

PD-UK

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Title: Changes in muscle activity on application of an auditory rhythmic cue

Objective

To investigate the changes in muscle activity upon application of an auditory rhythmic cue during walking in people with Parkinson's

Background

Gait impairment in Parkinson's leads to increased falls and disability. Research indicates auditory rhythmic cueing (ARC) normalises stepping through auditory feedback, which may be observed through muscle synergies (multi-muscle coordination patterns). This study aims to evaluate changes in gait and cognition related to ARC walking in people with Parkinson's.

Methods

Thirteen healthy older adults (HOA) (78 ± 7 years, 47% female) and twenty-five with Parkinson's (70 ± 5 years, 37% female). Global cognitive function assessed with the Montreal Cognitive Assessment (MoCA). Surface electrodes (Cometa, Bareggio (MI) Italy) measured lower limb muscle activity bilaterally from tibialis anterior, medial/lateral gastrocnemius and soleus during overground walking. Muscle synergies were determined using non-negative matrix factorisation, and the number calculated accounting for 90% of overall variance (nVAF) [2]. Gait parameters (velocity, stance, time) were determined from trunk accelerometry recordings and correlated using Spearman rank with nVAF.

Results

No significant differences ($p > 0.05$) in nVAF between NW and ARC in both groups. All muscles show co-contraction in synergy 1 and 2 for both HOA and Parkinson's. Medial gastrocnemius activity is observed in synergy 1 and 2, and greater bilateral tibialis anterior activity in synergy 3 and 4 in Parkinson's.

Conclusions

Muscle synergy weightings varied in distribution between both walking conditions. Greater gastrocnemius and tibialis anterior activity is observed in Parkinson's. Analysis of the remaining experimental cohort will provide higher power for robust statistical tests.