Understanding the role of nuclear lamina during the murine polyomavirus infection using microscopy

Bruštíková Kateřina[1], Rjabčenko Boris[1], Huérfano Sandra[1] and Horníková Lenka

[1] Department of Genetics and Microbiology Faculty of Science, Charles University, Prague, Czech Republic

The nuclear lamina (NL) is a dense meshwork of intermediate filaments V, type A lamins (lamin A/C), type B lamins (lamin B1 and B2) and membrane associated proteins. NL is located closely adjacent to the nucleoplasmic side of the inner nuclear membrane. It maintains the shape and integrity of the nucleus and plays important role in fine-tuning of DNA related processes e.g., replication and transcription and has been suggested to play a role in cell defense against pathogens. For viruses replicating in the nucleus, NL represents a natural barrier that restricts translocation of their genomes to the nucleus during entry or prevents virus progeny exit from the nucleus late times post-infection. Viruses had evolved different mechanisms to overcome this obstacle by affecting NL integrity or its composition. We followed a possible role of NL in the murine polyomavirus infection (MPyV).

First, we used confocal, STED super-resolution microscopy and semi-permeabilization assays to examine the structure and integrity of the nuclear lamina late times post infection (40h) or after transient expression of capsid proteins. We found that during infection as well as in the cells expressing MPyV capsid proteins (VP1, VP2 and VP3), the major capsid protein VP1 accumulates at the periphery of the nucleus under the nuclear lamina. Furthermore, although we observed the irregularities in the NL staining by confocal microscopy (suggesting its disruption), data from both STED resolution microscopy and nuclear envelope semi-permeabilization assay proved that nuclear integrity was preserved. Next, we performed in *situ* fractionation of infected cells late times post infection (40h) and detected lamins, VP1 protein and viral genomes in the last insoluble fraction, thus, indicating potential binding of virions to nuclear lamins. Lastly, using confocal microscopy, speckles positive for LT and lamin A/C staining were detected at early times post-infection (15-24 hpi). All together these data suggest that during MPyV infection NL could serve as a scaffold for replication and/or the formation of virus progeny.

Presenter's contact: katerina.podolska@natur.cuni.cz