

CEITEC

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MAFIL - Multimodal And Functional Imaging Laboratory

What we do

Neurologic and psychological markers of stress/resistance in the survivors of the holocaust and their descendants

This three-generation study is a research project aimed at investigating the psychological, neurobiological and genetic factors of strong stress in the survivors of the Shoah (holocaust) and finding an association between them. Another goal is to reveal mechanisms of trans-generation transfers of biomarkers by which chronic stress affects the lives of the second and third generations compared to control subjects of corresponding age, gender and education.

An evaluation of empathy induction within driver-rehabilitation programs

The goal of the project is finding better understanding of the empathy capability of different groups of drivers and to identify the possibilities of modifying social behaviour in the drivers' population with a complicated record of their driving practice. The project utilises the so-called "hyperscanning" - the brain activity is scanned simultaneously in two interacting individuals (the measurements are taken simultaneously at two MR devices). Thus, neurophysiology of socio-emotional behaviour is analysed in real time interactions.

fMRI neurofeeback for emotion regulation training

The project examines the effects of real-time fMRI neurofeedback (rt-fMRI-NF) in emotion regulation training. rt-fMRI-NF is an innovative method for intentional brain regulation training which has been already successfully used for reduction of many psychiatric and neurological symptoms. rt-fMRI-NF has not been previously used in the Czech Republic. The project includes implementation of the method, optimization



MRI scanning room

3T Siemens Prisma MR scanner with participant prepared for functional MRI study.



MRI control room

Siemens MR console, stimulation PC and hardware for recording of physiological signals.



rTMS lab

Alien technik DuoMag XT-100 system for guided rTMS brain stimuation.



High-density EEG cap (256 channels) for EGI GES 400 MR compatible EEG sytem

of the method by comparison of different methods for real-time BOLD signal extraction and examination of rt-fMRI-NF effectivity for emotion regulation training in patients with various mental disorders which share emotion regulation deficit.

Services and Methodologies Provided

- Human MR imaging in high field (3T) with focus on neuroimaging (anatomical, functional, diffusion and perfusion imaging and MR spectroscopy)
- Hyperscanning (two MR scanners used for simultaneous fMRI measurement of two competing or cooperating subjects)
- Neurofeedback (biofeedback based on real-time fMRI processing and evaluation)
- Human electrophysiological studies including neuromodulation
- Simulatneous recording of MR and electrophysiology
- Various types of data processing

Equipment

- Two whole-body human 3T MR scanners (Siemens Prisma 3T)
- 256-channel MR compatible EEG (EGI GES 400 MR)
 + other MR compatible systems for simultaneous EEG/ExG recordings
- Specialized hardware for stimulation and response recording inside or outside the MRI
- rTMS with frameless stereotaxy for noninvasive brain stimulation + MR compatible tDCS/tACS device
- MR compatible Eye-tracking system

Contact and Location

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