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RESEARCH AREA

Alzheimer's disease (AD) is neurodegenerative disorder, characterised by the impairment of memory, attention, sleep cycle and daily activities. In AD the cholinergic neuronal system is predominantly impacted. Nevertheless, postmenopausal women are 1.6 to 3 times more likely to develop AD than similar age men or younger individuals. The gonadal steroid 17β -estradiol (E2) contributes greatly to the development of gender differences. E2 improves cognitive function, attention, and behavioural changes, as well it has a neuroprotective effect, promoting synaptic plasticity and dendritic formation.

Our research explores the neuroprotective properties of E2 (alongside related compounds) within the cholinergic nervous system, utilizing neurotoxic and genetic AD mouse models. Additionally, we aim to elucidate the involvement of the cholinergic nervous system throughout the disease progression. Our research extends beyond neurons to encompass the brain's immune system, the microglia, reflecting a comprehensive approach to understanding neurodegenerative processes.

TECHNIQUES AVAILABLE IN THE LAB

- Small animal surgery (ovariectomy, stereotaxic surgery, etc.)
- Behavioural examinations
- Tissue collection, immunohistochemistry
- Confocal and super-resolution microscopy
- Molecular biology methods (PCR, Western blot, etc.)
- Cell culturing

SELECTED PUBLICATIONS

Farkas, S., Szabó, A., Hegyi, AE., Török, B., Fazekas, CL., Ernszt, D., Kovács, T., Zelena D. (2022) Estradiol and Estrogen-like Alternative Therapies in Use: The Importance of the Selective and Non-Classical Actions. **Biomedicines 10:** 861.

Farkas, S., Szabó, A., Török, B., Sólyomvári, C., Fazekas, CL., Bánrévi, K., Correia, P., Chaves, T., Zelena, D. (2022) Ovariectomy-induced hormone deprivation aggravates $A\beta_{1-42}$ 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 (Lausanne) 13:** 985424.

Gáll, Z., **Farkas, S.**, Albert, Á., Ferencz, E., Vancea, S., Urkon, M., Kolcsár, M. (2020) Effects of Chronic Cannabidiol Treatment in the Rat Chronic Unpredictable Mild Stress Model of Depression. **Biomolecules 10:** 801.

Szabó, A., **Farkas, S.**, Fazekas, C., Correia, P., Chaves, T., Sipos, E., Makkai, B., Török, B., Zelena, D. (2023) Temporal Appearance of Enhanced Innate Anxiety in Alzheimer Model Mice. **Biomedicines 11:** 262.

Kövesdi, E., Udvarácz, I., Kecskés, A., Szócs, S., **Farkas, S.**, Faludi, P., Jánosi, TZ., Ábrahám, IM., Kovács, G. (2023) 17β -estradiol does not have a direct effect on the function of striatal cholinergic interneurons in adult mice in vitro. **Front Endocrinol (Lausanne) 13:** 993552.

Várkonyi, D., Török, B., Sipos, E., Fazekas, CL., Bánrévi, K., Correia, P., Chaves, T., **Farkas, S.**, Szabó, A., Martínez-Bellver, S., Hangya, B., Zelena, D. (2022) Investigation of Anxiety- and Depressive-like Symptoms in 4- and 8-Month-Old Male Triple Transgenic Mouse Models of Alzheimer's Disease. **Int J Mol Sci. 23:** 10816.