

## **Hands on Training One Day Workshop on**

### **QEEG: a tool to assess cognition**

Department of Physiology  
All India Institute of Medical Sciences, New Delhi

**Aim** One day workshop will provide hands on training to young investigators and students in designing, administration and analysis of cognitive tasks targeting multiple domains of cognition and simultaneous acquisition and analysis of quantitative EEG. QEEG can capture brain activity in its inherent real time resolution along with excellent spatial resolution due to dense array acquisition and working knowledge of various QEEG analysis methods that can be used to study in brain activity during the performance of cognitive tasks.

#### **Introduction to workshop**

Cognition refers to the brain function that involves various brain processes starting from perception till action. It involves perception, orientation, attention, memory, language, construction, concept formation, reasoning, executive functions and motor performance. Neural networks in the human brain interact to produce higher cognitive functions. High time resolution in the millisecond range, direct access to neuronal signaling rather than the indirect metabolic signals picked up by fMRI, PET and high spatial resolution with high density recordings make high-density EEG to be the ‘ideal’ non-invasive tool to study brain activity during cognition. Various cognitive tasks have been designed and standardized in the Stress and Cognitive Electroimaging Laboratory (SCEL) at AIIMS Delhi to assess brain activity during attention, working memory, emotion, language and music in health and disease states such as Alzheimer’s disease, mild cognitive impairment, Parkinson disease, schizophrenia, glaucoma, ADHD, autism and addiction.

Quantitative EEG (QEEG) is the methodological analysis of EEG to derive the quantitative measures that reflect the underlying physiology and pathophysiology. QEEG analysis methods such as spectral power, coherence, EEG microstates, source localization, connectivity measures, causality measures and graph theory measures have been standardized and applied to study the brain activity of patients and healthy controls. This workshop will familiarize the participants with dense array acquisition and analysis of EEG during cognitive task performance in humans. In the process, the participants will be exposed to theory and practice of state-of-the-art technology such as high-density EEG, Photogrammetry system for registering 3-dimensional location of EEG electrodes, programs for designing cognitive tasks and various EEG analysis methods.

**Who can apply:** The workshop is free and open to all the faculty members, doctoral and postgraduate students working in the field of neuroscience. A maximum number of 20 or 40 delegates will be selected (to be decided).

**Program at glance:** A brief overview of the events in each workshop are as follows:

Total duration: 3 hrs

1. Designing a cognitive function task: 50 min
2. Acquisition and preprocessing of dense array QEEG: 40 min
3. EEG Analysis: 90 min
  - a. Time-frequency and coherence analysis: 30 minutes
  - b. Cortical sources analysis: 30 minutes
  - c. Microstates: 30 minutes

*Venue:* Stress and Cognitive Electroimaging Laboratory, Room No. 6010, 6<sup>th</sup> Floor, Convergence Block, Department of Physiology, AIIMS, New Delhi.

*Faculty Coordinator:* Prof Ratna Sharma,

*Co-conveners:* Dr Simran Kaur, Dr Prashant Tayade, Dr Suriya Prakash