UW Medicine
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Deep Brain Stimulation (DBS)

For patients with Parkinson's Disease (PD)

This handout describes how to prepare for and what to expect from deep brain stimulation (DBS).

This handout is in addition to the discussions you have with your providers (doctors, nurses, physician assistants, or other health care professionals). Please read this handout carefully.

Before Surgery

In the weeks before your deep brain stimulation (DBS) surgery, you will meet with care providers for:

- A consult about your surgery.
- Tests to measure your memory, concentration, and other brain functions (*neuropsychological testing*).
- A Physical Therapy (PT) visit to evaluate your balance and *gait* (the way you walk).
- A visit to evaluate your Parkinson's disease when you are off and on your medicines.
  - Do NOT take your Parkinson's medications for 12 hours before this visit
  - DO bring your Parkinson's medications to this visit
- Once these tests are complete, your provider will decide if you would benefit from DBS. If so, you will be scheduled for surgery.
- Within 30 days of surgery you will have a pre-operative visit. Your provider will review your health history, do a physical exam, get lab work and answer any questions you have about surgery.
  - DO take your Parkinson's medications as usual for this visit
- You will have an MRI before surgery.

Stage 1 Surgery: Deep Brain Lead Insertion

1 Week Before Surgery

- Stop taking any NSAID medications (such as Ibuprofen, Naproxen), vitamins and supplements.

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- If you are taking medications for blood clotting such as Aspirin, clopidogrel (Plavix), and warfarin (Coumadin), you will get special instructions.

Day Before Surgery

- A nurse will call you to tell you what time to arrive on the morning of your surgery.
- Bathe with the chlorhexidine soap you are given the night before, and morning of surgery.

After Midnight the Night Before Surgery

- Do not eat or drink anything.

Day of Surgery

- DO take your Parkinson's medications with a small sip of water the morning of surgery. Do this more than 2 hours before your scheduled arrival time.
- You will:
  - Be asleep for your surgery.
  - Have a metal frame attached to your head.
  - Stay in the ICU overnight.
  - See a Physical Therapist (PT) the morning after surgery, and likely discharge home in the early afternoon.

Care After Surgery

Wound Care

- You will have incisions (small cuts) on top of your head. The incision will be closed with skin staples.
- Keep the incision dry for 2 days (48 hours).
- After 2 days, you may shower and get the incision wet, but do not soak or scrub the incision. Pat the incision dry after getting it wet.
- You may wear a loose-fitting, clean cap that is washable.

Staple Removal

- Staple removal is usually done when you return for Stage 2 surgery.

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- If you need your staples removed at a different time, you will have an appointment in the Neurosurgery Clinic (206-598-5637).

Medicine

- Restart your Parkinson's medicines at your regular dose.
- We will give you special instructions for restarting aspirin, Plavix, or Coumadin.

Physical Restrictions

- Avoid strenuous activity and anything that makes you strain.
- For 2 weeks after surgery, do not lift anything that weighs more than 20 pounds.
- Walking and light exertion are OK.

Lesioning Effect

- After the leads are placed in Stage I, there may be some local swelling in the brain that can have similar effects to stimulation. This is called lesioning effect.
- You may see improvement in your tremor for a few days.
- You may have difficulty with balance or speech. Be extra careful when walking and using stairs.

Stage 2 Surgery: Pulse Generator Implantation

1 Week Before Surgery

- Stop taking any NSAID medications (Ibuprofen, Naproxen), vitamins and supplements.
- If you are taking medications for blood clotting, including Aspirin, clopidogrel (Plavix), and warfarin (Coumadin), you will get special instructions.

Day Before Surgery

- A nurse will call you to tell you what time to arrive on the morning of your surgery.
- Bathe with the chlorhexidine soap the night before, and the morning of surgery.

After Midnight the Night Before Surgery

- Do not eat or drink anything.
- Continue to take your usual medicines for Parkinson's.

Day of Surgery

- You will be asleep for surgery.
- You will be able to go home the same day.
- You will need someone to drive you home and stay overnight with you.
- Your device will remain off until programming.

Care After Surgery

Wound Care

- You will have one incision at the back of your head and one on your upper chest where the pulse generator is located.
- Keep the white outer dressing on for 24 hours.
- Leave the sticky tapes (Steri-Strips) on your incisions until they fall off.
- Keep the incisions dry for 2 days (48 hours).
- After 2 days, you may get the incisions wet, but do not soak or scrub them. Pat the incisions dry after getting them wet.
- You may wear a loose-fitting, clean cap that is washable.

Suture Removal

- Suture removal is usually not needed. Clear-colored sutures under the Steri-Strips will dissolve within a few weeks.
- If you need suture removal, you will have an appointment in the Neurosurgery Clinic (206-598-5637).

Parkinson's Medicine

- Restart your medicines at your regular dose.

Physical Restrictions

- Avoid strenuous activity such as heavy lifting or exertion for 2 weeks.

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Hand-held Patient Controller

- You will be given a controller for your DBS system.
- This controller will be activated at your first programming visit.

When to Call the Doctor

Call the Doctor if you have:

- Fever over 101°F (38.5°C)
- Fluid draining from your incisions
- Ongoing bleeding
- Increased redness and swelling of the incision, or near the hardware
- New numbness, weakness, or tingling

First Programming Visit

This visit is scheduled for about 1 month after your Stage 1 surgery.

- Stop taking your Parkinson's medicine 12 hours before your appointment time for this, and all, programming visits.
- Bring your Parkinson's medications to this visit.
- Bring your Patient Controller with you for programming.
- Other programming visits will also be needed.

