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RESEARCH AREA

Molecular, cellular and system biology research at the Laboratory of Reproductive Neurobiology aims to provide a deeper understanding of the central regulatory mechanisms of human reproduction. Hypothalamic secretion of gonadotropin-releasing hormone (GnRH) builds up during pubertal development. Secretory pulses of GnRH at every 30-90 minutes stimulate luteinizing and follicle stimulating hormone (LH and FSH) production in the anterior pituitary gland. These troph hormones, in turn, initiate and later maintain functions of the gonads (testes and ovaries). This laboratory combines anatomical, electrophysiological and molecular approaches to study i) the neuronal and hormonal control of pulsatile GnRH/LH secretion, ii) the mechanisms of the mid-cycle GnRH/LH surge which triggers ovulation in females, iii) the central effects of gonadal steroid hormones on neuroendocrine systems and on wider aspects of general neuronal functioning and iv) the molecular and cellular processes underlying reproductive senescence. Techniques applied for single-cell research include traditional neuroanatomical approaches, slice electrophysiology and high-throughput and high-resolution molecular biology methods. In recent years, the laboratory preferentially uses human hypothalamic tissue samples in anatomical and molecular research. In view of the limited translational value of rodent models in reproductive biology, the Human Hypothalamus Research Unit became the most dynamically developing research unit with a broad focus on the role of the hypothalamus in neuroendocrine, metabolic and autonomic regulation. Studies of the Laboratory of Reproductive Neurobiology may lead to a better understanding of various human pathologies, such as different forms of central infertility, polycystic ovary syndrome (PCOS), ovarian cycle disturbances due to insufficient caloric intake (e.g. anorexia nervosa) or stress, abnormal pubertal development (e.g. precocious puberty, hypogonadotropic hypogonadism), and central nervous system dysfunctions caused by postmenopausal estrogen deficiency.

TECHNIQUES AVAILABLE IN THE LAB

Histological section preparation (rodent, human). Immunohistochemistry (peroxidase-based/immunofluorescent multiple-labeling). Light and confocal microscopy. Surgical techniques (gonadectomy, subcutaneous implantation of silastic capsules/osmotic minipumps). Laser capture microdissection. RNA sequencing.

SELECTED PUBLICATIONS

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., 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 USA 119:** e2113749119.

Skrapits, K., Sárvári, M., Farkas, I., Göcz, B., Takács, S., Rumpler, É., Váczi, V., Vastagh, C., Rácz, G., Matolcsy, A., Solymosi, N., Póliska, S., Tóth, B., Erdélyi, F., Szabó, G., Culler, M.D., Allet, C., Cotellessa, L., Prévot, V., Giacobini, P., Hrabovszky, E. (2021) The cryptic gonadotropin-releasing hormone neuronal system of human basal ganglia. **Elife 10:** e67714.

Rumpler, É., Takács, S., Göcz, B., Baska, F., Szenci, O., Horváth, A., Ciofi, P., Hrabovszky, E., **Skrapits, K.** (2020) Kisspeptin neurons in the infundibular nucleus of ovariectomized cats and dogs exhibit unique anatomical and neurochemical characteristics. **Front Neurosci 14:** 598707.

Hrabovszky, E., Takács, S., Göcz, B., **Skrapits, K.** (2019) New perspectives for anatomical and molecular studies of kisspeptin neurons in the aging human brain. **Neuroendocrinology 109:** 230-241.

Skrapits, K., Borsay, B.A., Herczeg, L., Ciofi, P., Liposits, Z. and Hrabovszky, E. (2015) Neuropeptide co-expression in hypothalamic kisspeptin neurons of laboratory animals and the human. **Front Neurosci 9:** 29.