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NEURONUS 2022
NEUROSCIENCE FORUM
SUPPORTED BY IBRO

15-17 OCTOBER 2022, KRAKOW, POLAND

NENCKI INSTITUTE OF EXPERIMENTAL BIOLOGY PAS WARSAW, POLAND

ACTA NEUROBIOLOGIAE EXPERIMENTALIS

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NEURONUS 2022 NEUROSCIENCE FORUM SUPPORTED BY IBRO

15–17 OCTOBER 2022, KRAKOW, POLAND

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PROGRAMME

14TH OCTOBER, 2022

INSTITUTE OF PSYCHOLOGY OF JAGIELLONIAN UNIVERSITY

Workshop I – Room 2.15

DeepLabCut by Jessy Lauer

*(Swiss Federal Institute of Technology, Lausanne, Switzerland & Harvard University, USA)***Workshop II – Room 2.12**

Multimodal recordings: an insight into combining EEG with eye tracking and other research methods

*sponsored by Brain Products Academy and Elmiko Biosignals***15TH OCTOBER, 2022**

AUDITORIUM MAXIMUM, JAGIELLONIAN UNIVERSITY

9:00–10:10**Opening Ceremony – Large hall A**

Vice Rector for University Development, Jagiellonian University

prof. Jarosław Górniak

Vice-Dean for Science and International Relations, Faculty of Biology, Jagiellonian University

*prof. Magdalena Chadzińska***Keynote lecture – Large hall A**

Childhood physical activity effects on brain health and cognition

*Speaker: Charles Hillman (Department of Psychology, Department of Physical Therapy, Movement, and Rehabilitation Sciences, Northeastern University, USA)***10:10–10:45****Flashtalks – Large hall A****10:45–11:15****Coffee Break****11:15–13:15****Special Biological Session I – Large hall A**

Astrocytes

*Speakers: Alexei Verkhratsky, Mykhailo Batiuk, Dmitri Rusakov, Olena Bukalo***Cognitive Session I – Large hall B**

How does exercise benefit cognition and emotion?

*Speakers: Irene Estaban-Cornejo, Tomasz Ligęza, Dominika Pindus, Angelika Maurer***13:15–13:45****Lunch****13:45–15:00****Poster Session I – Exhibition room****15:00–16:00****Keynote lecture – Large hall A**

From a demand-based to a supply-limited view of brain energetics

Speaker: Suzanaerculano-Houzel (Department of Psychology and Biological Sciences, Vanderbilt University, USA)

- 16:00–17:30** **Biological Session II – Large hall A**
 Basic Neuroscience
Speakers: Aleksandra Pękowska, Katarzyna Ciuba, Michael Gabriel, Joanna Danielewicz
- Cognitive Session II – Large hall B**
 Emotional processing in modern neuroscience – from human-rat dyads to VR devices
Speakers: Magdalena Pietruch, Malwina Ankiewicz, Jan Argasiński, Anna Kaźmierowska, Ingrida Zelionkaite
- Medical Session I – Medium hall A**
 Biomarkers of Neurodegeneration
Speakers: Kaj Blennow, Fernando Gonzalez-Ortiz, Przemysław Kac, Patrycja Dżianok
- 17:30–18:00** **Coffee Break**
- 18:00–19:00** **Keynote lecture – Large hall A**
 The cinematic brain: Mapping the human emotion circuits with motion pictures
Speaker: Lauri Nummenmaa (Human Emotion Systems Laboratory at Turku PET Centre, Finland)
- 19:00–** **Welcome Reception**

16TH OCTOBER, 2022

AUDITORIUM MAXIMUM, JAGIELLONIAN UNIVERSITY

- 7:00–8:00** **Run for your brain!**
*Parking lot in front of the Institute of Psychology of the Jagiellonian University,
 6 Ingardena Street*
 Neu-run-us
- 9:00–10:00** **Keynote lecture – Large hall A**
 Routes to enhance stress resilience: Manipulation of genes or environment?
Speaker: Mathias Schmidt (Max Planck Institute of Psychiatry, Munich, Germany)
- 10:00–11:30** **Biological Session III – Large hall A**
 Neural substrates of affective behavior
Speakers: Marcelina Olga Węzik, Natalia Roszkowska, Olga Gulka, Karolina Protokowicz, Patryk Sambak
- Cognitive Session III – Large hall B**
 Approaches to increase replicability in neuroscience – lessons learned from consortia,
 many analysts and cooperative data collection
Speakers: Sven Mueller, Katharina Paul, Elena Cesnaite, Vanja Kovic
- Biological Session IV – Medium hall A**
 Markers of Aging
Speakers: Urszula Wojda, Natalia Pudelko-Malik, Anna Mietelska-Porowska, Gregory Petrazzo
- 11:30–12:00** **Coffee Break**

