LÁSZLÓ HUNYADY

HUN-REN Research Centre for Natural Sciences
Institute of Molecular Life Sciences

Address: Magyar Tudósok körútja 2.,
H-1117 Budapest, Hungary

RESEARCH AREA

Our research group studies the molecular "communication systems" that control cellular functions through receptors located on the cell surface. One of our main interests is understanding how signal transmission occurs through G protein-coupled receptors (GPCRs) and β-arrestins — proteins that play key roles in many physiological processes. Using modern laboratory techniques — including microscopy, cellular signaling assays, protein interaction analyses, and bioinformatics approaches — we map how these molecular interactions are formed and how they determine the effects of different drugs. Our goal is to identify novel signaling mechanisms that could contribute to the development of more precisely targeted and safer therapeutics.

TECHNIQUES AVAILABLE IN THE LAB

Students in our lab can learn the fundamentals of cell-based experiments, signaling assays (BRET, fluorescence microscopy), and protein interaction analyses. They gain hands-on experience in cell culture, transfection, and receptor activation studies, as well as in data processing and bioinformatics analysis. Through these projects, students are introduced to the experimental toolkit of modern molecular pharmacology and signal transduction research.

SELECTED PUBLICATIONS

Tóth, A. D., Szalai, B., Kovács, O. T., Garger, D., Prokop, S., Soltész-Katona, E., Balla, A., Inoue, A., Várnai, P., Turu, G., & **Hunyady, L.** (2024). G protein-coupled receptor endocytosis generates spatiotemporal bias in β-arrestin signaling. **Sci Signal 17**(842): eadi0934.

Kovács, K. B., Szalai, L., Szabó, P., Gém, J. B., Barsi, S., Szalai, B., Perey-Simon, B., Turu, G., Tóth, A. D., Várnai, P., **Hunyady, L.**, & Balla, A. (2023). An Unexpected Enzyme in Vascular Smooth Muscle Cells: Angiotensin II Upregulates Cholesterol-25-Hydroxylase Gene Expression. **Int J Mol Sci 24**(4): 3968.

Szalai, L., Sziráki, A., Erdélyi, L. S., Kovács, K. B., Tóth, M., Tóth, A. D., Turu, G., Bonnet, D., Mouillac, B., **Hunyady, L.**, & Balla, A. (2022). Functional Rescue of a Nephrogenic Diabetes Insipidus Causing Mutation in the V2 Vasopressin Receptor by Specific Antagonist and Agonist Pharmacochaperones. **Front Pharmacol 13**: 811836.

Tóth, A. D., Garger, D., Prokop, S., Soltész-Katona, E., Várnai, P., Balla, A., Turu, G., & **Hunyady, L.** (2021). A general method for quantifying ligand binding to unmodified receptors using Gaussia luciferase. **J Biol Chem 296**: 100366.

Turu, G., Soltész-Katona, E., Tóth, A. D., Juhász, C., Cserző, M., Misák, Á., Balla, A., Caron, M. G., & **Hunyady, L.** (2021). Biased Coupling to β-Arrestin of Two Common Variants of the CB2 Cannabinoid Receptor. **Front Endocrinol 12**: 714561.