REGISTRATION FORM FOR CZECH SCIENTIFIC INSTITUTION

1. Research institution data (name and address):

National Institute of Mental Health (NIMH)
Topolová 748, 250 67 Klecany Czech Republic

National Institute of Mental Health originated from Prague Psychiatric Centre on 1st January 2015. The establishment of a new modern centre oriented on research and clinical care was made possible by a project financed by Operational Programme Research and Development for Innovation. NIMH is meant to become national reference institution for the field of mental health. NIMH programme is focused on researching neurobiological mechanisms that lead to development of severe mental disorders (schizophrenia, depression, anxiety and stress reactions). Research also includes development and testing of new diagnostic and therapeutic methods including glutamatergic drugs and psychedelics. Our approach is based upon interconnection of methods of molecular biology, pharmacological innovations, animal modelling and clinical research and testing.

2. Type of research institution: State contributory organisation (státní příspěvková organizace)

3. Head of the institution: PhDr. Petr Winkler, Ph.D. – Director

4. Contact information of designated person(s) for applicants:

RNDr. Karel Valeš, Ph.D. – Head of Preclinical Research Program;
e-mail: karel.vales@nudz.cz; phone number: 283 088 475
National Institute of Mental Health
Topolová 748, 250 67 Klecany, Czech Republic

5. Research discipline in which the strong international position of the institution ensures establishing a Dioscuri Centre:

Life Sciences: *Diagnostic tools, therapies and public health* - public health, epidemiology, environmental health risks and occupational medicine, medical ethics, drug discovery and therapies, pharmacology

6. Description of important research achievements from the selected discipline from the last 5 years including a list of the most important publications, patents, or other results:

- KRUPCHANKA, D., MLADÁ, K., WINKLER, P., KHAZAAL, Y., ALBANESE, E. Mortality in people with mental disorders in the Czech Republic: a nationwide, register-based cohort study. The Lancet Public Health. 2018, 3(6), "e289"-"e295". ISSN 2468-2667. DOI: 10.1016/S2468-2667(18)30077-X. IF 11.600 Q1
- FÁRKOVÁ, E., ŠMOTEK, M., BENDOVÁ, Z., MANKOVÁ, D., KOPŘIVOVÁ, J. Chronotype and social jet-lag in relation to body weight, apetite, sleep quality and fatigue. Biological Rhythm Research. 2021, 52(8), 1205-1216. ISSN 0929-1016. DOI: 10.1080/09291016.2019.1630096. IF 1.219 SJR 0.252 AIS 0.207 Q3
- CHEVAL, B., SIEBER, S., MALTAGLIATI, S., MILLET, G., FORMÁNEK, T., CHALABAEV, A., CULLATI, S., BOISGONTIER, M. Muscle strength is associated with COVID-19 hospitalization in adults 50 years of age or older. Journal of Cachexia Sarcopenia and Muscle. 2021, 12(5), 1136-1143. ISSN 2190-5991. DOI: 10.1002/jcsm.12738. IF 12.910 SJR 2.803 AIS 2.643 Q1
- WINKLER, P., KONDRÁTOVÁ, L., KÅGSTRÖM, A., KUČERA, M., POLÁNOVÁ, T., SALOMONOVÁ, M., ŠTURMA, P., ROBOCH, Z., MURKO, M. Adherence to the Convention on the Rights of People with Disabilities in Czech Psychiatric Hospitals: A Nationwide Evaluation Study. Health and Human Rights. 2020, 22(1), 21-33. ISSN 1079-0969. IF 1.552 SJR 0.621 AIS 0.769 Q4
- MARTINEC NOVÁKOVÁ, L., HAVLÍČEK, J. Time, Age, Gender, and Test Practice Effects on Children's Olfactory Performance: a Two-Year Longitudinal Study. Chemosensory Perception. 2020, 13(1), 19-36. ISSN 1936-5802. DOI: 10.1007/s12078-019-09260-0. IF 1.833 SJR 0.405 AIS 0.467 Q3
- JURÍČKOVÁ, V., BOZDĚCHOVÁ, A., MACHOVÁ, K., VADROŇOVÁ, M. Effect of Animal Assisted Education with a Dog Within Children with ADHD in the Classroom: A Case Study. Child and Adolescent Social Work Journal. 2020, 37(6), 677-684. ISSN 0738-0151. DOI: 10.1007/s10560-020-00716-x. IF 1.862 SJR 0.613 AIS 0.602 Q2
- KÁŽMÉR, L., CSÉMY, L. Changing trends in adolescent alcohol use among Czech school-aged children from 1994 to 2014. Journal of Public Health Research. 2019, 8(1), 26-32. ISSN 2279-9036. DOI: 10.4081/jphr.2019.1493. Q4
- NOSKOVÁ, E., STOPKOVÁ, P., HORÁČEK, J., ŠEBELA, A. Augmentation therapy of N-acetylcysteine for OCD: A meta-analysis of double-blind, randomized, placebo-controlled trials. Journal of Obsessive-Compulsive and Related Disorders. 2019, 23(October), "Article Number: 100481". ISSN 2211-3649. DOI: 10.1016/j.jocrd.2019.100481. IF 1.418 Q4
- MUTLU, O., VALEŠ, K. New therapeutic uses of peptides of the adipokinetic hormone family.CH EP3446753. 27.02.2019. Dostupné také z: https://patentscope.wipo.int/search/en/detail.jsf?docId=EP238115837&tab=NATIONALBIBLI

