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LABORATORY OF

BIOLOGY OF THE CELL NUCLEUS

nucleus, lamins, lipids, transcription, histone deacetylases, nuclear periphery, super-resolution microscopy

In the picture:

1. Pavel Hozák | **2. Lenka Pišlová** | **3. Lívia Uličná** | **4. Sara Eliana Lopés Escudeiro** | **5. Vlada Filimonenko** | **6. Pavel Kříž** | **7. Ilona Kalasová** | **8. Miloslava Maninová** | **9. Iva Jellínková** | **10. Jindřiška Fišerová** | **11. Jana Uhlířová** | **12. Veronika Fáberová** | **13. Margarita Sobol** | **14. Lenka Jarolímová**

Cell nucleus is a fascinating organelle, where some 6×10^9 base pairs of DNA fold as a nucleoprotein complex (i.e., chromatin) into higher-order arrays so as to fit in a structure measuring only $10 \mu\text{m}$. The machineries for transcription of genes and processing of RNA products, for accurate DNA replication, repair and recombination are precisely regulated within the nucleus. Multiple protein-protein, protein-nucleic acid, and protein-lipid interactions take place in specific microenvironments forming functional domains. Our effort concentrates around three topics:

- 1] Phosphoinositides (PIs) are negatively charged glycerol-based phospholipids. Growing evidence shows the importance of PIs in the nuclear functions. The PIs are implicated in pre-mRNA processing, DNA transcription and chromatin remodelling. However, these functions are still poorly understood. We therefore employ a multi-disciplinary approach in order to study the functions of nuclear lipids in transcription and chromatin remodelling.
- 2] Lamins are filamentous proteins forming the nuclear lamina and other poorly characterized structures in the nuclear interior. Our preliminary data reveal interactions of lamin A with phospholipid PIP2 on the surface of newly described structures – PIP2 islets. Our project will bring new data on the role of these structures in regulating nuclear order, transcription patterns and development of laminopathies.
- 3] Nuclear periphery represents a complex compartment of substantial importance for chromatin organization. We aim to understand the mechanism of chromatin targeting to the nuclear periphery and its consequences in gene expression and chromatin organization during the developmental processes.

Selected recent papers:

Marášek P, Dzijak R, Studenyak I, Fišerová J, Uličná L, Novák P, Hozák P: Paxillin-dependent regulation of IGF2 and H19 gene cluster expression. **J Cell Sci** **2015** 128(16): 3106-16.

Venit T, Kalendová A, Petr M, Dzijak R, Pastorek L, Rohožková J, Malohlava J, Hozák P: Nuclear myosin I regulates cell membrane tension. **Sci Rep** **2016** 6: 30864.

