Department of Biochemistry and Molecular Biology

We are looking for diploma and PhD students.

Silvia Bágeľová Poláková, Ph.D.

Laboratory of Cell Cycle

Dr. Poláková's research uses fission yeast *Schizosaccharomyces pombe* as a model organism to study yet uncharacterized proteins involved in mitotic cell cycle and meiosis. We employ combination of classical molecular and genetic techniques, biochemistry and advanced imaging methods to decipher the molecular function of the proteins. We are particularly interested in proteins involved in homologous recombination and karyogamy. By studying these proteins we aim to discover how their dysfunction can lead to various diseases such as Down Syndrom or cancer in humans.

Current projects:

Functional analysis of Dbl2 protein required for homologous recombination.

Functional analysis of new proteins required for karyogamy, the process by which two nuclei fuse to produce a single nucleus.

Team:

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Research images:

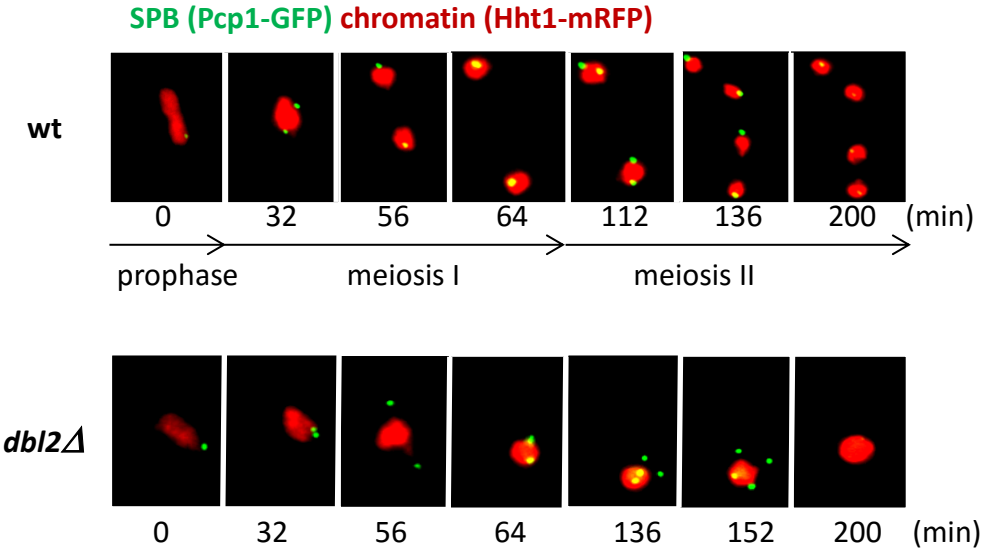

Figure 1. *Dbl2Δ* mutant is unable to segregate chromosomes during meiosis. A wild-type strain and *dbl2Δ* mutant were plated on sporulation plates and meiosis was analyzed by live-cell imaging. The SPBs (spindle pole bodies) and chromosomes were observed via endogenously tagged Pcp1-GFP and Hht1-mRFP, respectively. Numbers below the images represent time, in minutes, elapsed since filming began at the end of the horsetail stage. Prophase, meiosis I and meiosis II are indicated.

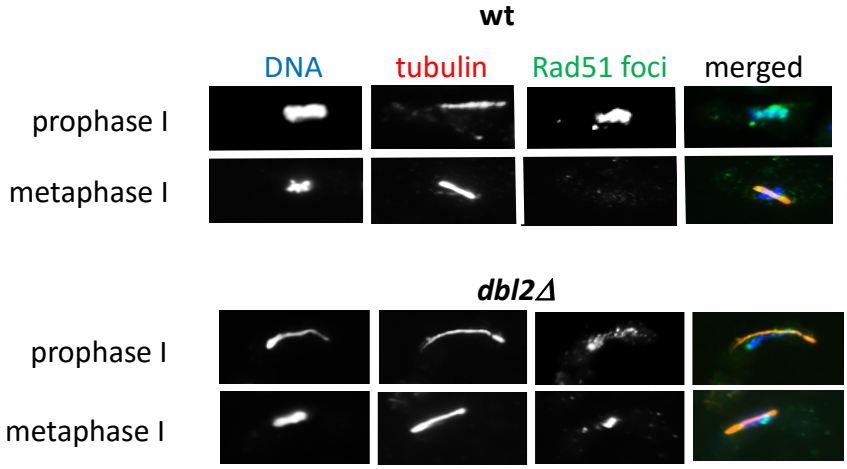

Figure 2. The failure to segregate chromosomes in the absence of Dbl2 correlates with persistent Rad51 foci.

Cells were mated on sporulation agar and at 10 – 17 hr fixed and immunostained for tubulin and Rad51; DNA was visualized by Hoechst staining. Representative images show that Rad51 foci persisted in metaphase I in *dbl2Δ* mutant cells but not in wild type.

Selected Publications:

1. Phadnis N, Cipak L, **Polakova S**, Hyppa RW, Cipakova I, Anrather D, Karvaiova L, Mechtler K, Smith GR, Gregan J. 2015. Casein Kinase 1 and Phosphorylation of Cohesin Subunit Rec11 (SA3) Promote Meiotic Recombination through Linear Element Formation. ***PLoS Genet.*** 11:e1005225.

2. Špírek M, **Poláková S**, Jatzová K, Sulo P. 2015. Post-zygotic sterility and cytonuclear compatibility limits in S. cerevisiae xenomitochondrial cybrids**.** ***Front Genet***. 5:454.

3. **Polakova S**, Benko Z, Zhang L, Gregan J. Mal3, the *Schizosaccharomyces pombe* homolog of EB1, is required for karyogamy and to promote oscillatory nuclear movement during meiosis. 2014. ***Cell Cycle***. 13:72-7.

4. Lubos Cipak*, **Silvia Polakova***, Randy W. Hyppa*, Gerald R. Smith and Juraj Gregan. Synchronized fission yeast meiosis using an ATP analog-sensitive Pat1 protein kinase. 2014. ***Nature Protocols.*** 9:223-31.
   (* equal contribution)

5. Kovacikova I, **Polakova S**, Benko Z, Cipak L, Zhang L, Rumpf C, Miadokova E, Gregan J. A knockout screen for protein kinases required for the proper meiotic segregation of chromosomes in the fission yeast *Schizosaccharomyces pombe*. 2013. ***Cell Cycle***. 12:618-24.

6. **Poláková, S.**, Blume, C., Àlvárez Zárate, J., Mentel, M., Jørck-Ramberg, D., Stenderup, J., Piškur, J. Formation of new chromosomes as a virulence mechanism in yeast *Candida glabrata*. 2009. ***Proc. Natl. Acad. Sci. U. S. A.*** 106:2688-93. Highlighted in ***Nature Review Microbiology***.