

The role of activity and plasticity in hippocampal subregions in different types of cognitive challenge

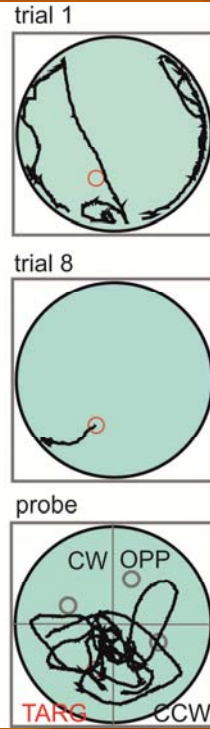
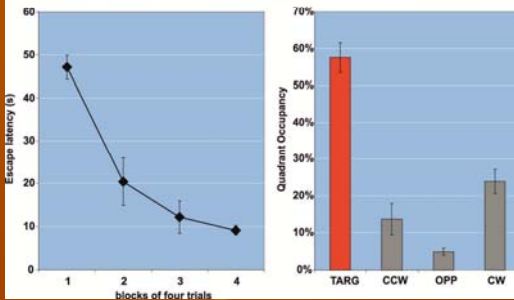
RNDr. Štěpán Kubík, PhD
kubik@biomed.cas.cz

Department of Neurophysiology of
Memory, Institute of Physiology, Academy
of Sciences of the Czech Republic

Cognitive challenge

Behavioral examination

- Spatial learning in Water Maze and cognitive coordination in Place Avoidance on a continuously Rotating Arena (Carousel), supposedly depending on different hippocampal functions deriving from different properties of hippocampal subregions.
- Preliminary data suggested disproportionately larger deficit in cognitive coordination than in spatial memory after lesions of DG. The effects of eliminating activity from individual subregions on performance would be compared between rapid and spaced temporal training profiles in each task.
- Given the propensity of schizophrenia-related changes in the hippocampus and DG, it is reasonable to ask if elements of MK-801-induced deficit in cognitive coordination of information from dissociated spatial frames on the rotating arena can be recreated by specifically targeting inputs and outputs of hippocampal subregions.

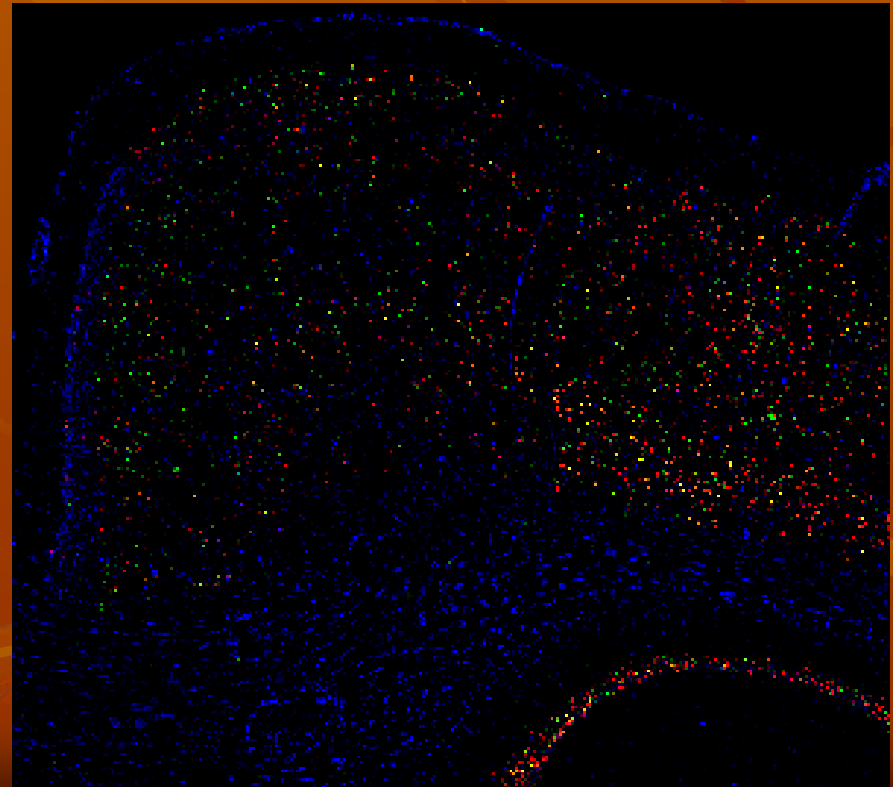
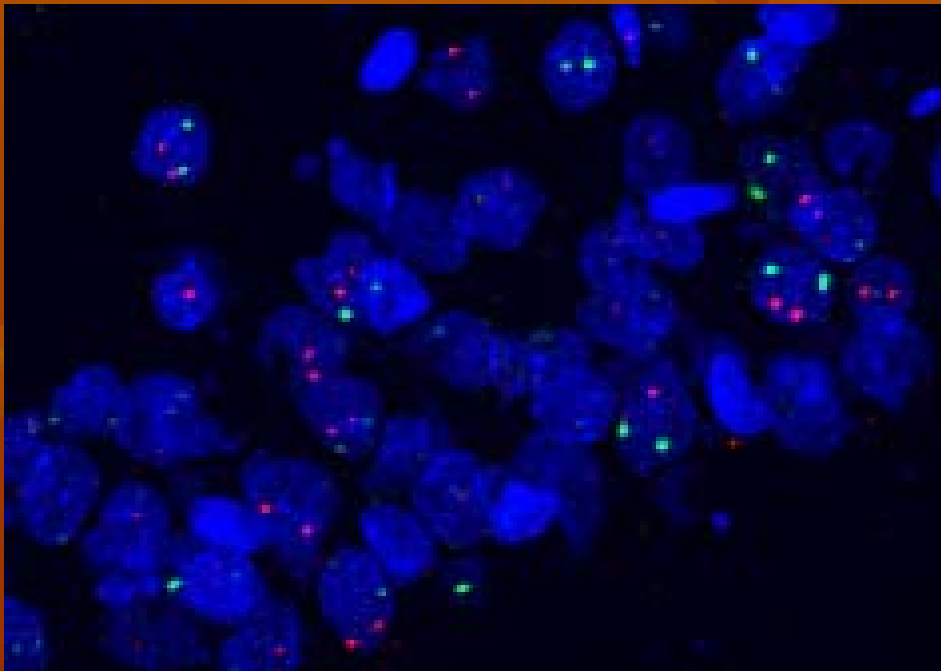


Our laboratory uses variety of behavioral tests including the water maze, contextual fear conditioning and context discrimination, and variants of place avoidance task on the rotating arena - Carousel



Imaging of neural ensemble activity using plasticity-related IEG expression

Expression of plasticity-related IEGs (Arc, Homer1a) in context-specific ensembles of CA1 and CA3 neurons. FISH for IEG *Arc* and *Homer1a* RNA allows imaging populations of neurons active during distinct behavioral episodes. The size and the overlap of these populations may be compared to test predictions about changes in subregional ensemble dynamics after different manipulations.



Collaboration

- We seek to collaborate on development of specific genetic models using viral transfer and optogenetic approaches. We would like to implement these techniques at the Institute of Physiology as a part of the project.
- We also expect wider intramural (Jiruška, Sedmera, Janáček) and extramural (UEM, Syka) collaborations on the implemented methodology (Optogenetics, CLARITY, image data analysis).

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Thank you

- Thank you for your attention!

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