

Abstract:

- Throughout their lifecycle, plants are subjected to DNA damage from various sources, both environmental and endogenous. Investigating the mechanisms of the DNA damage response (DDR) is essential to unravel how plants adapt to the changing environment, which can induce varying amounts of DNA damage.
- Using a combination of whole-mount single-molecule RNA fluorescence in situ hybridization (WM-smFISH) and plant cell cycle reporter lines, we investigated the transcriptional activation of a key homologous recombination (HR) gene, *RAD51*, in response to increasing amounts of DNA damage in *Arabidopsis thaliana* roots.
- The results uncover consistent variations in *RAD51* transcriptional response and cell cycle arrest among distinct cell types and developmental zones. Furthermore, we demonstrate that DNA damage induced by genotoxic stress results in *RAD51* transcription throughout the whole cell cycle, dissociating its traditional link with S/G2 phases.
- This work advances the current comprehension of DNA damage response in plants by demonstrating quantitative differences in DDR activation. In addition, it reveals new associations with the cell cycle and cell types, providing crucial insights for further studies of the broader response mechanisms in plants.



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Biosketch:

Konstantin works as a postdoctoral researcher at 3D organization of the cell nucleus laboratory at Plant Biology Department of Swedish Agricultural University in Uppsala, Sweden. His main focus there are questions related to DNA damage response and mechanisms governing changes in chromatin positioning within the nucleus (chromatin mobility). He received Doctoral degree (Ph.D.) in Genomics and Proteomics programme from Faculty of Science at Masaryk University in Brno, Czechia in January 2021 for his work describing chromatin states associated with transcriptionally active and inactive fractions of ribosomal DNA.