

7th Hungarian Neuroscience Meeting for Undergraduate Students, Graduate Students and Young Postdocs

24th January, 2024, Pécs



<https://hundoc2024.mitt.hu/invitation>



Endre Grastyán theoretical building of the Medical School - University of Pécs
(Pécs, Szigeti u. 12, 7624)

7th Hungarian Neuroscience Meeting for Undergraduate Students, Graduate Students and Young Postdocs

Program Overview

Wednesday, 24, January 2024

08:00 – 09:00 **Registration** (registration site will close at 12 o'clock)

09:00 – 09:15 **Welcome speech**

09:15 – 09:45 **Invited speaker**

How early-life experiences can shape behaviour in later life: Investigating the links between early-life social isolation, social abnormalities in adulthood and prefrontal network function

Christina Miskolczi (Institute of Experimental Medicine and Janos Szentagothai Doctoral School of Neurosciences)

09:45 – 11:00 **Oral presentations I.**

Presenters:

Abbas Anna Anoir: CARiNg-HD: Studying the effect of cariprazine in induced neurons directly reprogrammed from Huntington's disease patients' fibroblasts

Bosnyák Inez: Optimization of an ischemic retionopathy mouse model and evaluation of the consequences of oxygen deprivation

Bod Réka: Bridging in vivo and in vitro recordings in the human epileptic neocortex: patient-wise comparative analysis of single-unit activities

Ignácz Máté: Neuroectodermal stem cells contribute to the functional and morphological improvement of chronic spinal cord injuries via multiple mechanisms

Milica Milicic: TRPA1 ion channel does not contribute to the chronic stress-induced activation of locus ceruleus noradrenergic neurons

11:00 – 12:30 **Mini Poster Section**

12:30 – 13:30 **Lunch**

13:30 – 14:15 **Workshop I. Zsuzsanna Varga PhD** Mastering Essential Time Management Skills for Academic and Professional Success

14:15 – 15:30 **Oral presentations II.**

Presenters:

Horváth Ágoston Csaba: Towards layer-by-layer infrared neuromodulation: presentation and functional characterisation of an intracortical optrode needle featured with a micromirror tip ending

Padányi Anna: Modulation and investigation of cortical excitability with non-invasive transcranial magnetic stimulation and electro-encephalography in awake non-human primates

Ruppert Zsófia: Fructose supplementation exacerbates systemic inflammation induced by high-fat diet and causes brain shrinkage in mice

Szendi Vivien: Calbindin neurons of the lateral septum control maternal behaviour via a thalamicseptal-hypothalamic circuit

Zichó Krisztián: Novel pontine inhibitory nucleus regulates reward experience

15:30 – 16:00 **Coffee break**

16:00 – 17:00 **Workshop II. Meeting with the professor (Prof. György Buzsáki, Brain Prize in 2011)**

17:00 – 17:45 **Workshop III. Andrea Horváth-Sarródi M.D.** What Doesn't Kill You Makes You Stronger? - Life beyond failures

17:45 – 18:00 **Closing remarks – awards**

19:00 – 24:00 **Social Event - Pubquiz and socializing at Paulus - Pécs, Ifjúság útja 4, 7624**



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1.	<u>ABBAS, ANNA</u>	12
	CARING-HD: STUDYING THE EFFECT OF CARIPRAZINE IN INDUCED NEURONS DIRECTLY REPROGRAMMED FROM HUNTINGTON'S DISEASE PATIENTS' FIBROBLASTS	12
2.	<u>ADEGBITE, JANET</u>	13
	INVESTIGATION OF THE EFFECT OF SAHA ON A HUMAN CELL CULTURE MODEL OF ISCHEMIC STROKE	13
3.	<u>BALKÓ, ESZTER</u>	14
	THE EFFECT OF IMPAIRED AgRP NEURONAL FUNCTION ON BODY WEIGHT, LIFESPAN AND BEHAVIOUR IN CALORIE-RESTRICTED MICE	14
4.	<u>BALOG, BOLIDZSÁR ZSOLT</u>	15
	POSITIVE VALENCE REGULATED BY PONTINE INHIBITORY CELLS: FIBER PHOTOMETRY EVIDENCE	15
5.	<u>BALOGH, BOGLÁRKA</u>	16
	DEVELOPING AND VALIDATING A NEW MODEL FOR MOUSE SUBRETINAL HAEMORRHAGE	16
6.	<u>BALOGH-LANTOS, ZSÓFIA</u>	17
	CELL TYPE- AND LAYER-SPECIFIC INTRACORTICAL EFFECTS OF CONTINUOUS INFRARED NEURAL STIMULATION REVEALED BY HIGH-DENSITY LAMINAR RECORDINGS IN THE RAT NEOCORTEX	17
7.	<u>BÍRÓ, LÁSZLÓ</u>	18
	PERSISTENTLY INCREASED POST-STRESS ACTIVITY OF PARAVENTRICULAR THALAMIC NEURONS IS ESSENTIAL FOR THE EMERGENCE OF STRESS-INDUCED ALTERATIONS IN BEHAVIOR.	18
8.	<u>BOD, RÉKA</u>	19
	BRIDGING IN VIVO AND IN VITRO RECORDINGS IN THE HUMAN EPILEPTIC NEOCORTEX: PATIENT-WISE COMPARATIVE ANALYSIS OF SINGLE-UNIT ACTIVITIES	19
9.	<u>BODO, ANGELIKA</u>	20
	A PILOT STUDY USING DREADD TECHNOLOGY TO DEVELOP A NOVEL MODEL OF COGNITIVE IMPAIRMENT	20
10.	<u>BOGDÁNY, TAMÁS</u>	21
	ROLE OF VESTIBULAR INPUT IN LUCID DREAMING	21
11.	<u>BOSNYÁK, INEZ</u>	22
	OPTIMIZATION OF AN ISCHEMIC RETINOPATHY MOUSE MODEL AND EVALUATION OF THE CONSEQUENCES OF OXYGEN DEPRIVATION	22
12.	<u>BRUSZT, NÓRA</u>	23
	LONG-TERM EFFECTS OF MEMANTINE AND TWO ALPHA7 NICOTINIC ACETYLCHOLINE RECEPTOR COMPOUNDS ON NOVEL OBJECT RECOGNITION MEMORY OF AGED RATS	23
13.	<u>BUDAY, ZSOLT</u>	24
	CHARACTERISATION OF INHIBITORY AND EXCITATORY AFFERENTS OF THE PARAVENTRICULAR THALAMIC NUCLEUS	24
14.	<u>BUZÁS-KAIZLER, ANDRÁS</u>	25
	THE ROLE OF NEUROINFLAMMATORY MECHANISMS IN THE PERINATAL ASPHYXIA-INDUCED LONG-TERM NEUROPSYCHIATRIC DISORDERS	25
15.	<u>CSER, NÁRCISZ</u>	26
	INVESTIGATION OF TARGETED AND UNTARGETED MAGNETIC NANOPARTICLES ON A HUMAN BLOOD-BRAIN BARRIER MODEL	26
16.	<u>CSIKÓS, KLAUDIA</u>	27
	ARE CORTICAL COLUMNS UBIQUITOUS? HIGH-RESOLUTION IDENTIFICATION OF FUNCTIONAL DOMAINS IN CAT VISUAL CORTEX USING 3D FUNCTIONAL ULTRASOUND IMAGING	27