- 12:00–13:30** **Biological Session V – Large hall A**
Advanced neurotechnologies for brain activity monitoring and modulation
Speakers: Zoltan Fekete, Csaba Horváth, Zsófia Lantos, Kirti Sharma
- Cognitive Session IV – Large hall B**
Plastic brain and language – adaptive changes of neural networks
Speakers: Aleksandra Herman, Marta Wójcik, Agata Wolna, Jonas Walther, Anna Stróż
- Medical Session II – Medium hall A**
Translational Neuropsychiatry
Speakers: Ali Jawaid, Weronika Tomaszewska, Kinga Farkas, Katarzyna Hryniewiecka, Suelen Baggio, Sabina Podlewska
- 13:30–14:00** **Lunch**
- 14:00–15:15** **Poster Session II – Exhibition hall**
- 15:15–17:00** **Biological Session VI – Large hall A**
Systems Neuroscience of Sensory Processing
Speakers: Flavio Donato, Bartosz Zglinicki, Magdalena Sabat, Maciej Kania, Marek Brodzki
- Cognitive Session V – Large hall B**
Neuroimaging of the reading brain
Speakers: Milene Bonte, Katarzyna Chyl, Agnieszka Dębska, Agnieszka Glica, Katarzyna Wasilewska
- Computational Session I – Medium hall A**
New methods in MRI
Speakers: Rita Nunes, Michał Rafał Zaręba, Dominika Ciupek, Marcin Sińczuk, Alaa Alghanimy
- 17:00–17:30** **Coffee Break**
- 17:30–18:30** **Keynote lecture – Large hall A**
Fish feelings: Motivational internal states in larval zebrafish
Speaker: Florian Engert (Department of Molecular and Cellular Biology, Center for Brain Science, Harvard University, USA)
- 20:30–** **Neuronus Party**

17TH OCTOBER, 2022
AUDITORIUM MAXIMUM, JAGIELLONIAN UNIVERSITY

- 9:00–10:00** **Keynote lecture – Large hall A**
Diversity of oxytocin circuits modulating distinct socio-emotional behaviors
Speaker: Valery Grinevich (Central Institute of Mental Health, University of Heidelberg, Germany)

- 10:00–11:30** **Biological Session VII – Large hall A**
Hypothalamic control of behavior
Speakers: Frank Meye, Karolina Hajdukiewicz, Emilia Gawron, Alan Kania
- Cognitive Session VI – Large hall B**
Search for neural biomarkers of aware consciousness
Speakers: Ilona Kotlewska, Lucja Doradzińska, Karolina Golec, Julia Papiernik, Klaudia Krystecka
- Medical Session III – Medium hall A**
Novel targets in retinal ganglion cell neuroprotection
Speakers: Marialaura Amadio, Piotr Rodak, Joanna Machowicz, Anna Pacwa
- 11:30–12:00** **Coffee Break**
- 12:00–13:30** **Biological Session VIII – Large hall A**
Mitochondrial dysfunctions in neurological disorders
Speakers: Alessandro Prigione, Sinéad A. O’Sullivan, Aleksandra Stawikowska, Carla Ramon
- Cognitive Session VII – Large hall B**
Pupillometry: Getting information in the glimpse of an eye
Speakers: Alexandre Zénon, Beaupoil Laurent, Bartłomiej Król-Józaga, Monika Riegel, Jakub Cacek
- 13:30–14:00** **Lunch**
- 14:00–15:15** **Poster Session III – Exhibition hall**
- 15:15–16:30** **Biological Session IX – Large hall A**
Blood-brain barrier
Speakers: Aleksandra Rutkowska, Fiona Caratis, Jakub Jurczyk, Ewelina Czuba
- Cognitive Session VIII – Large hall B**
Specificity of language network in the contingently blind brain
Speakers: Maksymilian Korczyk, Marta Urbaniak, Dominika Radziun, Łukasz Bola, Jacek Matuszewski
- Computational Session II – Medium hall A**
Novel methods in EEG
Speakers: Joanna Duda-Golawska, Piotr Biegański, Anna Grabowska, Nikodem Hryniewicz, Sandra Frycz
- 16:30–17:00** **Coffee Break**
- 17:00–18:00** **Keynote lecture – Large hall A**
Built to learn: Insights into nature and nurture from studies with people born blind and cultural expertise
Speaker: Marina Bedny (Department of Psychological and Brain Sciences, Johns Hopkins University, USA)
- 18:00–18:15** **Awards & Closing Ceremony – Large hall A**

