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DBS for Neurobehavioral Disorders

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In the past decade, deep brain stimulation (DBS) has become an increasingly utilized and accepted option for patients with advanced and medically intractable Parkinson's disease, essential tremor and dystonia. The safety and efficacy of DBS for movement disorders has resulted in exploration of new DBS targets and applications. In this context, DBS for treatment of neurobehavioral condition has been investigated for the past several years with promising early results for those with severe and intractable obsessive compulsive disorder (OCD) and major depression. The DBS targets include the ventral capsule and ventral striatum for OCD and depression, as well as the subgenual cingulate cortex for depression.

The positive outcomes from these preliminary studies, have led to initiation of two randomized, controlled and blinded trials of DBS for depression, as well as a recent FDA HDE approval of DBS for OCD. The DBS approach for neurobehavioral disorders has been guided by advances in our understanding of neural circuits implicated in anxiety and mood and the necessity to help the large number of patients who are medication intractable with disability and suffering from these conditions. In this context, the use of DBS for treatment of bipolar disorders, addictions, aggressive behavior, anorexia, and schizophrenia is being investigated.

Mikell et al. [1] have provided a good review of the emerging understanding of the neural circuitry in schizophrenia and have offered an interesting hypothesis regarding a potential application of DBS for treating these patients. Their circuit-based rationale for DBS is based on the concept that abnormal hippocampal activity may be influencing striatal dopamine release, contributing to the generation of the positive psychotic symptoms of delusion and hallucinations. The authors suggest that DBS and high-frequency stimulation of the hippocampus or nucleus accumbens may modulate this abnormal electrical activity and these psychotic symptoms. The authors further argue that stimulation of these targets has been performed previously and that they should be explored in schizophrenia. However, it should be noted that schizophrenia patients can be very complex and the presence of psychotic features can be very challenging with respect to consenting and long-term management of the DBS. In summary, the authors have provided a nice overview of the schizophrenia circuitry. Their proposal of performing DBS for schizophrenia certainly warrants additional investigations in animal models, and possibly humans in the future.

Reference

- 1 Mikell CB, McKhann GM, Segal S, McGovern RA, Wallenstein MB, Moore H: The hippocampus and nucleus accumbens as potential therapeutic targets for neurosurgical intervention in schizophrenia. *Stereotact Funct Neurosurg* 2009;87:256–265.

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