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(1) Cortical reorganization after oral rehabilitation in brain-damage patients having dysphagia
A considerable proportion of patients with stroke and traumatic brain injury suffer from dysphagia, which may cause fatal pneumonia due to aspiration of food items. The current resource-demanding clinical oral rehabilitation strategies for dysphagia are mainly based on experience and lacks scientific evidence.
The purpose of this study is to examine the possible effects of a tongue-computer game training (Tongue Drive System), transcranial direct current stimulation (tDCS) and Facio-Oral Tract Therapy (F.O.T.T.) intervention as measured by: 1) Tongue computer game performance, 2) changes in swallowing frequency and 3) training-induced cortical plasticity by Transcranial Magnetic Stimulation (TMS).
This proposed model would allow a possibility to test different training paradigms in such a way that the optimum combination can be selected as a quantification method for the individual patient in order to improve their swallowing.

(2) ***Comprehensive oral assessment of brain-damaged patients in rehabilitation setting.***
Hospitalization negatively impacts oral health of the patients by increased accumulation of dental plaque and colonization with respiratory pathogens. Consequently, when oral hygiene is not taken care of properly, the oral structures (tooth, tongue, gingiva etc.) harbor pathogenic organisms leading to microbial burden of pathogens.
The aim of the study is to examine the over-all oral condition (status) of the brain-damaged patients and finding if there is any correlation between clinical and microbiological examinations. In addition, if there is also any correlation between social, behavioral status and present oral health status.

External collaborators:
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(3) ***Reliability of transcranial magnetic stimulation for swallowing musculature in the human motor cortex.***
TMS has been used as a tool for predicting recovery of function, to determine the type or location of reorganization occurring within the cortex, or to investigate the neurophysiological effect of interventions to enhance recovery.
The aim of the study is to determine the intra- and inter-session reliability of motor evoked potentials (MEP) size parameters for the swallowing muscles, focusing on the number of MEPs (sweeps) and the method of measuring MEP size (single sweep analysis to average sweep analysis).

(4) ***Influence of optimal air pressure (LISA) in controlling aspiration for tracheostomized acquired brain injury patients.***
The brain-damaged patients with tracheostomy tube suffer from severe form of dysphagia, having a higher degree of risk for aspiration.
The aim of the study is to determine whether optimal air pressure will reduce the volume of aspiration in brain damaged patients. The hypothesis is that certain amount of air pressure provided in a timely manner through tracheostomy tube will reduce the risk of aspiration and increase the swallowing frequency.

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