

Markers for Transcranial Direct Current Stimulation Benefits in Verbal Memory

Background

This Master Thesis is part of a larger project wherein the underlying neurophysiological mechanisms of transcranial direct current stimulation (tDCS) benefits in the cognitive domain are investigated.

Aging and neuropathological conditions are typically accompanied by memory complaints that impede the daily routine of those affected. Previous studies demonstrated that tDCS can improve cognitive performance in healthy young and elderly as well as in patients with Alzheimer's dementia. However, tDCS benefits are subject to a large interindividual response variability that hampers the reliability of tDCS as a clinically relevant therapeutic agent. With regards to behaviour, a lower baseline performance seems to be the prerequisite for stimulation-induced benefits. Additionally, links between neurotransmitter levels, γ -Aminobutyric acid and glutamatergic metabolites in particular, and behavioural tDCS gains have been uncovered.

Aim

To study the influence of tDCS on the performance in a word list learning task in different populations and correlate the tDCS benefits with cognitive markers at baseline in order to gain insights into the characteristics of tDCS responders.

Materials and Methods

Healthy young and elderly adults as well as cognitively impaired patients will be recruited for this study. Embedded in an array of cognitive assessments, the participants will be presented with a word list learning paradigm, part of which will take place in the MR scanner, while performing functional MR imaging and MR spectroscopy. Differences in the number of remembered words during encoding and during delayed recall will be tested between real and sham stimulated groups to evaluate the benefit of tDCS on verbal memory.

Nature of Thesis

Data collection: 90 %

Data analysis and documentation: 10 %

Requirements

Strong interest in research.

Experience in cognitive assessments and/or interaction with geriatric patients of advantage.

Supervisor

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References

Hsu, W et al. Effects of noninvasive brain stimulation on cognitive function in healthy aging and Alzheimer's disease: a systematic review and meta analysis. *Neurobiol. Aging* 2015 Aug; 36(8):2348-2359

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