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Fatigue in Parkinson's disease: neurophysiological correlates

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Background: Fatigue is frequent and highly disabling in neurological illnesses and occurs in 50% of patients with Parkinson's disease (PD) [1-2]. It is an overwhelming sense of tiredness, lack of energy or need for increased effort and it negatively impacts quality of life [1-3]. Yet, its pathophysiology is still far to be understood and no objective biomarkers exist. In Multiple Sclerosis (MS), fatigue was correlated to the lack of pre-movement facilitation (PMF), implying a dysfunction of movement preparation [4].

Aim: We tested the hypothesis that reduced pre-movement facilitation (PMF) could be an objective biomarker of fatigue in PD.

Methods: In this preliminary study, we enrolled 10 patients with a diagnosis of PD in the absence of cognitive impairment or neuropsychiatric symptoms and 10 healthy subjects (HS). Fatigue severity was measured with the Fatigue Severity Scale (FSS). We assessed PMF during a simple reaction time (RT) motor task using transcranial magnetic stimulation (TMS). RT was calculated as the mean time for electromyography (EMG) onset (thumb abduction) after a visual go signal. TMS was delivered within RT at 150, 100 and 50 ms.

Results: In PD, MEP amplitude increased significantly, compared to MEP at rest, only when TMS pulse was delivered at 50 ms (P=0,013) and not at 100 or 150 ms. In HS, MEP amplitude significantly increased during all the timings of the TMS protocol (all, p£0.002). In PD, the mean amplitude of MEP obtained at 50, 100 and 150 ms before the estimated EMG burst in a simple RT paradigm, resulted inversely correlated with FSS values (p=0.03; R=-0.27; Rsq=0.07).

Conclusions: PD patients showed reduced PMF compared to HS. Moreover, reduced PMF was greater in PD patients with higher degrees of fatigue, suggesting that it might be associated to a dysfunction in the cerebral circuits involved in the planning and preparation of the movement.

References:

[1] B.M. Kluger, K. Herlofson, K.L. Chou, J.S. Lou, C.G. Goetz, A.E. Lang, D. Weintraub, J. Friedman .2016. Parkinson's disease-related fatigue: A case definition and recommendations for clinical research. Mov. Disord. 31, 625–631. https://doi.org/10.1002/mds.26511.
[2] B.M. Kluger, L.B. Krupp, R.M. Enoka. 2013. Fatigue and fatigability in neurologic illnesses. Neurology 80, 409–416.
[3] F. Morgante, V. Dattola, D. Crupi, M. Russo, V. Rizzo, M.F. Ghilardi, C. Terranova, P. Girlanda, A. Quartarone. 2011. Is central fatigue in multiple sclerosis a disorder of movement preparation? J. Neurol. 258, 263– 272. https://doi.org/10.1007/s00415-010-5742-x.