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Neurosurgeon

Major clinical interests: Computer assisted neurosurgery, neurological surgery and radiation oncology, Gamma knife surgery, functional neurosurgery and epilepsy, surgical neuro-oncology

Research interests: Deep brain stimulation for Tourette syndrome, ALA fluorescence guided tumor resection, PET and SPECT in vivo imaging, image guided neurosurgery, Gamma knife surgery

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Major clinical interests: Parkinson's disease, atypical Parkinsonian disorders, other movement disorders (tremor, dystonia, tics, chorea, etc.), botulinum toxin injections

Research interests: Clinical identification of Parkinsonian disorders, new treatments for Parkinson's disease

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Medical Director, Deep Brain Stimulation Program
Neurologist

Major clinical interests: Evaluation and management of movement disorders patients for surgical therapies, Intraoperative neurophysiological mapping for DBS, Parkinson's disease, Dystonia, Tremor

Research interests: Mechanisms underlying benefit with DBS, Functional Magnetic Resonance Imaging (fMRI), Pathophysiology of Dystonia, Parkinson's disease and Essential Tremor

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Research interests: Parkinson's disease, Huntington's disease

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Clinical Nurse Specialist

Major clinical interests: Parkinson's disease and other movement disorders

Research interests: Quality of life, post-surgical management of movement disorders

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Mike R. Schoenberg, PhD, ABPP-CN

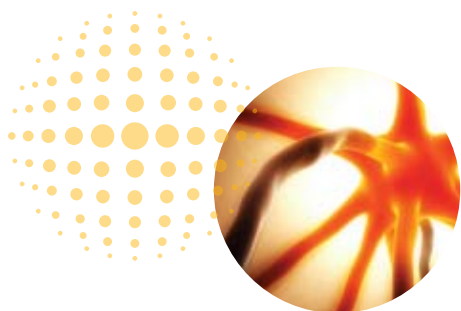
Neuropsychologist

Major clinical interests: Neuropsychological outcomes of neurological surgery, neuropsychological assessment, epilepsy, movement disorders, memory disorders, traumatic brain injury, stroke, somatoform disorders

Research interests: Epilepsy, neuropsychological effects of DBS, neuropsychological effects of medications, neuropsychological correlates of acquired brain injury, rehabilitation, brain plasticity, learning and memory and its anatomical correlates, psychometric properties of neuropsychological tests

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ABOUT UH NEUROLOGICAL INSTITUTE

University Hospitals Neurological Institute is Northeast Ohio's first designated institute for the comprehensive care of patients with diseases affecting the nervous system. It has fourteen Centers of Expertise that bring together some of the country's foremost experts in neurology, neurosurgery, neuropsychiatry, neuroradiology, neuro-oncology, neuro-ophthalmology, neurotology, neuropathology, neuro-psychology and related specialties. Under the direction of Warren Selman, MD, chairman of the Department of Neurological Surgery, and co-director Anthony Furlan, MD, chairman of the Department of Neurology, the Neurological Institute at University Hospitals offers the latest in innovative technology for the diagnosis and treatment of all neurological conditions and diseases.

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Movement Disorders Center: Deep Brain Stimulation Program



For many years, treatment options for various movement disorders, (including Parkinson's disease, essential tremor and dystonia) have been limited primarily to pharmacological therapy, whose effectiveness can decrease over time and whose side effects can be significant. Now, deep brain stimulation (DBS) offers patients with these conditions an effective surgical option. In appropriately selected candidates, DBS relieves the tremor of essential tremor (ET) and Parkinson's disease (PD) as well as motor dysfunction such as rigidity, bradykinesia, dyskinesia, shuffling and freezing. In generalized and cervical dystonia studies have shown substantial progressive improvement in dystonic symptoms over several months that is sustained. In all three of these disorders results of the procedure may dramatically improve patients' quality of life.

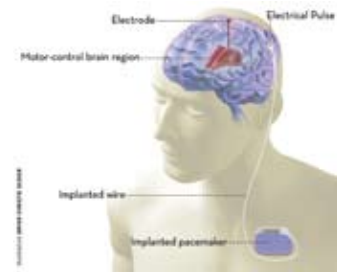
In 1997, the FDA approved the use of unilateral DBS of the thalamus for treatment of tremor related to PD and essential tremor. In 2002, the FDA extended its approval to include unilateral or bilateral stimulation of the subthalamic nucleus (STN) or internal globus pallidus (GPi) for PD. In 2003, the FDA approved unilateral or bilateral GPi or STN DBS for the management of select types of chronic, drug-refractory dystonia including generalized or segmental dystonia, hemidystonia, and cervical dystonia. The University Hospitals Neurological Institute is one of a select group of centers nationally doing surgical therapy for dystonia and has NIH-funded research investigating the mechanisms involved in the therapeutic benefit of DBS in dystonia.

