

Deep Brain Stimulation (DBS) for Parkinson's Disease (PD)

What is Deep Brain Stimulation (DBS)?

DBS is the most widely used surgical treatment for the motor symptoms of Parkinson's Disease (PD). In DBS, microelectrodes are inserted in the brain to deliver high frequency electrical stimulation to one of two targets: the subthalamic nucleus or globus pallidus. This stimulation modifies the signal in the brain circuit that is defective in PD. DBS is the most prominent surgical treatment for PD because it has been shown to be safe, efficacious, completely reversible, and customized to the patient. At this time, DBS is generally reserved for patients that experience refractory symptoms or intolerable adverse effects despite appropriate medical management.

What is the goal?

The purpose of DBS is to provide symptomatic relief to patients with medically refractory PD. The electrodes implanted in DBS modify the pathologic signal in the defective brain circuit in PD offering relief from motor symptoms, especially tremor. After DBS, you will still need to take your medications; however most patients are able to reduce the dosage of medications and experience fewer medication-related side effects, such as dystonia. DBS does not slow the progression of PD, but it does offer dramatic relief of symptoms.

What happens before surgery?

You will receive paperwork from Dr. Lad's office and from the Department of Surgery with instructions and reminders regarding preparation to make before you have surgery.

After being cleared for surgery, you will return to the office for a pre-operative visit the day prior to surgery. In preparation to make a surgical incision, we will put in 6 temporary bone screws called fiducials. These are tiny stainless steel screws that are placed into your skull and will help us precisely navigate to the area of your brain for stimulation. It will sound like you're at the dentist with drilling, scraping, and lots of pressure. No pain except for where we inject the anesthetic (lidocaine and epinephrine) – like a bee sting and feels uncomfortable. Next, you will get a CT scan that we will merge with your MRI for lead placement.

You will also have pre-anesthesia testing to make sure you are healthy enough to undergo the surgery. The anesthesiologist caring for you on the day of surgery may meet with you to review your medical history and answer any questions you may have. Dr. Lad will also visit you before the surgery to review the procedure and complete any necessary evaluations.

What happens during surgery?

A nurse will start your IV fluids and give you a medication to make sure you are comfortable. Once in the operating room, monitoring devices will be attached for your safety (blood pressure cuff, ECG, etc). Patients are awake for part of the DBS surgery so we can test the electrodes and make sure they are in the right place. A local anesthetic and IV medication are used. The procedure happens in two stages:

Stage 1: A small, dime-sized hole will be made in the skull. The neurosurgeon will insert a test electrode deep into the brain through the planned target area. We will observe what effect the test stimulation has on your movement, and whether there are any side effects from the stimulation. When the stimulator is turned on, your surgeon and neurologist will evaluate the lead location and stimulation strength by asking you to perform simple tasks, such as touching your fingers together or moving your arm. Your speech will be evaluated along with sensations such as numbness and tingling. Once the desired responses are obtained, the test electrodes will be removed and the final location for the implant will be determined. The permanent electrode implant will then be placed precisely into the optimal location. The electrode implant will be secured and the incision closed. The same steps will be repeated for the second electrode on the opposite side. The entire operating room procedure takes between 4-6 hours. The bone anchors will be removed after surgery. You will spend the night following surgery in the neurosurgical ICU. Patients are generally discharged 1-3 days following surgery.

Stage 2: The following week we will have you come in for the internal pulse generator (IPG) placement. You will be under general anesthesia (asleep) and will be an outpatient procedure. The IPG will typically be implanted in the upper chest region, below your collarbone. We will make an incision on the right upper chest region, bring the wires down underneath the skin, and connect to the IPG. You will have medication to control any pain. This procedure will take approximately 2 hours. Most patients are discharged the same day.

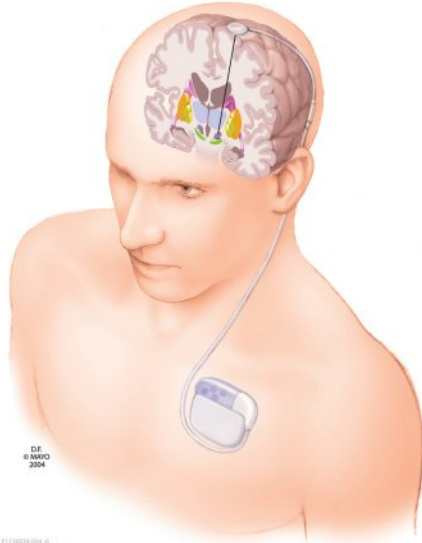


Illustration of an electrode implanted in the subthalamic nucleus with a lead tunneled under the skin to an IPG in the chest.

What happens after Surgery?

Once the surgery is complete, you will be transferred to the recovery room. You will be closely monitored here by your anesthesiologist and specially trained nurses. Dr. Lad will then explain how the surgery went to your family in the waiting room and you will be transferred to the Neurosciences Intensive Care Unit.

The DBS system will not be turned on until you see your neurologist. Do not be discouraged after the IPG placement that symptoms are not relieved. This gives the probes a chance to stabilize as the swelling goes down and the tissue heals. “Honey-moon” or “lesion-effect” may occur after we place the lead. Often the manipulation of the target area of the brain with lead placement can reduce your tremor for a short period of time. This is expected! We will not know the true effects until your neurologist turns on the device. Reprogramming is expected and you will see your neurologist to have the system reprogrammed for optimal effects.

How do I take care of myself after surgery?

You will receive post-operative information from Dr. Lad’s office and from the Department of Surgery. You will need to continue all preoperative pain medication. These will be slowly decreased by the physician who started them. Staples/sutures are removed 10 to 14 days after surgery. Most patients may also experience headache, fatigue from anesthesia, nausea/vomiting in the hospital (medications will be given) which usually improves over time. You may not drive or go back to work for about one month. You cannot wear wigs, use hair dye or other harsh products until complete healing has taken place. These will interfere in long term healing and may cause infection which could require further surgery.

What are the risks of surgery?

DBS is an invasive procedure, and while safe in expert hands, does have potential rare/infrequent risks, including:

- Infection
- Cerebrospinal fluid leak
- Blood clots
- Brain damage
- Seizures
- Loss of motor or sensory function to the extremities.
- Loss of bowel/bladder/sexual functioning
- Loss or alteration of speech or memory
- Stroke or hemorrhage (very rare)

If at any time following your surgery you notice:

- Redness, swelling, drainage or foul odor from the surgical site

- Excessive bleeding
- Increase in pain at the surgical site
- Fever of 101°F or higher with any of the above symptoms

CALL THE OFFICE IMMEDIATELY OR, IF AFTER HOURS, PAGE THE OPERATOR TO SPEAK TO THE NEUROSURGEON ON CALL AT 919-681-8111

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