- HÁJKOVÁ, M., KNÍŽKOVÁ, K., SIROŇOVÁ, A., KEŘKOVÁ, B., JONÁŠ, J., ŠUSTOVÁ, P., DORAZILOVÁ, A., RODRIGUEZ, M. Cognitive performance and lifetime cannabis use in patients with first-episode schizophrenia spectrum disorder. Cognitive Neuropsychiatry. 2021, 26(4), 257-272. ISSN 1354-6805. DOI: 10.1080/13546805.2021.1924649. IF 1.871 SJR 0.772 AIS 0.660 Q3

7. List of no more than 3 important research projects in the selected discipline awarded in national and international calls to the institution in the last 5 years:

PharmaBrain

RNDr. Karel Valeš, PhD., Ing. Šimon Skovajsa

European Structural and Investment Funds (ESIF), OP Research, Development and Education

148 262 697 CZK

Destigmatization of People with Mental Disease

PhDr. Petr Winkler, PhD.

European Structural and Investment Funds (ESIF), Operational Programme Employment

94 956 515 CZK

Centre for Technology and Knowledge Transfer NIMH

RNDr. Karel Valeš, Ph.D., Ing. Šimon Skovajsa

European Structural and Investment Funds (ESIF), OP Research, Development and Education

16 140 904 CZK

8. Description of the available laboratory and office space for a Dioscuri Centre:

The main objective of NIMH Clinical Centre as the national reference institution is to form a base for development, testing and introducing latest therapeutic methods into practice, for creating medical standards, and for training experts. Special attention is paid to research and treatment of mood disorders, anxiety disorders, psychotic disorders and mental disorders in old age including dementias. NIMH has inpatient wards (60 beds in total), a day care centre, memory disorders counselling office and specialized outpatient departments. NIMH Clinical Centre accepts patients from all regions of the Czech Republic on the basis of their clinical profile and current research programmes.

NIMH is also a training base for medical students of the Third Faculty of Medicine at Charles University in Prague and for other master's and postgradual programmes (psychology, neurosciences, biology, sociology, epidemiology etc.).

Clinical research section of the National Institute of Mental Health CZ has gained a vast experience with conduction of clinical trials, including international ones. Scientific activities of the Institute focused on diagnosis, prevention, and remediation of risk factors threatening mental health of the individual have consistently yielded results capable of surviving in a competitive environment of neuroscience research both in European and global forum.

