Functional circuitry analysis of the subthalamic nucleus in mice: Relevance for Deep Brain Simulation in Parkinson´s disease.

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Research Abstract

The subthalamic nucleus (STN) is a key area of the basal ganglia circuitry regulating movement and has long been a structure of interest for researchers and clinicians alike. There is ample evidence that high-frequency stimulation, so called Deep Brain Stimulation (DBS) of the STN improves symptoms such as tremor, rigidity and slowness of movement, so called bradykinesia, in patients with Parkinson´s Disease. Importantly, the mechanism through which the STN-DBS

effect is achieved is still unknown, a fact that has hindered progress. Based on our recent research, we now have the appropriate mouse genetics and optogenetics tools to address – at an unprecedented level of specificity – the mechanisms behind STN-DBS. We hereby propose an immediate and focused research program for the systematical investigation of DBS using STN-selective Deep brain-optogenetic stimulation paradigms. For this program, we have already secured the identification of the, by far, most STN-selective Cre-mouse existing today and have demonstrated that optogenetic stimulation within the STN causes an increased activity in the main target area while reducing the glutamatergic tone results in hyperlocomotion (Schweizer et al, PNAS pending final decision). This proposal is strongly framed around the completely new and thrilling possibility of implementing preclinical state-of-the-art-knowledge and technology to bring clinical interventions forward in a way that is beneficial for Parkinson patients.

Further information available at:

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