Course ID: CMEC14

Functional magnetic resonance imaging (fMRI) in psychiatry: From basic knowledge to clinical applications

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Educational Objectives: To gain practicable understanding of the principles of fMRI, research paradigms, analysis techniques and possible clinical applications in psychiatry.

Course description: The course will give an introduction to the investigation of brain function using the non-invasive method of functional Magnetic Resonance Imaging (fMRI). It will allow the participants to gain sufficient knowledge to design their own fMRI study.

The course will give the participants a non-technical understanding of the physical foundations of fMRI and the properties of different MRI-sequences. The physiological processes behind the technique of BOLD (Blood Oxygen Level Dependent) measurements will be provided. The possibilities and limitations of this technique will be discussed. Furthermore an overview of the advantages and disadvantages of different magnetic field strengths will be given with regard to fMRI, especially in the light of the 1.5 Tesla and 3 Tesla debate. The course will allow the participants to develop test designs suitable for fMRI and the aim of a planned study. Various stimulus paradigms will be presented to give the participants information about feasible fMRI investigations and how to design own stimulus paradigms. The participants will gain knowledge about various pre-processing steps in functional imaging. Additionally the most common statistical analysis strategies will be presented and discussed in the light of their advantages and disadvantages. The technology of co-registering of electrical brain activity and metabolic processes will be demonstrated. Finally recent applications of fMRI in psychiatry will be presented and discussed in the light of the knowledge gained in the course.

The course will also give an overview of MRI requirements, stimulus systems, programs for stimulus generation and image analysis. The faculty including, psychiatrists, physicists and psychologists, consist of researchers and clinicians with extensive experience with fMRI.

Educational methods and course material: Presentations with demonstrations, individual teaching at PC depending on number of participants, handouts, literature reference lists, software reference list, hardware reference list.

Target audience: Psychiatrist, psychologists and neurobiologists interested in functional neuroimaging.

Course level: No previous knowledge is required.