

Managing multiple cognitive tasks at once incurs a “switch cost”, measured as slower responses and increased errors when switching between tasks. This switch cost is greater in individuals with Parkinson’s Disease (PD). Deep brain stimulation (DBS) in the subthalamic nucleus (STN) is an effective treatment for motor symptoms in PD patients; however, high frequency STN-DBS in the motor region often leads to worsening cognitive control. Studies suggest that oscillations at low frequencies (2-7 Hz) across brain circuits support cognition, yet little work has been done on the cognitive effects of different DBS frequencies. We predicted that PD patients would show large switch costs, and the cost of switching between tasks would be the smallest in the low-frequency DBS condition. To investigate the effectiveness of low-frequency DBS to combat poor cognitive abilities in PD patients, we used a temporal bisection task switching paradigm, in which participants (n= 4 PD patients with STN-DBS: 3 men, 1 woman) responded to auditory cues. Participants completed this task once while in each of the three stimulation conditions: low-frequency (4 Hz), high-frequency, and with no stimulation. As expected, and shown previously in healthy adults, the data indicate that PD patients respond faster when performing single-task blocks and repeat trials compared to switching between tasks. Our findings provide preliminary evidence that variability of switch costs is higher during the 4 Hz stimulation condition, which may indicate that within PD patients, there are some individuals who respond positively to 4 Hz stimulation, and others who respond negatively or are not affected. This variability could lead us to discover critical information for designing individualized therapy for each PD patient for targeting cognitive deficits.