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LABORATORY OF

EPIGENETICS OF THE CELL NUCLEUS

meiosis, actin-binding proteins, chromosomal dynamics, vinculin

In the picture:

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Meiosis is a key process for sexual reproduction contributing to the genetic variability of organisms. Deciphering the roles of novel components of the synaptonemal complex would therefore significantly contribute to our understanding of the molecular mechanisms and dynamics of meiotic events, and may possibly also help to explain some of the fertility deficiencies, which are a prominent medical problem affecting 10 % of humans.

Our research focuses on chromosome dynamics during gametogenesis in two eukaryotic models [*C. elegans*, *M. musculus*], where we aim to address the proteins involved in early meiotic stages during pairing and synapsis of homologous chromosomes. Identification of new players affecting meiosis during gametogenesis is clearly a very important, timely endeavour as the chromosomal dynamics and possible complications during meiotic divisions still remain incompletely understood.

In our recent results, we showed that vinculin/DEB-1 clearly participates in meiotic prophase progression. Depletion of vinculin/DEB-1 affects chromosomal pairing stabilization, attachment of chromosomes to cytoskeletal forces, and formation of the synaptonemal complex during prophase I. Our study thus revealed an unexpected role of vinculin/DEB-1 in the progression of meiotic prophase, including chromosome dynamics and pairing, the essential meiotic components. So far, the nuclear functions of vinculin/DEB-1 have not been described at all, and in this project we suggest accomplishing a systematic study using a panel of structural, molecular and genetic methods in order to reveal details about its biological functions in the cell nucleus, and in meiosis in particular.

Selected recent papers:

Vrbacký M, Kovalčíková J, Chawengsaksophak K, Beck IM, Mráček T, Nůsková H, Sedmera D, Papoušek F, Kolář F, [Sobol M, Hozák P](#), Sedlacek R, Houštěk J: Knockout of Tmem70 alters biogenesis of ATP synthase and leads to embryonal lethality in mice. **Hum Mol Genet** 2016 25(21):4674-4685.

[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.



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