Bachelor- or Master thesis opportunity

Evaluation of applying combined action observation and motor imagery plus peripheral nerve stimulation on motor cortical excitability in stroke or geriatric patients

Background:
Experimental evidence revealed that brain motor areas are recruited not only when actions are actually executed, but also when they are simply observed. Neurophysiological and neuroimaging human studies based on transcranial magnetic stimulation (TMS), positron emission tomography, and functional magnetic resonance demonstrated an increased primary motor cortex (M1) activity while observing human movements. Action observation (AO) combined with peripheral nerve stimulation (PNS) was shown to evoke an even more pronounced plasticity in the primary motor cortex than AO alone. The increased M1 excitability after AO–PNS was long-lasting and specific for the stimulated muscle.

Recent studies suggest that AO in combination with motor imagery (AOMI) is also a powerful technique that originated in sports psychology and is used in rehabilitation, in particular in neurorehabilitation. So far, the combination of AOMI and PNS has not been evaluated in patients.

Aim: The aim of the project is to investigate the feasibility of applying combined AOMI-PNS in a small population of geriatric patients or patients after a stroke.

Tasks:
The successful candidate will recruit and test about 3 to 5 patients, who will watch a video of a repeated hand-related activity of daily living, such as grabbing a key, using AOMI. Simultaneously, the patients will receive electrical PNS on the median nerve at the right wrist. Pre- and post-evaluation will be performed using a) TMS to determine M1 excitability, b) the Box-and-Block test in order to assess the patients’ dexterity. Patients will also be asked to fill in a questionnaire on their opinion about certain aspects of the experimental procedure. The candidate will be guided and supervised throughout the preparation-, measurement- and data analysis process. A study protocol will have to be written and an application submitted to the local ethical committee.

Requirements:
- Interests in neurophysiological measurements
- Basic knowledge of statistical analysis with appropriate software
- Expertise in Matlab coding would be appreciated but is not necessary
- Highly motivated and team-oriented working morale

Offer:
- Introduction and supervision throughout the entire project
- Exciting opportunities in an interdisciplinary environment of clinical research and rehabilitation
- Possibility to visit various departments involved in rehabilitation of neurologic, orthopaedic, and geriatric patients.

Time period:
Begin and duration are negotiable.

For further questions, please contact Dr. F. Behrendt, Research Department, Reha Rheinfelden (f.behrendt@reha-rhf.ch). To view other opportunities at our department, go to: https://www.reha-rheinfelden.ch/ueber-uns/wissenschaft/themenboerse-praktika or follow us on Twitter: @RehaREsearch