QIBC
(High-content imaging and automated high-throughput single-cell data analysis)

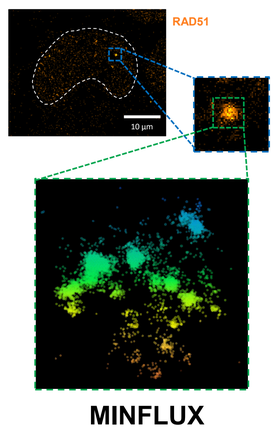
AI-assisted Data Analysis
(single-cell resolution)



Super-resolution Microscopy

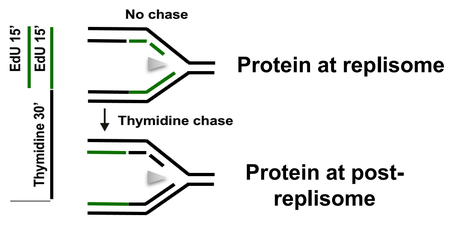


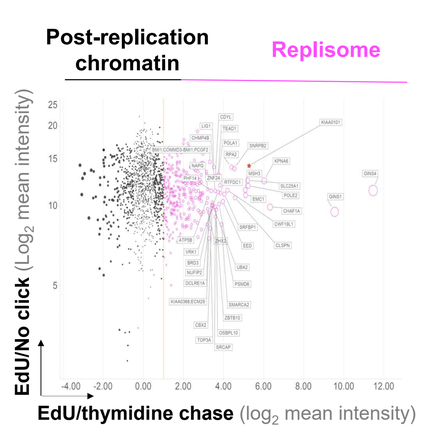




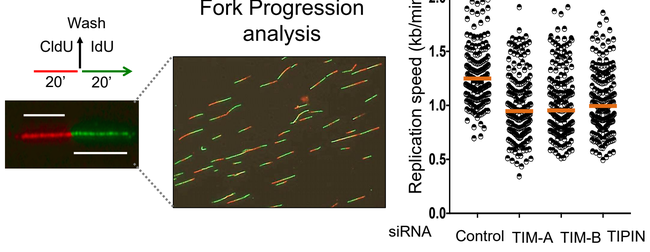
Replisome/DNA repair Biochemistry

iPOND-Mass spectrometry





Single molecule DNA fiber



Lab life:

If you are interested joining the lab then please contact Kumar: **ksom@sdu.dk**

Lab webpage- https://www.somyajitlab.com/

Further Reading:

- ***PAF15–PCNA exhaustion governs the strand-specific control of DNA replication.*** Gita Chhetri, Sugith Babu Badugu, Narcis-Adrian Petriman, Mikkel Bo Petersen, Aylin Seren Güller, Nora Fajri, Manon Coulée, Ganesha Pandian Pitchai, Jan Novotný, Frederik Tibert Larsen, Andreas Fønss Møller, Morten Frendø Ebbesen, Tina Ravnsborg, Anoop Kumar Yadav, Barath Balarasa, Anita Lunding, Hana Polasek-Sedlackova, Ole Nørregaard Jensen, Kim Ravnskjaer, Jonathan R. Brewer, Jesper Grud Skat Madsen, Nataliya Petryk, Jens S. Andersen, **Kumar Somyajit, *Nature* 2026**. 10.1038/s41586-025-10011-3
- ***Homology-directed repair protects the replicating genome from metabolic assaults.*** **Somyajit K#***, Spies J#, Coscia F, Kirik U, Rask MB, Lee JH, Neelsen KJ, Mund A, Jensen LJ., Paull. TT, Mann M, Lukas J*. ***Developmental Cell.* 2021** Feb 22;56(4):461-477.
- ***Redox-sensitive alteration of replisome architecture safeguards genome integrity.*** **Somyajit K**, Gupta R, Sedlackova H, Neelsen KJ, Ochs F, Rask MB, Choudhary C, Lukas J. ***Science.* 2017** Nov 10;358(6364):797-802.