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RESEARCH AREA

1. The Role of Vasopressin in Psychiatric Disorders

Vasopressin, primarily known for regulating our body's salt-water balance, is also an important neurotransmitter in the brain. Since it plays a crucial role in stress regulation, its involvement in stress-related psychiatric disorders such as anxiety and depression has been explored. Additionally, vasopressin is important for higher cognitive functions like learning, memory, and the formation of social relationships. Disruptions in these processes have been implicated in conditions like schizophrenia and autism. Our experiments aim to investigate the role of specific brain regions in these processes. Given that both the studied disorders and vasopressin itself exhibit strong gender differences (for example, women are more prone to depression, while male animals have more vasopressin in their brains), we intend to extend our research to both genders.

2. Studying Alzheimer's Disease in Animal Models

In our aging society, the prevalence of dementia is steadily increasing, making it essential to research new therapeutic possibilities. The complexity of the disease necessitates the use of animal models. Currently, the most common models are genetically modified mouse models. In our laboratory, we aim to test new therapeutic options using a mouse model previously employed, both at the whole organism level (behavior) and at the molecular level underlying changes (molecular biology techniques, imaging). Therapeutic interventions include influencing movement and nutrition. We pay increased attention to comorbidities as well (anxiety, depression, and metabolic changes). We emphasize the potential differences between the two genders.

TECHNIQUES AVAILABLE IN THE LAB

Animal examionations, small animal operations (ovariectomy, stereotaxic surgrey etc.), behavioural examinatiopns (elevated plus maze, forced swim test, Morris Watermaze, conditioned fear test etc.), opto- and pharmacogenetic, fibre photometry, human and animal tissue collection, processing, other molecular biological methods (PCR, Western blot, RNAscope), cell culture, superresolution microscopy.

SELECTED PUBLICATIONS

Szőnyi, A., Zichó, K., Barth, A. M., Gönczi, R. T., Schlingloff, D., Török, B., Sipos, E., Major, A., Bardóczi, Z., Sos, K. E., Gulyás, A. I., Varga, V., **Zelena, D.**, Freund, T. F., Nyiri, G. (2019) Median raphe controls acquisition of negative experience in the mouse. **Science 366:** 8746.

Chaves, T., Török, B., Fazekas, C. L., Correia, P., Sipos, E., Várkonyi, D., Hellinger, Á., Erk, D., **Zelena, D.** (2022) Median raphe region GABAergic neurons contribute to social interest in mouse. **Life Sci. 289:** 120223.

Barabás, K., Makkai, B., Farkas, N., Horváth, H. R., Nagy, Z., Váradi, K., **Zelena, D.** (2022) Influence of COVID-19 pandemic and vaccination on the menstrual cycle: A retrospective study in Hungary. **Front Endocrinol. 13:** 974788.

Farkas, S., Szabó, A., Török, B., Sólyomvári, C., Fazekas, C. L., Bánrévi, K., Correia, P., Chaves, T., **Zelena, D.** (2022) Ovariectomy-induced hormone deprivation aggravates Aβ1-42 deposition in the basolateral amygdala and cholinergic fiber loss in the cortex but not cognitive behavioral symptoms in a triple transgenic mouse model of Alzheimer's disease. **Front Endocrinol 13:** 985424.

Keller, D., Láng, T., Cservenák, M., Puska, G., Barna, J., Csillag, V., Farkas, I., **Zelena, D.**, Dóra, F., Küppers, S., Barteczko, L., Usdin, T. B., Palkovits, M., Hasan, M. T., Grinevich, V., Dobolyi, A. (2022) A thalamo-preoptic pathway promotes social grooming in rodents. **Curr Biol. 32:** 4593-4606.