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RESEARCH AREA

Our research aims to gain a deeper understanding of the central nervous system mechanisms that regulate human reproduction, as well as the diseases caused by their dysfunction, through investigations at the molecular, cellular, and systemic levels. As part of this effort, we are studying kisspeptin-producing neurons in the hypothalamus, which play a key role in the neural regulation of reproduction. These neurons mediate the effects of sex hormones (estrogen, progesterone, and androgens) produced by the gonads on gonadotropin-releasing hormone (GnRH) neurons, by conveying hormonal signals. They also regulate the reproductive functions of the pituitary gland.

Mutations in genes encoding kisspeptin or its receptor can cause hypogonadotropic hypogonadism, characterized by delayed puberty and infertility. We focus on studying the functions of these neurons, their role in positive and negative feedback mechanisms, pubertal regulation, and the development of reproductive disorders.

TECHNIQUES AVAILABLE IN THE LAB

- Transcardial perfusion (on rodents)
- Immunohistochemistry
- Laser capture microdissection
- RNA sequencing
- Bioinformatic analyses

SELECTED PUBLICATIONS

Szentkirályi-Tóth, S., **Göcz, B.**, Takács, S., Sárvári, M., Farkas, I., Skrapits, K., Rumpler, É., Póliska, S., Rácz, G., Matolcsy, A., Ternier, G., Fernandois, D., Giacobini, P., Prevot, V., Colledge, WH., Wittmann, G., Kadar, A., Mohacsik, P., Gereben, B., Fekete, C., Hrabovszky, E. (2025) Estrogen-regulated lateral septal kisspeptin neurons abundantly project to GnRH neurons and the hypothalamic supramammillary nucleus. **J Neurosci** 1307-24.2024.

Göcz, B., Rumpler, É., Szentkirályi-Tóth, S., Skrapits, K., Takács, S., Sárvári, M., Farkas, I., Póliska, S., Hrabovszky, E. (2024) Laser-capture microdissection for spatial transcriptomics of immunohistochemically detected neurons. **J Biol Chem 301(2):** 108150.

Rumpler, É., Göcz, B., Skrapits, K., Sárvári, M., Takács, S., Farkas, I., Póliska, S., Papp, M., Solymosi, N., Hrabovszky, E. (2023) Development of a versatile LCM-Seq method for spatial transcriptomics of fluorescently tagged cholinergic neuron populations. **J Biol Chem 299:** 105121.

Göcz, B., Rumpler, É., Sárvári, M., Skrapits, K., Takács, S., Farkas, I., Csillag, V., Trinh, S.H., Bardóczi, Z., Ruska, Y., Solymosi, N., Póliska, S., Szőke, Z., Bartoloni, L., Zouaghi, Y., Messina, A., Pitteloud, N., Anderson, R.C., Millar, R.P., Quinton, R., Manchishi, S.M., Colledge, W.H., and Hrabovszky E. (2022) Transcriptome profiling of kisspeptin neurons from the mouse arcuate nucleus reveals new mechanisms in estrogenic control of fertility. **Proc Natl Acad Sci U S A 119(27):** e2113749119.

Göcz, B., Takács, S., Skrapits, K., Rumpler, É., Solymosi, N., Póliska, S., Colledge, W.H., Hrabovszky, E. and Sárvári, M. (2022) Estrogen Differentially Regulates Transcriptional Landscapes of Arcuate and Preoptic Kisspeptin Neuron Populations. **Front Endocrinol 13:** 960769.