10. Bosnyák, Inez

Optimization of an ischemic retinopathy mouse model and evaluation of the consequences of oxygen deprivation

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The retina has one of the highest metabolic activities and oxygen consumption, so insufficient blood supply leads to visual impairment. Retinal hypoxia has a key role in the development of age-related macular degeneration, glaucoma, diabetic retinopathy, and retinopathy of prematurity, among others. The incidence of these diseases is increasing, however, no effective treatment without side-effects is available. Furthermore, the pathomechanism of the above-mentioned conditions is not fully understood. Based on these facts, our aim was to develop an optimal ischemic retinopathy mouse model to investigate the retinal damage in a time-dependent manner and to analyze the sensitivity of different cell types.

Retinal ischemia was induced by bilateral common carotid artery occlusion (BCCAO) for 10 (n=12), 13 (n=14), 15 (n=14), or 20 (n=18) minutes, or by right permanent unilateral (n=17) common carotid artery occlusion (UCCAO) in 4-month-old CD1-IGS mice. The data obtained were compared with a sham-operated group (n=18). Optical coherence tomography was used for following the changes in retinal thickness 3, 7, 14, 21 and 28 days after the surgeries. After standardizing the results, the confidence intervals were compared for statistical analysis. Different immunohistochemical analyses were also performed. We evaluated the number and distribution of ganglion cells in the central and peripheral regions on whole-mount retina preparations. Vascular density was studied by lectin staining. Rods and cones were labelled too. For immunolabeled samples, non-parametric tests were used to analyze the results.

We observed significant changes in almost all retinal layers during the experimental period, but the absolute values of these changes are not very remarkable. The number of ganglion cells significantly decreased in the peripheral region in the 20-minute BCCAO group, and in the central and peripheral regions in the UCCAO group 4 weeks after the intervention. The percentage of vascular density was higher in the 20-minute BCCAO and in the UCCAO groups, suggesting neovascularization. In addition, cone loss was also observed in these groups.

Our results suggest that the 20-minute BCCAO is a good model for investigating the consequences of ischemia and reperfusion in the retina in a time-dependent manner, while the UCCAO causes more severe damage in a short time, so can be used for testing new drugs.

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57. Méresz, Balázs

Potential new treatment target in bacterial keratitis

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Introduction: Bacterial keratitis is an infection of the corneal tissue caused by various bacterial species. Etiology and pathogenesis are influenced by diverse factors. One of the most common factors is contact lens wear. Other predisposing factors include different eye injuries, previous ocular surgery, corneal edema, and drug induced effects with corticosteroids. Despite the progress made in diagnosis and treatment keratitis is still responsible for the most sight-threatening lesion. Pituitary adenylate cyclase-activating polypeptide (PACAP) is a neuropeptide found in the central nervous system and peripheral organs, known for its neuroprotective and anti-inflammatory effects, which are mainly mediated through PAC1 receptor. The aim of our research is to investigate the protective role of the PAC1 receptor in endotoxin-induced keratitis model in mice.

Methods: In our study, we induced bacterial keratitis in a CD1-IGS mouse strain by intraperitoneal injection of lipopolysaccharide (LPS). To investigate the role of PAC1 receptor, half of the animals were treated intravitreally with PAC1 receptor antagonist, maxadilan. 24 hours after injection, optical coherence tomography (OCT) was used to assess inflammation and treatment-induced changes in the anterior segment of the eye. Routine histological examinations were performed to confirm OCT results. To map inflammatory pathways, we determined the expression of 40 cytokines in the different groups. Five weeks after the LPS administration, a four-step scoring system known from the literature was used to determine the degree of keratitis.

Results: Based on OCT and post-mortem histology results, we found a significant increase in central corneal thickness 24 hours after LPS injection, which was attenuated by maxadilan treatment. Cytokine assays showed that maxadilan inhibited the activation of inflammatory pathways. Five weeks after maxadilan injection grading score showed less severe keratitis in the group receiving LPS and treated with maxadilan compared to the group receiving endotoxin alone.

Conclusion: Our results suggest that targeting the PAC1 receptor could be a promising therapeutic approach for the treatment of bacterial keratitis.