

## MRT - SHAPING SENSORIMOTOR PLASTICITY THROUGH ROBOTIC GAIT TRAINING WITH G-EO SYSTEM IN PARKINSON'S DISEASE

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**Introduction.** Medication resistant-FOG (FOG-R) is a disabling symptom of advanced Parkinson's Disease (PD) and it is largely untreatable.

**Purpose.** To examine the efficacy of robotic gait training (G-EO system) on FOG-R while analysing neurophysiological changes before and after treatment.

**Method.** 9 patients with advanced PD and history of FOG-R underwent G-EO training (12 session, 3 times/week, 4 weeks). Exclusion criteria were: dementia; change of PD medication in the last month; dyskinesias; other neurological disorders; severe orthopaedic and cardiovascular diseases; rehabilitation treatments within 3 months of enrolment. Outcome measures: number and duration of FOG episodes detected both in outpatient clinic during videotaped Timed Up and Go tests (TUG) and at home, by means of a smartphone app; Gait and Falls Questionnaire; New Freezing of Gait Questionnaire; PD Questionnaire-39; Home diary of falls, Mini-BESTest for balance evaluation, UPDRS III, Six-Minutes Walking Test. All patients were tested by Transcranial Magnetic Stimulation (TMS) before and after treatment both in OFF and ON medication states. Sensorimotor plasticity (SMP) was induced by means of the rapid paired associative stimulation (rPAS). Motor evoked potentials (MEPs) were recorded at baseline and for 15 minutes after rPAS.

**Results.** After robotic treatment the gait performance improved in terms of speed, endurance, step rhythm and balance. At home, FOG occurrence and duration decreased by about 50%. Before rehabilitation, SMP was deficient in all subjects both in OFF and ON states. The robotic treatment restored the potentiation of MEPs amplitudes by rPAS both in OFF and ON states. An inverse correlation was found between PD duration and the improvement in MEPs amplitude induced by rPAS, after rehabilitation.

**Conclusions.** Robotic gait training with G-EO System is an effective rehabilitation approach able to improve gait performance and reduce FOG-R in PD patients by shaping SMP.