Epilepsy is a complex disease that involves a diverse set of symptoms and neurological disorders. A conservative model of the imbalance between the excitatory and inhibitory neurotransmitter systems is insufficient to understand the mechanisms of epilepsy. Therefore, it is necessary to include non-classical signaling molecules such as nitric oxide (NO). However, it has not been possible to clearly define whether endogenous NO is a pro or anticonvulsive. The purpose of the study was to determine the temporal profile of changes in the activation of the brain nitrenergic system in response to seizures and to correlate the activation of the nitrenergic system with the intensity of seizures. The study used a pilocarpine model of epilepsy. The kinetics of NO release was determined by electron paramagnetic resonance spectroscopy followed by NO spin trapping. Seizures were classified on the basis of modified Racine's scale. The data obtained allowed us to determine that after epileptic seizures, intense NO release lasts for the first 12 h. After this, the NO concentration drops sharply to levels that are not significantly different from those in control animals. Additionally, no significant correlation was found between the levels of NO released in the brain and the intensity of seizures.

Funding: This research was funded by the Priority Research Area BioS under the program "Excellence Initiative-Research University" at the Jagiellonian University in Cracow, grants U1U/P03/DO/14.33 and U1U/P03/DO/14.90.

BLOCKADE OF H3 HISTAMINE RECEPTORS FACILITATES ANTISEIZURE ACTION OF PENTOXYPHILLINE

Prybolovets KO^{1*}, Poshyvak OB^{2*}, Pervak MP¹, Yehorenko OS¹, Godlevsky LS¹

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Considering the important role of inflammation in epilepsy development is reasonable to investigate the effects of combined usage of different modulators of neural inflammation. The work aimed to investigate the effects of the blocker of histamine H3 pitolisant hydrochloride (Selleck, USA) and pentoxophylline (Sigma-Aldrich, USA), which prevents proinflammatory cytokines elaboration upon pentylentetrazol (Sigma-Aldrich, USA) (PTZ)-kindled seizures in rats. Male Wistar rats four months of age kindled to the stage of generalized tonic-clonic seizure fits with PTZ (35 mg/kg, i.p.) were used in observations. Pentoxo-

phylline (50 mg/kg, i.p.) administered with pitolisant (5 mg/kg, i.p.) caused the increase of first seizure manifestations latency by 67.2% in comparison with the control group of kindled rats ($P < 0.05$). Also, PTZ-induced generalized tonic-clonic fits were prevented, and seizure severity was 1,6+0,2 scored points which were 2.6 times less than the control value ($P < 0.01$). Both the latency of first seizures and their severity were significantly different when compared with separate effects of pentoxifylline (100 mg/kg, i.p.) or pitolisant (10 mg/kg i.p.) administrations ($P < 0.05$). Also, ictal potentials were absent in the ventral hippocampus under conditions of combined drug administration. Hence, gained data showed that blockade of H3 histamine and endogenous proinflammatory cytokines resulted in synergic antiseizure effects.

Funding: This research was funded by the Ministry of Health Care of Ukraine (Number of research work 0121U114510).

THE MECHANISM OF REALIZATION OF ANTISEIZURE EFFECTS OF CEREBELLAR ELECTRICAL STIMULATION

Bidnyuk VK¹, Pervak MP¹, Poshyvak OB^{2*}, Yehorenko OS¹, Varava SV¹, Godlevsky LS¹, Haustov OO¹

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We have reported that electrical stimulations of cerebellar structures resulted in the heightened antiseizure effectiveness of diazepam against pentylentetrazol (PTZ)-kindled seizures. Such effects might be explained by the increased antioxidant mechanisms in the brain tissue, which counterparts oxidative stress, as a fundamental pathogenetic mechanism of chronic epileptic activity. The work aimed to investigate the state of antioxidant defense in the cerebral cortex of PTZ-kindled rats under electrical stimulations (100 Hz, 0,25 ms, 50-100 mcA, 2,5 s) of the paleocerebellar cortex (V-VII lobules). Kindling was produced *via* three weeks of PTZ administration (35 mg/kg, i.p.), and animals with fully developed generalized seizure fits were included in the observation. Kindled animals were stimulated two times daily, three days starting 24 h after the last kindled seizure fit, and testing PTZ was administered afterward. The net reduction of superoxide dismutase activity – by 40.7% and catalase – by 32.0% in comparison with the control group of animals registered 24 h after the last sham stimulation. Besides, the level of free thiols in the cerebral cortex was ten times greater than in kindled rats ($P < 0.02$). Gained data favoring the