

Is there a relationship between oculomotor fatigability and perceived fatigue in multiple sclerosis?

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Purpose: In patients suffering from multiple sclerosis (MS), fatigue is one of the most common and disabling symptoms of disease. The exact pathophysiological mechanisms are not clear and objective measures to quantify and monitor fatigue and fatigability in MS are lacking, which makes targeted treatment difficult. This prospective study investigated if repeated saccadic eye movements enable measurement of oculomotor fatigability and can reflect perceived fatigue in MS.

Methods: A validated standardized infrared oculography protocol was used for quantifying saccades in MS patients and healthy controls (HC), which included a first pro-saccadic task (FPT) and a repeated pro-saccadic task (RPT). The protocol was designed to induce oculomotor fatigability between FPT and RPT. Saccadic peak velocity, latency and gain were calculated in both tasks. Saccadic fatigability was assessed by subtracting the parameters of RPT by those of FPT. The neurological fatigue index (NFI) sum score was used to assess perceived fatigue. The relationship between saccadic parameters and NFI sum score in MS patients was analysed using a linear regression model, corrected for sex and disease duration.

Results: This cross-sectional study included 181 MS patients and 58 HC. The MS patients had a mean disease duration of 18.5 (± 10.2) years. There was a significant change in all parameters from FPT to RPT in both the HC and MS group, most prominent in the MS group (differences between tasks in MS group: latency $9.6 \pm$ ms, peak velocity -18.4 ± 21.6 deg/s, gain -0.06 ± 0.20 , $p < 0.001$). Latency in both FPT and RPT was related to NFI-sum scores (β 0.03 ($p = 0.05$) and β 0.04 ($p = 0.009$), respectively). There was no relationship between peak velocity, gain of both tasks and the fatigability parameters with the NFI sum scores.

Conclusions: This study demonstrates significant oculomotor fatigability in patients with MS. There was however no simple relationship between objective oculomotor fatigability and subjective fatigue perception. The potential value of oculomotor fatigability as an outcome measure for treatment trials no fatigue in MS remains to be seen.

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