

CS18-039 - Prefrontal circuits for cognitive flexibility in an extradimensional set-shifting task for mice and humans

Abstract

The prefrontal cortex endows mammals with the capability to switch their attentional focus between different relevant aspects of incoming information and to adjust, accordingly, their behavioural strategies for successful actions. We aim to determine neuronal activity patterns in the prefrontal cortex and serotonergic inputs, which underlie attentional set-shifting and behavioural flexibility. We will perform electrophysiological recordings of multiple individual prefrontal and serotonergic neurons in head-fixed mice as well as functional magnetic resonance imaging (fMRI) in healthy human subjects, while both, mice and humans, will perform an identical visual extra-dimensional set-shifting task. In this task, which represents a modified version of the Wisconsin card sorting test, subjects are required to flexibly shift their attention as well as behavioural strategy according to distinct visual features of the same cues presented. Furthermore, we will perform exactly-timed optogenetic manipulations of serotonergic inputs to the prefrontal cortex in mice, fMRI in human subjects suffering from depression, and pharmacological intervention with selective serotonin reuptake inhibitors (SSRI) in mice and human subjects during task performance. This project will identify neuronal firing and activity patterns in the prefrontal cortex and serotonergic inputs, which underlie the ability to flexibly shift attentional focus and adjust behavioural strategies for successful actions.

Scientific disciplines:

Neurobiology (60%) | Clinical psychiatry (20%) | Magnetic resonance imaging [MRI] (20%)

Keywords:

prefrontal cortex, neuronal circuits, in vivo electrophysiology, fMRI imaging

Principal Investigator: Thomas Klausberger

Institution: Medical University of Vienna

Co-Principal Investigator(s): Rupert Lanzenberger (Medical University of Vienna)

Status: Ongoing (01.08.2019 - 31.07.2024)

Further links to the persons involved and to the project can be found under

<https://wwtf.at/funding/programmes/cs/CS18-039/>