Safety Warnings

Diathermy

Diathermy is the use of heat or electrical currents used to relax muscles. Diathermy anywhere on your body may cause severe brain injury. **Tell anyone treating you that you CANNOT have:**

- Shortwave diathermy
- Microwave diathermy
- Therapeutic ultrasound diathermy (also known as deep heat treatment)

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Magnetic Resonance Imaging (MRI)

MRI scanning of any body part on patients with DBS may cause severe injury. Permanent brain injury may result from improper use of MRI scanning.

MRIs should be performed only in centers that are familiar with DBS systems, and under very strict safety guidelines.

Risks, Discomfort, and Side Effects

Anesthesia and Sedation

There are always risks with anesthesia and sedation. This may include a reaction to the medicines you receive, heart attack, *apnea* (stop breathing), or even death. A tube will be placed in your mouth to help with your breathing while you receive general anesthesia. There also may be other unknown risks.

Risks of Surgery

Every effort will be made to minimize the risks of the surgery and of brain stimulation. However, complications may occur. Besides the general surgery risks your doctor has explained to you, these complications from the implantation of this device may occur:

- Paralysis, coma, or death
- Bleeding inside the brain (stroke)
- Leaking of fluid surrounding the brain
- Seizures
- Infection
- Allergic response to implanted materials
- Temporary or permanent neurological complications
- Brain lead placed in a location that was not the intended target
- Confusion or attention problems
- Pain at the surgery sites
- Headache

Side Effects

Side effects of brain stimulation may include:

- Tingling sensation (paresthesia), shocking sensation, or numbness.
- Temporary worsening of symptoms.
- Speech problems like slurred speech, or difficulty with word finding.
- Vision problems (double vision) or difficulty opening your eyes.
- Dizziness or lightheadedness (*disequilibrium*).
- Difficulty walking with increased risk of falling.
- Facial and limb muscle weakness or partial paralysis (*paresis*).
- Abnormal, involuntary movements (*chorea, dystonia, dyskinesia*).
- Cognitive changes such as confusion or memory trouble.
- Behavioral or mood changes such as depression or impulsive behavior.
- Weight gain.

You will be given a controller to take home, so that you may turn your neurostimulator on or off. Many side effects can be reduced with reprogramming or turning off the neurostimulator.

Other side effects or complications may occur that are more unusual or are not yet known and cannot be predicted at this time.

The lead will remain implanted unless a problem occurs and it needs to be removed. The length of time your neurostimulator battery lasts depends on your programmed settings.

Possible Complications

Possible complications from the device include:

- Pain, lack of healing, scarring, or infection where the system parts are implanted.
- Movement of the lead or extension connector may occur, possibly requiring additional surgery.
- DBS therapy could stop due to mechanical or electrical problems. Either of these would require surgery. The neurostimulator battery needs to be changed before the end of battery life.
- You may have an allergic reaction to the system. Your body may reject the device since it is a foreign object.

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- Rarely, tissue damage can be caused by the programming parameters or a malfunction of one of the parts.

Interference with Other Devices

The neurostimulator may interfere with other implanted devices, such as an implanted defibrillator or pacemaker. External defibrillators, electrocautery devices, radiation therapy, and ultrasonic devices may interfere with the neurostimulator and may even damage it.

Also, the electrical signal from the neurostimulator may interfere with the function of an external defibrillator. The safety of external defibrillators on patients with this implanted system is not known.

Electromagnetic Interference (EMI)

Electromagnetic interference (EMI) is a field that is generated by equipment in medical, work, and home environments. The field may be electrical, magnetic, or both. This equipment can create enough EMI to:

- Turn your neurostimulator off or on.
- Cause an uncomfortable sensation.
- Reset your neurostimulator to factory settings. This would require reprogramming by your doctor.

Your neurostimulator is designed to protect against most EMI. However, strong electromagnetic fields and permanent magnets can interfere with your system. Even when the therapy is turned off, interference can affect the lead(s).

If you suspect EMI:

- Move away from the source of the EMI.
- If possible, turn off the suspected source of EMI.
- Then use your programmer to turn your therapy on or off.

Theft Detectors and Screening Devices

It is possible that some patients are sensitive to stimulation or have a low stimulation threshold. These people may experience a brief increase in the stimulation as they walk through theft detectors and screening devices.

These devices could also turn your neurostimulator on or off. Higher levels have been described as uncomfortable, "jolting," or "shocking" as people pass through theft detectors and screening devices.

Other Equipment Exposure

Other equipment may also cause a brief increase in perceived stimulation. You may want to avoid this equipment if you experience an increase in stimulation:

- Electrical arc welding equipment
- Electric induction heaters used in industry to bend plastic
- Electric steel furnaces
- Power lines and electrical substations
- Power generators

Pregnancy

Safety and effectiveness of an implanted DBS system in pregnant women is not known.

More Information About the Neurostimulator

Your Neurologist will decide when to program your neurostimulator. Programming will set the stimulation to best control your symptoms and may take several hours. You may have to return to the clinic a few times to have the stimulation adjusted for the best symptom control for you, especially during the first months after implant. There may be changes in the level of suppression of your symptoms over time. These changes may include less relief, no relief, or loss of effective stimulation.

In many cases, your doctor can correct these changes by programming the brain stimulation system again. However, surgery may be required to reposition or replace the lead, replace the system, or remove the system. Because your condition changes with time, your symptoms may improve, worsen, or remain unchanged with stimulation. If the neurostimulator is ruptured or pierced after implant due to outside forces, severe burns could result from exposure to battery chemicals.

There may be other risks from this therapy that are still unknown. If you have questions, please ask your doctor.

Questions?

Your questions are important. Call your doctor or healthcare provider if you have questions or concerns.

Neurology Movement Disorders Clinic: Call 206.598.7688 weekdays from 8 a.m. to 5 p.m.

Neurosurgery Clinic: Call 206.598.5637

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