A Multifaceted Approach to Determine the Therapeutic Efficacy of Ventral Pallidum Deep Brain Stimulation for Epilepsy

Bonesteel, Carsyn (School: Burnt Hills-Ballston Lake High School)

Epilepsy is characterized by recurrent seizures and is often treated with anti-seizure medications. However, 30% of patients are refractory to this approach and do not experience seizure freedom, therefore they must seek an alternative treatment. The most recently FDA-approved neuromodulatory method is anterior thalamus deep-brain stimulation (ANT-DBS). While effective in delaying seizure onset, it does not prevent them entirely. In contrast, this study investigates a novel DBS target, the ventral pallidum (VP-DBS), as an efficacious treatment for seizure prevention. My previous work compared the efficacy of VP-DBS directly to ANT-DBS and found that there was no significance in the number of seizures. However, there was a significant decrease in the total duration of seizures for VP-DBS in comparison to naive controls, whereas ANT-DBS showed little effect. In the continuation of this project, potential adverse effects of VP-DBS without seizures were analyzed by assessing coordinated forelimb function, memory, and appetite behavior, through the following behavioral tests: Limb Use Asymmetry, Novel Object Recognition, and Fasted Feeding, respectively. VP-DBS did not affect any of these functions, with insignificant findings in all behavioral tests ($p > 0.05$). Altogether, the VP appears to be a more effective DBS target than the ANT for seizure reduction and a highly promising candidate for refractory epilepsy treatment in humans.

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