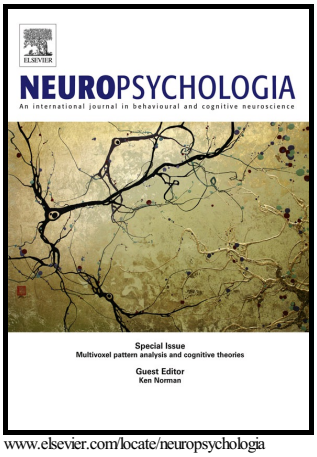

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Subthalamic nucleus stimulation, dopaminergic treatment and impulsivity in Parkinson's disease

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Abstract

Background

Deep brain stimulation of the subthalamic nucleus (STN DBS) is known to increase response speed and lower response accuracy in Parkinson's disease (PD) patients. It has been proposed that this speed-accuracy tradeoff is due to enhanced sensitivity of the motor system to sensory information. An alternative possibility is that this effect is due to weakened suppressive processes. The two alternative interpretations can be tested by analyzing the electromyographic activity (EMG) of the response agonists when the patients perform conflict reaction time tasks. In those tasks, fast subthreshold muscle impulses often occur in the agonist of the incorrect response. These impulses are *partial errors* that are suppressed before being behaviourally committed.

Material and Methods

Here we analyzed the EMG of the response agonists recorded while sixteen PD patients performed a Simon task that elicits prepotent response tendencies so as to decipher (i) whether STN DBS affects the expression and/or suppression of subthreshold muscle impulses that are critical for action control and (ii) the interaction between dopaminergic treatment and STN DBS. The patients were tested On and Off STN DBS and On and Off dopaminergic medication in a full factorial design.

Results

STN DBS not only impaired the proficiency to suppress subliminal action impulses ($p = 0.01$) but also favoured the muscular expression of fast incorrect impulses ($p<0.001$). Dopaminergic treatment only affected the action impulses suppression ($p = 0.02$) and did not change the effect of STN DBS on impulsive action control.