ABOUT DEEP BRAIN STIMULATION

At University Hospitals (UH) Neurological Institute, DBS surgery is performed in two stages. In the first stage one or two leads (thin, insulated wires) are stereotactically placed, with the guidance of microelectrode recording, into the targeted brain area (e.g., thalamus, internal globus pallidus, or subthalamic nucleus). About seven to 10 days later, an extension wire, also insulated, is tunneled subcutaneously connecting the lead to the neurostimulators that are implanted just below the clavicle. About three weeks after the leads are implanted, the neurostimulators are programmed to send high-frequency electrical stimulation from the neuro-stimulator along the extension wire and the lead into the brain.

MOVEMENT DISORDERS CENTER

DEEP BRAIN STIMULATION PROGRAM



UNIVERSITY HOSPITALS NEUROLOGICAL INSTITUTE'S APPROACH TO DBS

The DBS Program at University Hospitals Case Medical Center brings together the expertise of movement disorders neurologists, stereotactic functional neurosurgeons, advanced practice nurses, and neuropsychologists to provide a comprehensive approach to the care of patients considering or receiving DBS therapy.

The multidisciplinary program comprises highly trained and experienced physicians and practitioners. They are dedicated to providing efficient, coordinated care and a seamless experience for patients from the initial referral and evaluation through surgery, programming, and their return back to the referring physician for continued care.

The Center was the first in North America to treat Tourette syndrome with DBS. Our physicians continue to pioneer new advances in DBS with active research on Tourette syndrome, dystonia, and Parkinson's disease, as well as other neurological conditions. Every patient is evaluated by our multidisciplinary team of experts.

The team develops a comprehensive and collaborative treatment plan that is best suited to each person's unique situation. Team members draw upon their extensive clinical and research experience to devise appropriate, specific, individualized therapy.

In addition to the specialists' integrated expertise, patients and family members are given vital education and emotional support along the way. Because of the personalized care, patients have better outcomes resulting in shorter recovery times and a functional return to activities of daily living.

The UH Neurological Institute offers providing extra convenience for patients as well as referring physicians, eliminating the frustration of coordinating multiple treatment modalities.

BENEFITS

DBS has significantly improved the quality of life for many patients, allowing them to regain their independence and resume many normal activities. (See charts below.) In clinical studies, at least eight out of 10 Parkinson's patients experience a significant improvement in functional ability with DBS. For patients with essential tremor, up to 90% will achieve significant relief from their incapacitating tremor. For patients with dystonia, more than 80% will experience significant benefit from DBS.

Other benefits:

- Bilateral DBS can control the symptoms of movement disorders on both sides of the body.
- DBS often decreases the amount of daily medication required to manage symptoms.
- Patients who suffer dyskinesia as a side effect of medication experience more than an 80% reduction in dyskinesias.
- In contrast to older surgical therapies such as thalamotomy and pallidotomy, DBS is considered non-destructive and reversible allowing patients with DBS to be eligible for new surgical treatments should they become available.

MOVEMENT DISORDERS TEAM

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Clinical Nurse Specialist, Movement Disorders

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Assistant Professor, Clinical Neuropsychologist





RISKS

DBS, like any surgical procedure of the brain, carries inherent risks. In addition to the routine surgical risks related to bleeding, anesthesia and possible infection, DBS presents a small risk of neurological complications such as stroke, paralysis and speech impairment. DBS of the STN, GPi, and thalamus generally results in relatively little change in thinking and memory. Decreases in language function and memory have been reported in some studies. Other studies have found no changes. Still yet other studies report improved language and short-term memory scores following DBS surgery. A small proportion of candidates for DBS are at higher risk for cognitive difficulties following DBS surgery. This group of patients includes those with pre-existing cognitive difficulties or dementia.

