Laboratory of Experimental Neurophysiology

"Our goal is to understand mechanisms of memory processing on the level of brain neural networks."

Offer

- Extracellular single neuron activity, chronically implanted microelectrodes
- EEG recorded through superficial or deep electrodes
- Behavior in cognitive tasks under parallel registration of single neuron activity
- Memory tests in animal models (rat, mouse)
- Relation between EEG, single unit activity and behavior (sleep, locomotion, cognitive tasks)
- EEG analysis
- Analysis of memory tests

Expertise

- The lab's concept is to systematically explore properties of memory processing across networks within hippocampus and connected cortical areas
- We mainly record electric activity from populations of place cells in laboratory rats and decode the neural information in high temporal resolution
- This enables to study detailed kinetics of memory processing and to relate it with local brain oscillations and behavior

Research Area & Excellence

We focus on hippocampal circuits and their interactions with neocortical areas. Hippocampal system has been found crucial for declarative memory in humans and certain types of cognitive abilities in animals, namely for orientation and spatial memory.
Because we can read the information code in hippocampal pyramidal cells relatively well, this system thus provides a fascinating field offering a direct insight into mechanisms of how brain represents external world and how this information is later recalled.

Members

- Karel Ježek, M.D., Ph.D. – Research Group Leader
- Karel Blahna, M.D.
- Helena Geciová
- Štěpán Kápl, M.Sc.
- Michael Mareš
- André Oliveira, M.D.
- Zuzana Petránková, Ph.D., M.Sc.
- M.C.P. Stephanie Lissette Proskauer-Pe?a
- Lenka Sýkorová, M.Sc.
- Pavel Šnejdar, B.Sc.
- František Zitrický, M.D.

Selected Publications

- Alme CB, Miao C, Jezek K, Treves A, Moser E, Moser MB. Place cells in the hippocampus: Eleven maps for eleven rooms. PNAS, 2014. 111 (52): 18428–35
- Rose T, Schoenenberger P, Jezek K, Oertner TG. Developmental Refinement of Vesicle Cycling at Schaffer Collateral Synapses. Neuron, 2013. 77 (6): 1109–1121
- Jezek K, Henriksen EJ, Treves A, Moser E, Moser MB. Theta-paced flickering between place-cell maps in the hippocampus. Nature, 2011. Sep 28; 478 (7368): 246–9
- Stella F, Cerasti E, Bailu Si, Jezek K, Treves A. Self-organization of multiple spatial and context memories in the hippocampus. Neurosci & Biobehavior Rev. 2012. 36 (7): 1609–25
- Jezek K, Lee B, Kelemen E, McCarthy K, McEwen BS, Fenton AA. Stress-induced Out-of-Context Activation of Memory. PLoS Biology, 2010. 8 (12): e1000570-13

Are you interested in this expertise?

Please contact CPPT UK
Web: www.cppt.cuni.cz/
Mail: transfer@cuni.cz
Phone: +420 224 491 255

Experts and their department

Karel Ježek, M.D., Ph.D.
Biomedical Center
Web: http://www.biomedic-plzen.cz/cz