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RESEARCH AREA

Our research group investigates the role of the SMTNL-1 protein in female fertility and the regulation of insulin signaling. Using in vitro endometrial stromal cell cultures in a PCOS model, we analyze how SMTNL-1 influences insulin sensitivity, cell differentiation, and the cycle-dependent functions of the endometrium.

In parallel, we study the tumor suppressor function of the serine/threonine phosphatase PPM1B in various human malignancies, including lung, cervical, and hepatocellular carcinoma. Our aim is to elucidate the role of PPM1B in the upper-level regulation of the MP/PRMT5/histone modification proto-oncogene axis, and to understand how phosphatase dysfunction contributes to tumor progression and disruption of cell cycle control.

TECHNIQUES AVAILABLE IN THE LAB

During the project, our students can acquire modern molecular biology and cell culture techniques. They gain hands-on experience in in vitro culture of human endometrial and tumor cells, performing hormonal and metabolic treatments, and establishing PCOS models. They are introduced to protein expression and signaling analyses (Western blot, immunostaining, confocal microscopy), as well as RT-qPCR, transfection, and phosphatase activity assays. In addition, they develop basic skills in data analysis and statistical evaluation.

SELECTED PUBLICATIONS

Major, E., Györi, F., Horváth, D., Keller, I., Tamás, I., Uray, K., Fülöp, P., Lontay, B. (2021). Smoothelin-Like Protein 1 Regulates Development and Metabolic Transformation of Skeletal Muscle in Hyperthyroidism. *Front Endocrinol* **12**: 751488.

Keller, I., Ungvári, Á., Major, E., Horváth, D., Kónya, Z., Tóth, E., Erdődi, F., Kiss, A., Lontay, B. (2025). Magnesium-dependent-protein phosphatase 1B regulates the protein arginine methyltransferase 5 through the modulation of myosin phosphatase. *J Biol Chem* **2**: 108107.

Makai, A., Keller, I., Szalmás, F., Ungvári, Á., Horváth, D., Major, E., Enyedi, A., Takács, I., Lontay, B. (2025). Decreased PPM1B Expression Drives PRMT5-Mediated Histone Modification in Lung Cancer Progression. *Biomolecules* **11**: 1581.

Tamás, I., Major, E., Horváth, D., Keller, I., Ungvári, Á., Haystead, T., MacDonald, J., Lontay, B. (2022). Mechanisms by which smoothelin-like protein 1 reverses insulin resistance in myotubules and mice. *Mol Cell Endocrinol* **551**: 111663.