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LABORATORY OF

INTEGRATIVE BIOLOGY

simple epithelia, cytoskeleton, cell junctions, extracellular matrix, mechanotransduction

In the picture:

1. Kateřina Nepomucká | 2. Gizem Dymian-Eyrlimez | 3. Helena Havelková | 4. Lenka Sarnová | 5. **Martin Gregor** | 6. Markéta Jiroušková | 7. Alžběta Kalendová

The main research focus of our group has been centred around cytolinker-dependent regulation of the actin and intermediate filament cytoskeleton, maintenance of epithelial barrier function, adhesion-mediated signalling and cell motility.

Plectin, a ubiquitously expressed cytolinker protein, interlinks the three main components of the cytoskeleton: actin microfilaments, microtubules and intermediate filaments. In addition, plectin recruits the cytoskeleton to junctional complexes in the plasma membrane. In epithelia, plectin controls keratin cytoarchitecture and is essential for the structural integrity, mechanical strength and maintenance of the paracellular barrier function.

At the cellular level, we have recently provided evidence that intermediate filaments and plectin are crucial for cellular mechanosensing. Cells can sense their environment, such as neighbouring cells or properties of the extracellular matrix, and translate these stimuli into biochemical signals for migration, cellular transport and division. The cytoskeleton provides the physical interface between the cell and the extracellular matrix in sensing a mechanical stimulus. Previously, actin microfilaments were the only cytoskeleton component considered to be involved in mechanosensing, i.e., how the cell senses and responds to mechanical inputs.

Using advanced molecular cell biology techniques and transgenic mouse models, we are studying the role of plectin in the development, progress, and healing of various liver and intestinal diseases. Knowledge of its role in the development of liver fibrosis, cholestatic liver disease, colitis and colon cancer provides us with potential to develop new targets for treating these diseases.

Selected recent papers:

Müller M, Wetzel S, Köhn-Gaone J, Chalupsky K, Lüllmann-Rauch R, Barikbin R, Bergmann J, Wöhner B, Zbodakova O, Leuschner I, [Gregor M](#), Tiegs G, Rose-John S, Sedlacek R, Tirnitz-Parker J E E, Saftig P, Schmidt-Arras D: A disintegrin and metalloprotease 10 (ADAM10) is a central regulator of murine liver tissue homeostasis. **Oncotarget**, 10.18632/oncotarget.7836, 2016.

Brauer R, Tureckova J, Kanchev I, Khoylou M, Skarda J, Prochazka J, Spoutil F, Beck I M, Zbodakova O, Kasperek P, Korinek V, Chalupsky K, Karhu T, Herzig K H, Hajduch M, [Gregor M](#), Sedlacek R: MMP-19 deficiency causes aggravation of colitis due to defects in innate immune cell function. **Mucosal Immunol.**, 9:974-85, 2015.

Song J-G, Kostan J, Drepper F, Knapp B, de Almeida Ribeiro Jr E, Konarev P V, Grishkovskaya I, Wiche G, [Gregor M](#), Svergun D I, Warscheid B, Djinić-Carugo K: Structural insights into Ca²⁺/calmodulin regulation of plectin 1a - integrin β 4 interaction in hemidesmosomes. **Structure**, 23:558-70, 2015.