The Clinical research section has state of the art MRI facilities (3T Siemens Prisma MRI scanner) and computer infrastructure, which gives us access to high quality MRI scans and the necessary computing power. The NIMH also has outpatient and inpatient clinics, extensive laboratory facilities, thus integrating the clinical care and research. Furthermore, the model of close collaboration between NIMH and major psychiatric hospitals is unique, as it allows for better integration of these clinics into academic work and for wider knowledge dissemination.

Laboratory of the NIMH is equipped with advanced computer-based behavioral methods including the prepulse inhibition of startle responses (PPI), open-field arenas, Multi Conditioning System and other behavioral methods used in this project. This laboratory also has an accredited surgery room, in which part of the microdialysis procedures will take place. Next we have analytical centre focused on neurochemical analysis, particularly microdialysis samples (mass spectrometry systems, hybrid mass spectrometer LTQ Orbitrap Velos, liquid chromatographs with UV-vis detection, gas chromatographs). Our laboratory possesses systems for video/EEG recording. Sophisticated off-line analysis of the data will be performed in a MatLab environment with custom written scripts. Our laboratory possesses all necessary equipment for immunoblotting including: a centrifuge with rotors, vertical electrophoresis, a wet and semi-dry transfer device (Bio-Rad, USA), 2-D and 3-D shakers, a film processing device and evaluation software (Raytest, Germany). Staff in the laboratory has extensive experience in working with rats, GMO organisms and they have passed an examination according to Animal Protection Laws.

9. List of the available research equipment for a Dioscuri Centre:

Cellular and Molecular Imaging Laboratory

- Leica TCS SP8 X Confocal Laser Scanning Microscope
- Zeiss AxioImager Z1 Fluorescence Microscope

Mass Spectrometry Laboratory

- QTrap 6500 Mass Spectrometer, AB Sciex - High sensitivity quantification of analytes in complex matrices (MS spectra with a unit resolution of molecular mass (m/z))
- Triple TOF 5600 Mass Spectrometer, AB Sciex - High resolution and accurate mass determination (suitable for qualitative analysis of unknown samples, untargeted analysis and fingerprinting)
- UltiMate 3000 UPLC System, Thermo Fischer Scientific - Separation of analytes in complex matrices with UV-Vis, Fluorescence or Mass Spectrometry detection
- Bullet Blender 24 Gold, Next Advance (homogenisation of tissues, high sample capacity, for small sample amounts, no cross-contamination between samples, cooled)
- 3D Printer I3MK3, Prusa Research (3D printing of plastic lab-ware and components)

Tissue Culture and Immunocytochemistry Laboratory

- Instrumentation for anesthesia and animal surgery, transcardial perfusion, tissue extraction, fixation and processing for immunohistochemistry and cytochemistry
- Perfusion pumps and laboratory accessories for fixation, with a wide range of possibilities enabling processing and preparation of samples to meet the specific experimental requirement
- Semi-automatic cryostat Leica CM1860UV for cutting thin and ultrathin frozen sections for histological and ultrastructural analysis, section thickness selection ranging 1 - 100 µm at a temperature range from 0 °C to -35 °C
- Luminometer Lumicycle enables high-throughput luminometry on self-luminous tissues, such as those from transgenic animals containing the luciferase gene. The latter enables also a wide range of read-outs and applications, including chronobiological studies.

