Alleviating Motor Symptoms in Parkinson's Disease with Functional Near Infrared Spectros- copy Guided Motor Imagery Training

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Antragsstellende

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Zusammenfassung

Parkinson's disease (PD) is the second most common neurodegenerative disease. It is treated pharmacologically or through deep-brain stimulation (DBS), but not all motor symptoms respond equally well and side effects are common. For these reasons, there is a clear demand for the development of alternative, non-pharmacological interventions. One promising approach for a non-pharmacological add-on therapy is the use of real-time functional magnetic resonance imaging (rt-fMRI) neurofeedback (NFB), where patients undergo several NFB sessions in which they perform motor imagery (MI) and receive feedback on the activation of a target region of the motor network, the supplementary motor area (SMA). The basic idea of this rt-fMRI guided MI is that learning to self-regulate SMA through the combination of MI and NFB should result in lasting changes in the motor circuits and should lead to improved motor performance. However, the rt-fMRI NF approach comes with a number of difficulties, ranging from high costs to a considerable number of exclusion criteria. A suitable alternative can be functional Near Infrared Spectroscopy (fNIRS), a method conceptually similar to fMRI. This project aims to develop a paradigm suitable for an fNIRS guided MI training for alleviat- ing motor symptoms in PD. This will be achieved in three work packages (WP). In WP1 it will be established that we can reliably measure SMA activation with fNIRS. Aim of WP2 is the development of an fNIRS MI NFB protocol that allows learning to self-regulate SMA activa- tion and validation of the protocol in a group of older healthy volunteers. In WP3 a small proof-of-concept study will be conducted in which patients with PD undergo an MI training with and without fNIRS-based neurofeedback and with extensive pre- and post-training sessments. We expect that the project will result in at least three joined peer-reviewed pub- lications, which will form the basis for an external grant application.