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Laboratory of Biology of Cytoskeleton

Modulation of microtubule organization, microtubule proteins

Research topics

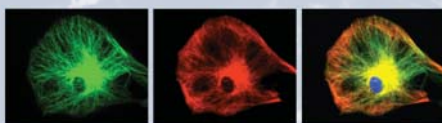
The long-term research programme of the laboratory has been focused on studying the structure-function relationships of microtubule (MT) proteins and their interactions with other cytoskeletal elements in cells under normal and pathological conditions. The organization of MT networks is controlled by microtubule organizing centres (MTOCs). One of the key components of MTOCs is γ -tubulin, which is necessary for nucleation of MT. There are cumulative data indicating that γ -tubulin could also have other functions. Current work focuses on the understanding of the function of γ -tubulin forms, modulation of MT properties by signal transduction molecules, and molecular and functional characterization of MTOC components. To address these questions, techniques of molecular biology, biochemistry and immunology are being used, as well as a variety of microscopic techniques. Our results demonstrate that non-receptor protein tyrosine kinase Fyn of the Src family plays an important role in MT nucleation both from MTOC and from membranes. We have also shown that ectopic cellular expression of γ -tubulin in gliomas may be significant in the context of centrosome dysfunction and may serve as a novel marker of anaplastic changes.

Current grant support

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Selected recent papers

1. Sulimenko V, Dráberová E, Sulimenko T, Macůrek L, Richterová V, Dráber P, Dráber P. Regulation of microtubule formation in activated mast cells by complexes of γ -tubulin with Fyn and Syk kinases. *J Immunol.* 2006;176:7243-53.
2. Katsetos CD, Reddy G, Dráberová E, Šmejkalová B, Del Valle L, Ashraf Q, Tadevosyan A, Yelin K, Maraziotis T, Mishra OP, Mörk S, Legido A, Nissanov J, Baas PW, de Chadarevian JP, Dráber P. Altered cellular distribution and subcellular sorting of gamma-tubulin in diffuse astrocytic gliomas and human glioblastoma cell lines suggest centrosome protein amplification. *J Neuropathol Exp Neurol.* 2006;65:465-77.
3. Pěkníková J, Pexidrová M, Kubátová A, Koubek P, Teplá O, Sulimenko T, Dráber P. Expression of beta-tubulin epitope in human sperm with pathological spermogram. *Fertil Steril.* 2007;88:1120-28.
4. Katsetos CD, Dráberová E, Šmejkalová B, Reddy G, Bertrand L, Chadarevian JP, Legido A, Nissanov J, Baas PW, Dráber P. Class III beta-tubulin and gamma-tubulin are co-expressed and form complexes in human glioblastoma cells. *Neurochem Res.* 2007;2:1387-98.



Microtubules (green) and intermediate filaments (red) in primary astrocytes.



Pavel Dráber, Assoc Prof, PhD / Head of Laboratory

Eduarda Dráberová, PhD / Research Scientist

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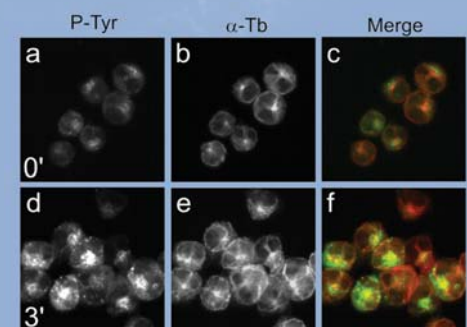
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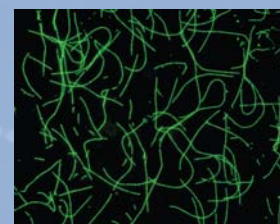
Stanislav Vinopal, MSc / PhD Student

Zuzana Hájková / Diploma Student

Tetyana Sulimenko / Maternity Leave



Immunofluorescence localization of tyrosine-phosphorylated proteins (green) and α -tubulin (red) in resting (a-c) and activated (d-e) *Lyn*^{-/-} bone marrow mast cells.



Microtubules prepared *in vitro* from purified tubulin.