Can we boost motor imagery to improve freezing of gait in patients with Parkinson disease? A pilot study

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Content: Motor Imagery (MI) is a self-generated process to activate the sensory-motor system in absence of actual movement. Increasing evidence suggests that MI can be effective in improving motor performance. Although in Parkinson's disease (PD) authors indicate a substantially normal efficiency of MI, in PD patients with freezing of gait (FOG), the MI effects are not assured. Indeed, executive resources are needed to activate MI process, like conscious elaboration and monitoring, that might be not effective in PD patients with FOG.

The aim of our research is to evaluate the priming effect of visual, auditory and cognitive tasks as boosters of the MI process in patients with PD and FOG.

19 PD with FOG attended 4 MI training sessions (one a week) in 4 different conditions, assigned in a random order. Sessions consisted of Motor Imagery training preceded or not by one of three booster tasks (1. Action observation (AO), 2. Attention task, 3. Auditory observation) and followed by motor execution. The training was focused on two motor tasks: gait initiation (GI) and turning (TU). Before and after each session, the motor performances were assessed with inertial sensors. At the beginning and the end of each session, MI ability measures - MI questionnaire (GIQ) – and FOG severity (FOG-Q) were assessed.

Overall, the results showed an improvement in MI capability (GIQ score; $p < 0.05$) and FOG severity ($p < 0.05$). GI task showed a reduced variability in first step length and APA execution ($p < 0.05$); TU showed a reduced number of steps ($p < 0.05$) and angle ($p < 0.05$). When we analysed differences among the "booster" tasks, we found that AO was superior in enhancing turning performance.

These preliminary results show that boosting MI could be feasible to improve MI ability and reduce FOG, and that AO seems to better enhance the MI effect on movements.