Improving mobility and balance in Parkinson’s disease through circuit class training (IMPACT): Clinical outcome, posturography and brain connectivity

Maarten R.C. van den Heuvela, Andreas Daffertshofera, Gert Kwakkelb, Peter J. Beeka, Erwin E.H. van Wegena

a Research Institute MOVE, Faculty of Human Movement Sciences, VU University Amsterdam, The Netherlands
b Department of Rehabilitation Medicine, Research Institute MOVE, VU University Medical Center, Amsterdam, The Netherlands

Objectives
• Investigate the effects of a balance training program based on augmented visual feedback (VF) in Parkinson’s disease (PD) patients.
• Correlate the changes in clinical outcome measures with changes in posturographic outcomes.
• Investigate training-related changes in brain activity, as determined by EEG.

Introduction
• To develop training protocols that target the specific needs of PD patients, more insight in the rehabilitation process is required.
• It is unclear if training-related improvements in motor tasks are due to recovery of neural pathways (restitution of function) or due to compensatory strategies (substitution of function).
• The presence of visual cues facilitates the central nervous system (CNS) in adopting alternative strategies. External visual triggers can greatly affect motor execution both in healthy subjects and in patients suffering from PD.
• In this RCT we compare conventional balance training to a novel balance training program consisting of workstations that provide task-related visual feedback.
• We will document changes in terms of clinical, posturographic and neurophysiological outcomes.

Research questions
1. Does task-related visual feedback support balance control in terms of:
   a. Center-of-pressure variability?
   b. Clinical outcome measures?
2. How does brain activity alter in the course of balance training?

Clinical outcome measures
• Functional Reach Test
• Berg Balance Scale
• Falls Efficacy Scale
• 10 meter Walk Test
• Parkinson’s Disease Questionnaire
• Hospital Anxiety and Depression Scale
• Multidimensional Fatigue Inventory

EEG
• Source of activity / regions of interest (beamformers)
• Spectral power changes (motor-related beta- and alpha-power)
• Intra- / inter-hemispheric synchronization (phase coherence, synchronization likelihood)
• Topological changes of functional connectivity (graph theory)

Discussion:
We will assess the relative effectiveness of two balance training programs, and investigate the relationships between outcome measures from clinical assessments, posturography, and neurophysiological recordings.

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M.R.C. van den Heuvel, MSc. • m.r.c.vanden.heuvel@vu.nl • (+31) 20 59 88522 • www.move.vu.nl/members/maarten-van-den-heuvel

References
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