

Title:

Impulsive motor behaviors and impaired decision-making capacity evaluation in patients with Parkinson's disease with Deep Brain Stimulation.

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Research Project Description:

The basal ganglia are key nodes in circuitry that selects and inhibits competing action commands in the motor system. Previously, we showed that subthalamic nucleus (STN) deep brain stimulation (DBS) improves inhibitory control over undesired action impulses. We aim to test the effects of globus pallidus internus (GPi) DBS on susceptibility to impulsive action errors and the proficiency of reactive inhibitory control to counteract interference from action impulses.

We have reported preliminary results and our goal is to include 25 to 30 more patients. So far, 13 patients with either left GPi (N=8) or right GPi (N=5) DBS performed a Simon conflict task during "on" and "off" DBS stimulation. The Simon task produces conflict between an impulsive action tendency and a goal-directed action, which interferes with response time and accuracy for executing the goal action. We applied the Dual Process Activation-Suppression (DPAS) model to separate the initial bottom-up strength of action impulses (i.e., percentage of fast, impulsive errors) from the proficiency of top-down reactive inhibition to counteract unwanted motor impulses (i.e., slope reduction of interference).

We observed that stimulating GPi reduces the initial gating of bottom-up impulsive action tendencies, leading to enhanced motor system conflict and greater susceptibility to acting on strong impulsive actions. The role of the student will be to participate in the recruitment and testing of patients, as well as in the planning and writing of the manuscripts we expect to get publish after completing the project.



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