

ISSN 0065-1400 (PRINT)
ISSN 1689-0035 (ONLINE)

2022 Volume 82
Supplement

ACTA

NEUROBIOLOGIÆ
EXPERIMENTALIS

www.ane.pl



NEURONUS 2022
NEUROSCIENCE FORUM
SUPPORTED BY IBRO

15-17 OCTOBER 2022, KRAKOW, POLAND

NENCKI INSTITUTE OF EXPERIMENTAL BIOLOGY PAS WARSAW, POLAND

ACTA NEUROBIOLOGIAE EXPERIMENTALIS

Volume 82, Supplement, 2022 – 12th Neuronus 2022 Neuroscience Forum

Contents

PROGRAMME.....	IV
KEYNOTE SPEAKERS.....	VIII
BIOLOGICAL SESSION 1.....	IX
BIOLOGICAL SESSION 2.....	XI
BIOLOGICAL SESSION 3.....	XIII
BIOLOGICAL SESSION 4.....	XV
BIOLOGICAL SESSION 5.....	XVi
BIOLOGICAL SESSION 6.....	XVII
BIOLOGICAL SESSION 7.....	XIX
BIOLOGICAL SESSION 8.....	XXI
BIOLOGICAL SESSION 9.....	XXII
COGNITIVE SESSION 1.....	XXIII
COGNITIVE SESSION 2.....	XXV
COGNITIVE SESSION 3.....	XXVII
COGNITIVE SESSION 4.....	XXVIII
COGNITIVE SESSION 5.....	XXX
COGNITIVE SESSION 6.....	XXXI
COGNITIVE SESSION 7.....	XXXIII
COGNITIVE SESSION 8.....	XXXV
MEDICAL SESSION 1.....	XXXVII
MEDICAL SESSION 2.....	XXXIX
MEDICAL SESSION 3.....	XLI
COMPUTATIONAL SESSION 1.....	XLII
COMPUTATIONAL SESSION 2.....	XLIV
POSTER SESSION 1.....	XLVI
POSTER SESSION 2.....	LXIV
POSTER SESSION 3.....	LXXXIII



NEURONUS 2022 NEUROSCIENCE FORUM SUPPORTED BY IBRO

15–17 OCTOBER 2022, KRAKOW, POLAND

ORGANIZERS

STUDENT NEUROSCIENCE SOCIETY 'NEURONUS'

Institute of Zoology and Biomedical Research, Jagiellonian University

PSYCHOLOGY STUDENTS' ASSOCIATION

Institute of Psychology, Jagiellonian University

Head of the Conference

Alicja Szadziewska

Project Coordinators

Michał Ślęzak

Przemysław Adamczyk

Michał Kuniecki

Maria Czarnecka

Aleksandra Gruszka-Gosiewska

Anton M.L. Coenen

Anna Błasiak

Members of Organizing Committee

Aleksandra Bartosz-Nowakowska

Karolina Sekuła

Alicja Radzimska

Karolina Warzecha

Anna Leśniewska

Kinga Przybylska

Emilia Gawron

Kinga Skoczek

Gabriela Rajtar

Kornelia Tryzno

Gabriela Stopka

Maciej Kania

Hanna Nikanava

Marta Kołodziejak

Joanna Doliwa

Monika Żuwała

Kaja Szymanek

Piotr Rywczak

Karolina Przyborowicz

SCIENTIFIC COMMITTEE

Scientific Committee – Biological Section

Michał Ślęzak

Łukasiewicz Research Network, PORT Polish Center for Technology Development, Wrocław, Poland

Anna Błasiak

Department of Neurophysiology and Chronobiology, Jagiellonian University in Krakow, Poland

Steffen Kandler

Biozentrum, University of Basel, Switzerland

Gilles van Luitelaar

Donders Centre for Cognition, Radboud University Nijmegen, the Netherlands

Kamil Pradel

Department of Neurophysiology and Chronobiology, Jagiellonian University in Krakow, Poland

Scientific Committee – Cognitive Section

Michał Kuniecki

Psychophysiology Lab, Jagiellonian University in Krakow, Poland

Aleksandra Gruszka-Gosiewska

Experimental Psychology Lab, Jagiellonian University in Krakow, Poland

Przemysław Adamczyk

Institute of Psychology, Jagiellonian University, Poland

Maria Czarnecka

Szwed Lab, Jagiellonian University in Krakow, Poland

Scientific Committee – Medical Section

Witold Libionka

Vital Medic, Poland

Marcin Majka

Department of Transplantation, Institute of Pediatrics, Jagiellonian University Medical College, Poland

Adrian Chrobak

Department of Adult Psychiatry, Jagiellonian University Medical College, Poland

Scientific Committee – Computational Methods Section

Tomasz Pięciak

Universidad de Valladolid, Spain

HONORARY PATRONAGE

International Brain Research Organization (IBRO)
Przemysław Czarnek – Minister of Education and Science
Witold Kozłowski – Marshal of the Malopolska Region
Prof. Jacek Majchrowski – Mayor of the City of Krakow
Prof. Jacek Popiel – Rector of the Jagiellonian University
Prof. Jacek Nowak – Dean of the Faculty of Philosophy of the Jagiellonian University
Prof. Joanna Zalewska-Gałosz – Dean of the Faculty of Biology of the Jagiellonian University
Prof. Przemysław Bąbel – Head of the Institute of Psychology of the Jagiellonian University
Prof. Paweł Grzmil – Head of the Institute of Zoology and Biomedical Research of the Jagiellonian University
Polish Neuroscience Society (PTBUN)
Neurobiology Committee of the Polish Academy of Sciences
Prof. Maciej Żylicz – President of Foundation for Polish Science
Nencki Foundation
Poland Innovative
Tygiel Foundation

