

## **SMARTPHONE-BASED FREEZING OF GAIT MONITORING AT HOME IN SUBJECTS WITH PARKINSON'S DISEASE**

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**Introduction.** Freezing of Gait (FOG) is a distressing gait disorder frequently related to Parkinson's disease (PD) progression and severe disability. Detecting and quantifying FOG, in a clinical setting, is difficult given its episodic nature; hence, reliable tools are warranted for FOG monitoring in the daily life. A number of wearable sensors to detect FOG have been studied, but the majority of the available technology lacks "ecological" validation.

**Purpose.** To assess the usability, at home, of the smartphone-based system for FOG detection, validated in the outpatient setting (Capecci et al 2016). Moreover, the correlation between data collected in the daily living scenario and those recorded in the laboratory has been sought.

**Method.** 24 patients with PD-related resistant-FOG were studied. At baseline, the following measures were taken: UPDRS, New-FOG-Q, 6MWT, PDQ-39, GFQ and video-recorded TUG-test with and without dual-tasks while wearing the smartphone, in both OFF and ON medication conditions. Patients were instructed on how to use the FOG monitoring system at home, and were requested to wear it for three consecutive days. The system was customized to record the number of FOG events and FOG duration per minute walking.

**Results.** 23 out of 24 patients (95.83%) complied with the recommendations about system wearing, and used the system 263[185;461] minutes/day. Median[IQR] values recorded during the 3 days were: 3[1.05;5.15] FOG/min and 5.1[1.52;9.47]sec/min of FOG duration. Both parameters were significantly related with the number and duration of FOG events recorded during the simple-TUG performed either in OFF or in ON medication conditions ( $p=.001$ ), and with dual-task in ON condition ( $p=.003$ ). They were also related with GFQ ( $p=.006$ ) and NFOG scores ( $p=.03$ ).

**Conclusions.** A smartphone-based FOG monitoring system is usable and reliable, even in daily living situations. It could be of great help in assessing the efficacy of rehabilitation approaches to relieve FOG-related disability.