

# BRAIN CITY

## *Uncovering the secrets of a healthy and diseased brain and mind*

The centre is implementing the project: „Nencki-EMBL Center of Excellence for Neural Plasticity and Brain Disorders: BRAINCITY“. It conducts research into a comprehensive understanding of how the human brain, and its product - the mind, operate. The researchers hope to use this knowledge to develop innovative solutions which improve the prevention, diagnosis, monitoring and treatment of brain diseases. This includes mental illnesses such as depression and schizophrenia, addictions, as well as neurodegenerative diseases such as Alzheimer's or Parkinson's.



BRAINCITY – Centre of Excellence for Research on Neural Plasticity and Brain Disease



Prof. Leszek Kaczmarek, PhD and Associate Prof. Ewelina Knapska, PhD



Brain disorders; synaptic plasticity; stem cells, optical imaging; neuromedicine



Comprehensive research into the complex mechanisms of brain plasticity



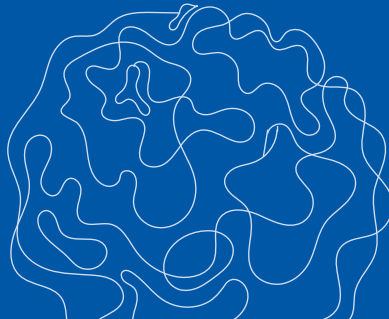
*Annual medical and social costs of brain diseases in the EU exceed EUR 800 billion. This is more than the costs associated with cancer, cardiovascular diseases and diabetes combined –*

**Prof. Leszek Kaczmarek, PhD**

*To understand such a complex and intriguing organ as the brain, it is necessary to conduct research at several levels of organisation. Therefore, in BRAINCITY we will combine, among others, genome editing technologies and gene-protein manipulation, methods for precise visualisation of both: single synapses and entire neuronal networks, organoid research, animal behaviour research and bioinformatics techniques –* **Ewelina Knapska, PhD.**



**Quotes**





**Prof. Leszek Kaczmarek, PhD** – Head of the Neurobiology Laboratory at the Nencki Institute of Experimental Biology, Polish Academy of Sciences, Warsaw. He is a Member of the Polish Academy of Sciences, the European Molecular Biology Organization (EMBO) and Academia Europaea. He was Principal Investigator on more than 50 national and international research projects funded, among others, by the EU, NATO and the Wellcome Trust. He has worked as Contract Professor at the University of Catania (Italy) and as Visiting Professor at McGill University in Montreal (Canada), the University of California in Los Angeles and the Institute of Optics and Photonics in Castelldefels (Spain). Prof. Kaczmarek was awarded Foundation for Polish Science Prize in the field of natural and medical sciences for his research on the influence of various stimuli on gene expression in the mammalian brain. He also received the Prime Minister's Award for lifetime achievements in science.



**Ewelina Knapska, PhD** – Professor at the Nencki Institute, Head of the Laboratory of Neurobiology of Emotion at the M. Nencki Institute of Experimental Biology of the Polish Academy of Sciences in Warsaw. She graduated from the University of Warsaw with a master's degree in biology and psychology, and obtained her PhD in neurobiology from the M. Nencki Institute of Experimental Biology of the Polish Academy of Sciences. She completed a two-year fellowship at the University of Michigan, USA. She received her PhD Hab. degree in 2013. She received grants from the Foundation for Polish Science, the Minister of Education and Higher Education, National Science Center in Poland. In 2016, she was awarded the prestigious European Research Council Starting Grant. In 2018 she became a member of the FENS-Kavli Network of Excellence, a prestigious organisation for young brain scientists sponsored by The Federation of European Neuroscience Societies (FENS) and The Kavli Foundation.

Miniature brain-like structures, or brain organoids, are the innovative research models used in BRAINCITY. Brain organoids are grown from stem cells obtained from peripheral blood or skin cells. These organoids provide insights into the mechanisms underlying neural and psychiatric disorders, and enable the testing of potential diagnostic and therapeutic methodologies.

One of the brain properties studied in BRAINCITY is neuroplasticity. This is the ability to reorganise the network of nerve cells in response to various stimuli. When we meet new people, gain new experiences or learn something, the number and distribution of synapses, i.e., connections between neurons, changes. Neuroplasticity is essential for maintaining brain health.



**Interesting facts**



International strategic partner:  
European Molecular Biology Laboratory (EMBL)



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