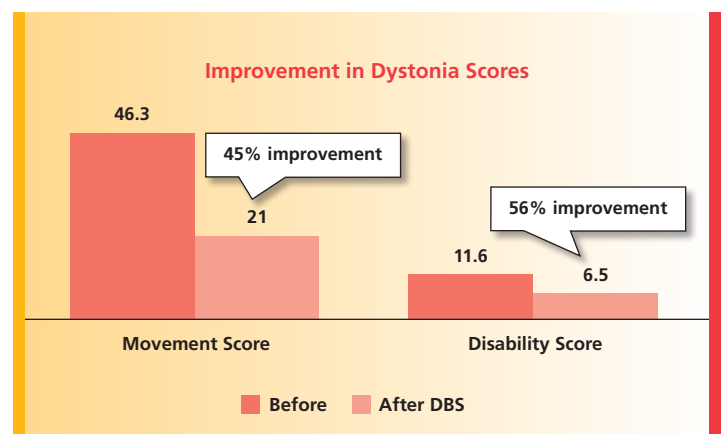
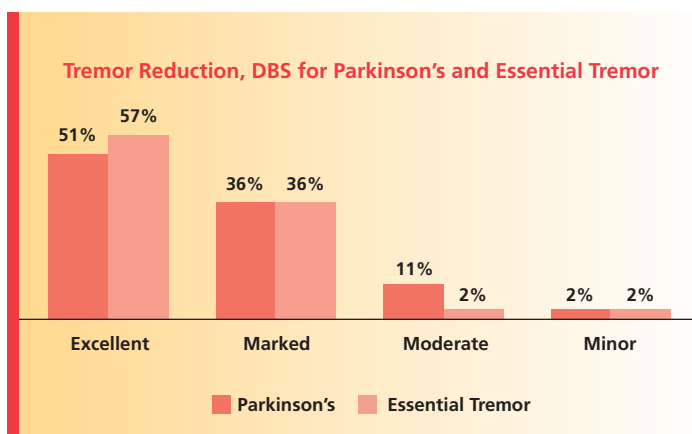
WHO IS A CANDIDATE?

DBS is appropriate for patients who no longer respond consistently to medications, or those who develop significant side effects after taking them. In Parkinson's disease DBS is particularly helpful for patients who have a history of a good response to medication but the response has become unpredictable with fluctuations between 'ON' and 'OFF' states, or complicated by significant dyskinesia, or the patient has tremor that is refractory to medications. Generalized dystonia patients with significant disability despite oral medications are excellent candidates. Cervical dystonia patients who have failed botulinum toxin due to drug resistance are also good candidates. Essential tremor patients who have failed medications and have disabling arm tremor are typically excellent candidates.

For all patient types, the DBS team makes use of a battery of tests, including neurological examination, neuropsychological examination, and MRI scanning, to identify appropriate candidates. Surgical recommendations are made only after a careful analysis of all possible benefits and risks. Patients with significant cognitive decline, overwhelming health problems, or significant age-related health problems, are generally less optimal candidates.

FOLLOW-UP CARE AND THE PRIMARY PHYSICIAN

The DBS program is a tertiary care service. Our goal: provide a continuum of high-quality care for all patients. After the procedure, patients with PD or ET are seen at the Movement Disorders Center about every two to four weeks for a period of two to three months to have adjustments made to their stimulators. Patients with dystonia are seen for programming every one to two months for a period of six to eight months to have adjustments made to their stimulators. Programming the neurostimulators is a process that requires balancing the amount of stimulation with medication needs to provide the best possible functional improvement. After that time, patients return to the care of their primary physician. Routine follow-up and care with a neurologist is necessary to ensure that each component of the disease and recovery are closely monitored. Patients should return to the Center on an annual basis to check the status of their battery. The primary physician plays a key role in our Center. Perioperative management is carefully coordinated with the preservation of ongoing care by all local physicians. The Center strives to maintain an active partnership with primary physicians during all stages of patient care. The Center's movement disorders team is always available to help with any questions or problems that arise.



Source: Esselink R, et al. Unilateral pallidotomy versus bilateral subthalamic nucleus stimulation in PD: a randomized trial. *Neurology*, 2004, 62(2): 201-7; Krauss J, et al. Concepts and methods in chronic thalamic stimulation for treatment of tremor: technique and application. *Neurosurgery*, 2001, 48(3): 535-43. Vidailhet M, et al. Bilateral deep-brain stimulation of the globus pallidus in primary generalized dystonia. *New England Journal of Medicine*, 2005, 352(5): 459-67.