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### Anti-saccades in early stages of multiple sclerosis

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**Purpose:** Eye movements disability is common finding in multiple sclerosis (MS) but the exact stage at which changes are visible is not clear. The aim of study was to assess if anti-saccade (AS) planning and execution are altered at early stages of the disease.

**Methods:** A total of 48 participants with MS selected by a neurologist (JJC) at Hospital de Braga and 52 controls participated in this study. Inclusion criteria: relapsing-remitting course, EDSS $\leq$ 3, 1 month or more without MS crisis, and normal or corrected visual acuity. Exclusion criteria (MS and Control): cognitive impairment, traumatic brain injury or stroke. The mean age in the MS group was 37y and 33y in the control group. Eye movements were monitored using a binocular infrared eyetracker running at 250Hz (RED250, SMI Gmb Germany), precision  $<0.4$ deg, stimuli were presented in a 22 monitor (Dell P2210). Code for running the experiment and data analysis was written using the Matlab (Mathworks Inc). Participants were seated in a room dim light at 74cm from the monitor and head movements were minimized by a headband. The task was to fixate, after a variable period between steady fixation and the stimulus of 1250ms or 1600ms, participants looked as quickly as possible for the opposite direction where the target (a 30x30mm cross) was presented (anti-saccade movement). Each subject performed 40 trials.

**Results:** The main results were the proportion of the directional errors (wherein the participant voluntarily looked for the wrong side), and latencies for: i) anti-saccades, ii) pro-saccades (movement in the same direction of the stimulus) and iii) correction (reaction time that the participant takes from the error fixation until to start the movement). The mean number of errors was 28%(SD=19) in MS group and 16%(SD=11) in the control group, mean difference 12%,  $t(74)=3.83$ ,  $p<.001$ . Anti-saccades latency was 330msec (SD=61) in the MS group and 294ms(SD=59) in the control group, mean difference 36ms,  $F(1,98)=10.99$ ,  $p<.05$ . The mean of the correction latency value was 178ms(SD=111) in the MS group and 129ms(SD=107) in the control group with a mean difference of 49ms,  $F(1,98)=6$ ,  $p<.05$ . No statistically significant differences were found in accuracy and pro-saccade latency between groups.

**Conclusions:** This study shows that anti-saccades latency and errors are increased at early stages of multiple sclerosis. Anti-saccades might be a sensitive tool to assess functional status in people with this condition.