FUNDERS & SPONSORS

Co-financed by the program "Excellent Science" of the Minister of Education and Science
International Brain Research Organization (IBRO)
Elmiko
Science Products

MEDIA PATRONS

krakow.pl
studentnews.pl
biotechnologia.pl

Biologhelp
edoktorant
Dziennik Naukowy

Kopalnia Wiedzy
Puls UM

Poster design
Aniela Dmochowska

Contact
info@neuronusforum.pl

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**

of LHb neurons and their responses to AS differ between brain states. Firstly, we performed *in vivo* extracellular recordings of midbrain DA neurons combined with optotagging and recorded their responses to electrical foot shocks from urethane anaesthetized rats. Secondly, we recorded activity and responses to AS of LHb neurons using Multi-Electrode Arrays. We observed two neuronal subpopulations of both VTA/SNc and LHb – excited and inhibited by AS. However, we also recorded previously undescribed populations of VTA/SNc and LHb neurons which responses to AS differ between brain states. This study sheds new light on interplay of LHb/VTA/SNc in AS-coding and influence that brain state may exert on processing of aversion.

Funding: National Science Centre, PRELUDIUM 2019/33/N/NZ4/03011.

PENTYLENETETRAZOLE-INDUCED KINDLING AS A MODEL OF METABOLIC SYNDROME

Bidnyuk V.K.¹, Pervak M.P.¹, Poshvyak O.B.^{2*}, Yehorenko O.S.¹, Varava S.V.¹, Godlevsky L.S.¹, Haustov O.O.¹

¹Department of Biophysics, Informatics and Medical Devices, Odessa National Medical University, Odessa, Ukraine, ²Department of Pharmacology, Danylo Halytsky Lviv National Medical University, Lviv, Ukraine

*E-mail: olesya.poshvyak@gmail.com

Data on the relationship between epilepsy and metabolic syndrome justified the evaluation of MS markers expression in PTZ-kindled rats. PTZ kindling was induced in four months aged male Wistar rats with three weeks epileptogen (35.0 mg/kg, i.p.) administration. Those animals with fully developed generalized seizures were used for investigations. The glucose tolerance test (GTT) was followed by a significant rising in blood glucose level 30 min after glucose i.p. administration (2.0 g/kg) up to 395.7±47.2 mg/dl, which exceeded the control data by 1.74 times ($P<0.001$). Insulin tolerance test (0.75 U of insulin/kg) revealed in 15 min after glucose i.p. administration (2.0 g/kg) up to 114.3±15.7 mg/dl, which exceed the control data by 31.3% ($P<0.001$). Significant differences were maintained for 2 h. Avidin-biotin peroxidase complex method was used to determine differences in the immunohistochemical determination of TNF- α and p-NF- κ B in dorsal hippocampal structures. It was established that in kindled rats, the level of TNF- α and p-NF- κ B determined with the intensity of color raised in PTZ-kindled rats by 3.73 and by 3.0 times correspondently ($P<0.001$). Circulating fasting blood triglycerides was 142.2±22,6 mg/dl and exceeded the control value by 18.8% ($P<0.01$). Gained data favored

similar mechanisms of chronic brain epileptic activity and metabolic syndrome.

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

ABNORMAL METABOLISM AND AUTOPHAGY IN THE SPINAL CORD OF SOD1-G93A MICE ARE MODIFIED BY SWIM TRAINING

Katarzyna Patrycja Dzik^{1*}, Damian Józef Flis², Katarzyna Barbara Kaczor-Keller³, Zofia Kinga Bytowska⁴, Mateusz Jakub Karnia¹, Wiesław Ziółkowski⁵, Jan Jacek Kaczor¹

¹Department of Animal and Human Physiology, Faculty of Biology, University of Gdansk, Gdansk, Poland, ²Department of Pharmaceutical Pathophysiology, Faculty of Pharmacy, Medical University of Gdansk, Poland, ³Department of Molecular Biology, Institute of Genetics and Animal Biotechnology, Polish Academy of Science, Magdalenka, Poland, ⁴Division of Bioenergetics and Physiology of Exercise, Faculty of Health Sciences with Institute of Maritime and Tropical Medicine, Medical University of Gdansk, Gdansk, Poland, ⁵Department of Rehabilitation Medicine, Faculty of Health Sciences with Institute of Maritime and Tropical Medicine, Medical University of Gdansk, Gdansk, Poland

*E-mail: katarzyna.dzik@ug.edu.pl

Amyotrophic lateral sclerosis (ALS) is an incurable, neurodegenerative disease. ALS might cause behavioral disturbances and cognitive dysfunction. Exercise has revealed a neuroprotective influence on the motor neurons in ALS. Swim training was applied five times per week for 30 min to the SOD1-G93A mice model of ALS and B6SJL mice as controls. ALS mice were tested before ALS onset, at the first symptoms of the disease, and at the terminal stage. All mice underwent behavioral tests. The spinal cord was tested for enzymatic activities and signaling protein content. The study revealed increased locomotor activity in pre-symptomatic ALS mice; the swim training reduced these symptoms. Decreased PGC-1 α , IGF-1, and TBK1 signaling molecule content, among with increases in AMPK, metabolic sensor, abnormally regulated metabolism, and autophagy in the spinal cord of SOD1-G3A mice, causing accumulation of p62 and mitochondrial OGDH. The metabolic changes present already at the pre-symptomatic stage of the disease shift towards glycolytic processes at the terminal phase of ALS. On the other side, we suggest that swim training causes the adaptation resulting in higher NFL content and increased IGF-1, protecting spinal's cord mitochondria against disruption. The therapeutic aquatic activity might slow down the progression of ALS.

Funding: Research project was founded by grant from the Polish National Science Centre (2018/29/N/NZ7/01627).