"Functional biomarkers in psychiatry and neurology"
Quantitative EEG, event related potentials and neurotherapy

Workshop
In Camden, London
With

Prof. Jury D. Kropotov

4th to 7th April 2013
The cost of the 4 days will be: €700 or £600
(or €190 /£160 a day)

° The goal of the workshop is to teach attendees how to improve their diagnostic and treatment tools by using a newly emerged technology of Quantitative EEG, event related potentials and neurotherapy.

° The attendees are required to bring laptops with them. At the workshop the attendees will be supplied by an educational software and EEG files from the HBI (Human Brain Index) reference database.

° Each day will consist of two parts:

Morning: theoretical usually by lectures and practice with software on EEG files taken from the HBI reference database and

Afternoon: working with hardware/software, recording EEG and analyzing EEG files recorded during the workshop.

° The attendees will be supplied with hardware for recoding EEG. Each attendee will get the opportunity to record and analyse EEG and ERP by themselves.

www.qeeg.co.uk
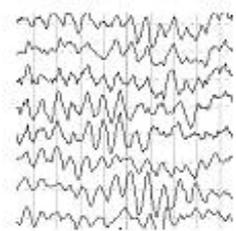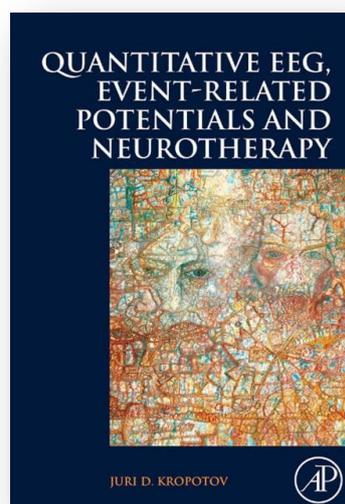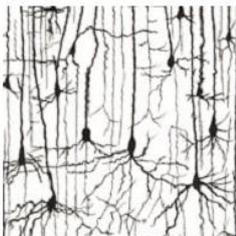
First day

Morning: Topics:
- ° Generators of EEG rhythms.
- ° Background EEG as a reflection of cortical self-regulation.
- ° What does clinical EEG mean?
- ° Pathological EEG patterns (slow waves, spikes, paroxysms….) in epilepsy, brain tumors, and some other brain disorders.
- ° Mapping potentials
- ° Generating Slow Resolution Electromagnetic Tomography (LORETA and s-LORETA) from the spectral maps.

The aim is teach attendees the foundations of clinical EEG, namely:
- 1) neuronal basics of brain rhythms
- 2) methods of recording and montaging,
- 3) how to distinguish non-EEG artifacts from EEG records,
- 4) to correct artifacts using available software,
- 5) to distinguish pathological EEG patterns by means of visual inspection as well as by means of automated tools.
- 6) to use brain maps and s-LORETA imaging for depicting the data.

Procedure: lecture (power point presentation is supplied), practice with EEG records on healthy subjects and patients from the HBI database (software and EEG files are supplied).

Afternoon: Topics:
- ° recording EEG in resting state (eyes open, eyes closed, hyperventilation)
- ° visual inspection of the EEG recording
- ° artifact correction
- ° automated spike detection.

the aim is to teach attendees:
- 1) to place electrodes on the patients head according to 10-20 system,
- 2) to start, end and store an EEG recording,
- 3) to be able to use the built-in database to manage the datasets,
- 4) to remontage the recording.

Procedure: the attendees will be divided into groups. Each group will be supplied with hardware/software for recording and analysis. One of the attendees will serve as a subject (to be recorded) while the others will record.

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Second day

Morning: Topic:
- ° quantitative EEG as a method for neuro-metrics
- ° qEEG-endophenotypes (biological markers) in the healthy population
- ° qEEG-endophenotypes in brain disorders

The aim is to teach attendees methods of spectral analysis, including
- 1) Fourier and wavelet transformations,
- 2) coherence,
- 3) event related de-synchronization, as well as to show how these methods enable us to reveal
- 4) QEEG-endophenotypes of brain disorders such as ADHD, dyslexia, anxiety.

Procedure: lecture, practicing with EEG records on healthy subjects and patients from the HBI database.

Afternoon: Topic:
- ° Spectral and coherence analysis of EEG recorded on the first day
- ° Comparing spectral characteristics of recorded EEG with the normative database.

the aim is to teach attendees:
- 1) to remontage the recording into the HBI database montage,
- 2) to perform spectral and coherence analysis,
- 3) to compare the results of the analysis with the HBI database,
- 4) to interpret the results.

Procedure: the attendees will be divided into groups. Each group will be supplied with software for analysis of the EEG of the group. Spectra, coherence, theta/beta ratios, asymmetry maps for EEGs recorded in the first day will be computed and analysed.

Third Day

Morning: Topics:
- ° Event related potentials (ERPs) as markers of stages of information flow in the brain.
- ° Association of ERP components with functioning of brain systems.
- ° Reflection of dysfunctioning of brain systems in ERPs components.

The aim is to teach attendees methods of Event Related Potentials, including
- 1) averaging technique,
- 2) Independent Component Analysis (ICA),
- 3) to show the discriminative power of ERPs in ADHD, dyslexia and traumatic brain injury etc.

Procedure: lecture, practicing with EEG records on healthy subjects and patients from the HBI database.

Afternoon: Topic:
- ° Recording of EEG in a Visual Contingent Performance Task (VCPT).
- ° Pre-processing EEG
- ° Computing ERPs by averaging techniques
- ° Comparison behavioral of parameters (omission and commission errors, latencies and variances of responses) with the normative data of the HBI database
- ° Comparison of ERPs with the HBI database
- ° Comparison of ICA components of ERPs with the normative data.

The aim is to teach attendees:
- 1) to use Psytask software for presenting tasks provided with the HBI database,
- 2) to record EEG in one of the tasks (such as VCPT),
- 3) to compute ERPs and behavioral parameters,
- 4) to analyze ERPs visually and to make maps was well as LORETA images of ERPs components,
- 5) to compare ERPs and ERP components with the HBI reference database.

Procedure: the attendees will be divided into groups. Each group will be supplied with hardware/software for recording and analysis. One of the attendees will serve as a subject (to be recorded) while the others will do recording. EEG in the VCPT task will be recorded and analyzed.
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Fourth day

Morning: Topics:
- ° Neurofeedback and tDCS as tools of neurotherapy
- ° Neurotherapy for peak performance in healthy subjects
- ° Neurotherapy for correcting cortical dysregulation in brain disorders
- ° Neurotherapy for correcting disorders of information flow.

The aim is to teach attendees methods of neurotherapy, including
- 1) qEEG-based neurofeedback,
- 2) s-LORETA neurofeedback,
- 3) ICA-neurofeedback,
- 4) ERP-based neurofeedback,
- 5) Transcranial Direct Current Stimulation,
- 6) Transcranial Magnetic Stimulation (TMS).

Procedure: lectures, practicing with EEG records on patients from the HBI database and constructing neurotherapy protocols.

Afternoon: Topics:
- ° Analysis of EEG records made during the first days.
- ° Constructing neurotherapy protocols for peak performance by using the recorded EEG files.
- ° Analysis of EEG records of patients from the HBI reference database.
- ° Constructing neurotherapy protocols for treatment.

The aim is to teach attendees to use the HBI reference database for construction of protocols for neurotherapy.

Procedure: attendees will be divided into groups. Each group will be supplied with an HBI database. The records made during the first days will be analysed and neurofeedback protocols for peak performance will be suggested. Several records from patients of the HBI database will be analysed.