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RESEARCH AREA

Investigating the neurocognitive underpinnings of ageing and neurocognitive impairment in rodents: identification of preclinical drug development strategies and development of combined cognitive enhancer therapies. The main objective of the project is to understand and model the processes underlying brain ageing and neurocognitive disorders (dementias) in rodents and to study cellular and behavioural processes in a coordinated manner in the same model. The research is carried out in two locations: our cellular biology (electrophysiology) laboratory is located at the Faculty of Natural Sciences (Faculty of Science) and our small animal behavioural pharmacology laboratory is located at the Szentágothai Research Centre (SZKK). Our preclinical animal models include e.g. pharmacologically induced amnesia, natural ageing, repetitive mild traumatic brain injury and genetic (DREADD) models. Behavioural changes are investigated in state-of-the-art test packeges. Our results are further utilized in both basic and applied drug discovery research. Our main long-term goal is to unravel the as yet unknown mechanisms underlying neurocognitive diseases and to identify biomarkers that may later play a crucial role in the diagnosis and treatment of cognitive disorders and in the development of new drug candidates.

TECHNIQUES AVAILABLE IN THE LAB

Szentagothai Research Centre: rodent behaviour laboratory and core facility: Behavioural pharmacology studies in rodents: neurological tests, open field test, elevated zero maze test, spatial memory tasks (T-maze test, Morris Water Maze), operant behavioural tests (e.g., psychomotor vigilance tasks), systemic application of pharmacological compounds, drug development in rodent models of psychiatric and neurocognitive disorders.

SELECTED PUBLICATIONS

Bruszt, N., **Bali, ZK.** Tadepalli, SA., Nagy, LV., Hernádi, I. (2021) Potentiation of cognitive enhancer effects of Alzheimer's disease medication memantine by alpha7 nicotinic acetylcholine receptor agonist PHA-543613 in the Morris water maze task. **Psychopharmacology 238:** 3273-3281.

Nagy, LV., **Bali, ZK.**, Kapus, G., Pelsőczi, P., Farkas, B., Lendvai, B., Lévay, G., Hernádi, I. (2021) Converging evidence on D-amino acid oxidase-dependent enhancement of hippocampal firing activity and passive avoidance learning in rats. **Int J Neuropsychopharmacol 24(5):** 434-445.

Tadepalli, SA., **Bali, ZK.**, Bruszt, N., Nagy, LV., Amrein, K., Fazekas, B., Büki, A., Czeiter, E., Hernádi, I. (2020) Long-term cognitive impairment without diffuse axonal injury following repetitive mild traumatic brain injury in rats. **Behav Brain Res 378:** 112268.

Bali, ZK., Bruszt, N., Tadepalli, SA., Csurgyók, R., Nagy, LV., Tompa, M., Hernádi I. (2019) Cognitive enhancer effects of low memantine doses are facilitated by an alpha7 nicotinic acetylcholine receptor agonist in scopolamine-induced amnesia in rats. **Front Pharmacol 10:** 73.

Bali, ZK., Nagy, LV., Bruszt, N., Bodó, K., Engelmann, P., Hernádi, Z., Göntér, K., Tadepalli, SA., Hernádi, I. (2023) Increased brain cytokine level associated impairment of vigilance and memory in aged rats can be alleviated by alpha7 nicotinic acetylcholine receptor agonist treatment. **Geroscience 46:** 645-664.