

Saccadometry – innovative tool to evaluate response to pharmacological and interventional treatment of PD patients after DBS

Stanisław Szlufik¹, Andrzej W. Przybyszewski², Justyna Dutkiewicz¹, Piotr Habela³, Dariusz Koziarowski¹

¹Klinika Neurologii Wydziału Nauki o Zdrowiu, Warszawski Uniwersytet Medyczny

²Massachusetts Institute of Technology

³Polsko-Japońska Wyższa Szkoła Technik Komputerowych w Warszawie

Introduction: Pharmacological (levodopa) and interventional (deep brain stimulation /DBS/) treatment of Parkinson's disease patients results in improvement of motor impairment, but it can also induce oculomotor abnormalities as DBS tends to shorten the latency and decrease the velocity of saccadic movements. However, previous studies regarding this issue are conflicting.

Aim: The aim of our study was to analyse the saccadic movements in Parkinson's disease patients after bilateral deep brain stimulation of the subthalamic nucleus (STN DBS) and to assess the changes in saccadic movements in various phases of treatment.

Material and methods: The study group consisted of 17 patients (8W, 9M, mean age 52.2 ± 9.6 years) with idiopathic Parkinson's disease after bilateral STN DBS. The saccadic evaluations were performed in 4 phases (MED-ON DBS-ON, MED-ON DBS-OFF, MED-OFF DBS-ON, MED-OFF DBS-OFF). The latency, duration, amplitude and velocity of horizontal saccades were evaluated. The results were correlated with UPDRS III examination.

Results: MED-OFF DBS-OFF – 40.9 ± 13.8 points. Correlations were observed between saccadic latency and the treatment phase during examination: MED-ON DBS-ON mean latency 244.2 ± 83.5 , mean

amplitude 10.2 ± 2.6 , mean velocity 413.9 ± 136.1 , UPDRS III – 10.2 ± 6.8 points; MED-ON DBS-OFF mean latency 333.3 ± 140.2 , mean amplitude 11.7 ± 3.6 , mean velocity 496.7 ± 144.1 , UPDRS III – 32.5 ± 13.1 ; MED-OFF DBS-ON mean latency 283.6 ± 95.5 , mean amplitude 11.4 ± 2.5 , mean velocity 490.8 ± 125.4 , UPDRS III – 18.4 ± 9.9 ; MED-OFF DBS-OFF mean latency 320.2 ± 127.7 , mean amplitude 11.9 ± 4.5 , mean velocity 504.0 ± 117.4 , UPDRS III – 40.9 ± 13.8 . UPDRS III examination and saccadic latency were statistically significant in the MED-ON DBS-ON and MED-OFF DBS-OFF phases.

Conclusions: Our data suggest significant correlations between saccadic movements and pharmacological/interventional treatment of Parkinson's disease. The changes in saccadic evaluation are also correlated with UPDRS III examination, which implicates it to be a good biomarker of Parkinson's disease. Our data also confirm the influence of deep brain stimulation on the improvement of saccadic movements in Parkinson's disease patients.

Grant 2011/03/B/ST6/03816 from the National Centre for Research and Development, Poland

Key words: saccadic evaluation, Parkinson's disease, deep brain stimulation