The Chinese University of Hong Kong
Department of Biomedical Engineering

<u>Graduate Seminar – PhD Oral Defence</u>

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Supervisor : Prof. TONG Kai Yu Raymond

Date : 28 August 2023

Time : 3:00 pm

Venue : ERB 1118, William M W Mong Engineering Building, CUHK

Title: The treatment effectiveness of combined neurofeedback (NF) and transcranial direct current stimulation (tDCS) for the rehabilitation of the people with cognitive deficits after stroke

Cognitive impairment commonly occurs after stroke. Neurofeedback (NF) and transcranial direct-current stimulation (tDCS) have emerged as an innovative treatment for cognitive impairment. This study aimed to investigate the correlation between physiological signals and clinical outcomes in stroke patients. Moreover, we evaluated the effectiveness of combined neurofeedback and tDCS in improving cognitive function.

The study was divided into three parts. First, we measured EEG signals in subjects with their eyes closed and with their eyes open and investigated their correlation with cognitive and quality-of-life assessment outcomes. In addition, we conducted a visual search (number search) experiment, capturing participants' eye-tracking performance. Their eye-tracking metrics were compared to that of their counterparts without cognitive deficits. Later in the study, we assessed the effectiveness of the neurofeedback training by comparing it to the group that received tDCS plus NF and the sham NF group.

This research has several findings. First, there was a significant correlation between brain symmetry indices and cognition and well-being assessments. The brain symmetry index at delta frequency is the most useful parameter in clinical scoring. In addition, there were significant differences in eye-tracking metrics between people with and without cognitive impairment after stroke. Furthermore, we found that the NF group achieved better cognitive outcomes than the sham NF group. NF combined with tDCS even promote improvements in cognitive function and quality of life indices in post-stroke patients with cognitive deficits. The findings highlight the possibility of assessing physiological signals (e.g., EEG, eye tracking) as an adjunct to neuropsychological assessments in stroke patient clinics. Furthermore, combined NF and tDCS interventions are effective for post-stroke cognitive rehabilitation.

*** ALL ARE WELCOME ***

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