Biochemistry and Radioisotope Laboratory

- Two 2x ultracentrifuges (Beckman) and 2x high-speed centrifuges (Beckman) with corresponding rotors for isolation of proteins and organelles

- Spectrofluorophotometer (Schimadzu) for sensing and quantitative biochemistry, using fluorescence probes and reporters
- ATR-FTIR spectrometer for vibrational spectral analysis, e.g., high-sensitive estimations of drug levels
- A Teflon-glass homogeniser (Potter's Braun) for homogenisation of brain tissue, liver and other tissue for protein chemistry and biochemistry research
- Microplate spectrometer reader and microplate spectrofluorophotometer reader
- Equipment and facilities for ELISA experiments (protein expressions, interactions – levels of complexes of two proteins)
- Equipment for Western blotting, quantification of protein expressions
- Radiolabeled isotopes laboratory is a special compartment within the biochemical laboratory with special access to trained and authorised personnel

High Performance Liquid Chromatography (HPLC) Laboratory

- Hewlett Packard 1100 Binary HPLC pump, Dionex P580 Quarternary pump with DA detector and Gilson FC203B fraction collector
- Dionex ultimate 3000 HPLC systém with Quarternary pump, Autosampler, DA detector, FL detector
- Thermo Scientific Evolution 201 UV-VIS spectrophotometer with Peltier thermostat and 8-position Cell changer
- Tecan Infinite M200 Pro Multimode Microplate Reader (UV-VIS absorbance, luminescence, fluorescence, time-delayed fluorescence reading modes) with Reagent Injectors and temperature control systems
- Thermo Scientific WellWash 4MK2 automatic microplate washer
- Hettich 320R table-top refrigerated centrifuge

Chemical Synthesis Laboratory

Chemical synthesis laboratory is a cutting-edge research facility within the Department of Experimental Neurobiology for designing and synthesising chemicals with pharmacological and therapeutic activity relevant to neuropsychiatric and neurodegenerative diseases. It affords a wide range of physical and chemical reactions and interventions for producing new drug leads, followed by their characterisation and optimisations.

Animal Behaviour Laboratory

- Rat Forced Exercise Bed model 80805AC apparatus with accessories for real-time monitoring and control and evaluation of the effects of pharmacological interventions and sleep deprivation

- Open field arenas, platforms for object recognition task studies; elevated plus maze and Y-maze
- Bar holding and beam walking platforms for testing motor and coordination functions equipped with a digital camera for real-time monitoring motor performance
- Ultrasonic microphones - Dodotronic Ultramic 250 and 384 for monitoring communication between animals in various behavioural contexts
- A range of setups for anxiety and social behaviour testing applied to autism and schizophrenia models
- Tools and methodologies for testing motor development and communication and their alterations in generic and pharmacological induced disease models

Electrophysiology Laboratory

- Surgery room with stereotaxic apparatus and inhalation anesthesia (isoflurane and oxygen)
- Setups for recording single unit activity and local field potentials in vivo in behaving rats
- EEG measurements in freely moving animals (Axona Ltd)
- 4DSI telemetry system
- Wireless EEG/EMG/EOG measurement and monitoring of state-dependent changes in neural activity in anaesthetised and freely behaving animals
- Real-time video of behavioural tasks combined with intra-vital electrophysiology
- Implanting of electrodes and telemetric modules for EEG measurement
- In vitro electrophysiology and fluorescence imaging (under development)

Clinical research equipment:

- Siemens Magnetom 3T Prisma MRI scanner
- 256-channel EEG systems EGI GES 400 (MR compatible) (Electrical Geodesics, Inc., USA)
- MR and EEG equipment for audio-visual stimulation and recording of subject`s interactions, programmed in the E-Prime and Python
- MagPro R30 Stimulator (Magventure Tonika Elektronic, Denmark) for rTMS research and treatment
- BrainSight Frameless Navigation System (Rogue Research Inc., Canada)
- tDCS Stimulator HDCStim (Newronica, Italy)
- Geodesic Transcranial Electrical Neuromodulatory System GTEN 100 (Electrical Geodesics, Inc., USA)
- 32-channel EEG system (2x) (M&I, Czech Republic)

Virtual Reality Lab:

- complete VR-ready PC/notebook setup with configuration for VR research and development (with Unity Pro license)
- HTC Vive Pro Eye Virtual Reality Headset (Kit) - VR glasses with Controllers, Resolution, 1440 x 1600 pixels per eye, with precise tracking of head, eye and hand movements, includin additional HTC motion trackers
- TC Vive Pro Virtual Reality Headset Kit (VR glasses, Motion Sensors, Controller, built-in audio)
- 3x wireless standalone Oculus Quest 2- Advanced All-In-One Virtual Reality Headset- 128 GB
- Oculus Rift headset (VR glasses, Motion Sensors, Controllers)
- setup for wireless physiological measurement including ECG/breathing sensors (FBME CTU)
- 2x Samsung Gear VR with Controller & Samsung Galaxy S8 mobile phones

SEX Lab:

- BioPac Systems
- Penile plethysmography (PPG)
- Vaginal Photoplethysmography (VPG)
- Electrocardiography (ECG)
- Galvanic skin response (GSR)
- Functional Magnetic Resonance Imaging (fMRI)
- Eye tracking/pupilometry
- Kinect
- Intel RealSense technology
- Oculus Rift
- Leap Motion

Sleep and Chronobiology Research Centre

- Polysomnographs
- Actigraphs
- NOX Polysomnographs
- Lumicycle

10. List of the additional benefits (other than listed in the conditions for hosting a DC, see invitation) that the Institution declares to provide for a Dioscuri Centre (i.e.: additional funds, personal benefits, dual career options, relocation support or other):

HR AWARD HRS4R: **HR Excellence in Research**

- International Relations office of NIMH offers support with relocation
- Pleasant and modern working environment in the newly built research / treatment institute
- Own staff restaurant and a spacious café
- Flexible working hours - in NIMH, each individual employee can set their own working hours. NIMH also supports part-time jobs and occasional Home Offices
- Extra week of holiday above the statutory entitlement and three sick days per year
- NIMH provides time off to improve and upgrade qualifications
- A meal allowance in the form of meal vouchers
- Every researcher has the opportunity to participate in domestic and international projects as well as undertake their own research project/s
- NIMH enables professional internal and external personal and professional development - seminars, conferences, internships - led by domestic and foreign experts
- Active participation in seminars and conferences in the Czech Republic and abroad
- English language trainings
- A gym, yoga, bike shed, changing rooms and showers are available free of charge for the staff in the NIMH building
- Massages and physiotherapy services are available directly in the building
- NIMH publishes an internal newsletter, employees can publish their own contributions

11. Other information about the internationalization of the research institution, international researchers employed at the institution, the availability of English language seminars etc.:

NIMH is a globally open institution that proactively establishes relations with foreign research organizations and universities and supports the mobility of research, academic and administrative staff.

NIMH participates in international discourse, especially in the field of science and education, and contributes to the exchange of study and scientific experience between prestigious European and world workplaces and participates in international research projects in the fields of psychiatry, social psychiatry, psychopharmacology and neuroscience.

Our goal is to deepen the process of internationalization of NIMH, strengthen international cooperation and develop human resources in research.

NIMH has developed a strategy of international cooperation for the years 2021-2024, which sets goals in this area. The Office for International Cooperation, which is responsible for international activities, also operates at NIMH.

NIMH establishes international cooperation in the field of science and research, supports the development of international partnerships and is involved in several international projects, including the World Health Organization (WHO) and the EU. Our Social Psychiatry research program has been established as a World Health Organization (WHO) collaborative center for public mental health research and development services. We are part of a prestigious network of more than 800 collaborating centers around the world that help formulate, implement and evaluate WHO programs at the international level.

English is a widely used language at NIMH. More than 50 international researchers are employed here.

NIMH closely colaborates with the Third Faculty of Medicine of Charles University in Prague. NUDZ is a teaching base of the 3rd Faculty of Medicine, with a further extension of master's and postgraduate study programs in the field of neuroscience, psychology, biology, sociology and epidemiology.