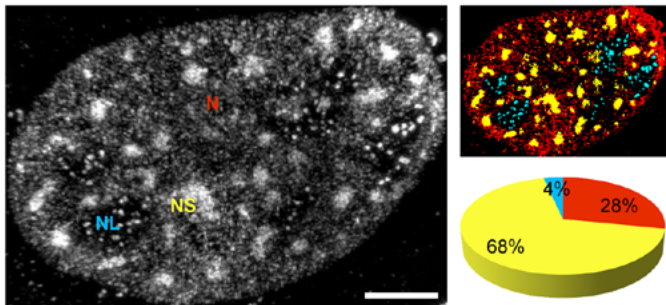


**Cell nucleus, regulation of gene expression, nucleoskeleton, nuclear myosins and phospholipids, microscopy**

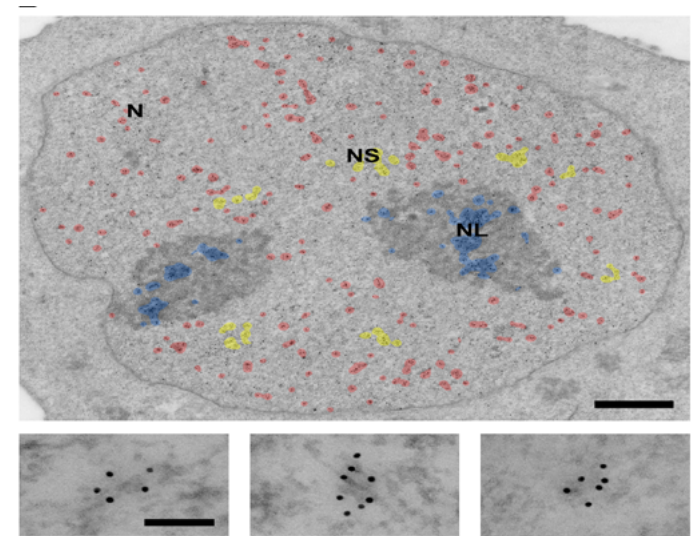
In diploid mammalian cells, some  $6 \times 10^9$  base pairs of DNA fold as a nucleoprotein complex [i.e., chromatin] into higherorder arrays so as to fit in a nucleus measuring only 10  $\mu\text{m}$ . The nucleus also contains machineries for transcription of genes and processing of RNA products, and for precise DNA replication, repair and recombination. The nuclear interior is therefore functionally highly compartmentalized, and recent evidence points strongly to structurerelevant regulation of the nuclear functions – however, the mechanisms forming the 3Dstructure of the nucleus are still mostly obscure. We therefore employ a multidisciplinary approach in order to study the nuclear functions in relation to the higherorder nuclear structures, e.g., nuclear bodies, the nucleolus, and the nucleoskeleton.



**Figure 1.** Super-resolution image showing PtdIns(4,5)P2 antibody staining in nuclear speckles (NS), nucleoli (NL) and the nucleoplasm (N). Scale bar: 1  $\mu\text{m}$ . The distribution of PtdIns(4,5)P2 pools in colour-coded original image and intensity quantification chart are shown on the right.

Our research concentrates on: [1] the relationship between nuclear compartmentalization and regulation of gene expression, [2] the structure, dynamics, and function of the nucleoskeleton, which contributes to the nuclear compartmentalization, [3] the molecular mechanisms of laminopathies, [4] the functions of nuclear lipids, [5] development of new microscopy methods.

**Figure 2.** A TEM image of nuclear PtdIns(4,5)P2 labelling on the surface of an ultrathin section. The abbreviations and colour-coding are the same as above. NLIs of 40–100 nm are shown in a magnified view below. Scale bars: 1  $\mu\text{m}$  [main panel], 100 nm [magnified views]

**Selected publications:**

1. [Fišerová J, Maninová M, Sieger T, Uhlířová J, Šebestová L, Efenberková M, Čapek M, Fišer K, Hozák P\\*](#) (2019) Nuclear pore protein TPR associates with lamin B1 and affects nuclear lamina organization and nuclear pore distribution. *Cell Mol Life Sci*, **76**:21992216.
2. [Sztacho M, Sobol M, Balaban C, Escudeiro Lopes SE, Hozák P\\*](#) (2019) Nuclear phosphoinositides and phase separation: Important players in nuclear compartmentalization. *Adv Biol Regul*, **71**:111117.
3. [Uličná L, Rohozková J, Hozák P\\*](#) (2018) Multiple aspects of PIP2 involvement in *C. elegans* gametogenesis. *Int J Mol Sci*, **19**(9).
4. [Sobol M, Krausová A, Yildirim S, Kalasová I, Fábriová V, Vrkošlav V, Phillimonenko V, Marásek P, Pastorek L, Čapek M, Lubovská Z, Uličná L, Tsuji T, Lisa M, Cvačka J, Fujimoto T, Hozák P\\*](#) (2018) Nuclear phosphatidylinositol 4,5bisphosphate islets contribute to efficient RNA polymerase II dependent transcription. *J Cell Sci*, **131**(8).
5. [Uličná L, Kalendová A, Kalasová I, Vacík T, Hozák P\\*](#) (2018) PIP2 epigenetically represses rRNA genes transcription interacting with PHF8. *Biochim Biophys Acta Mol Cell Biol Lipids*, **1863**:266275.





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