### Parkinson’s disease, Essential Tremor and primary dystonia

**What is Deep Brain Stimulation and how does it work?**

Deep Brain Stimulation (DBS) uses one or two surgically implanted medical devices, similar to cardiac pacemakers, to deliver electrical stimulation to precisely targeted areas of the brain. These structures are deep within the brain and involve motor control. Your neurosurgeon will decide which of these areas to target. Stimulation blocks the signals that cause the disabling motor symptoms of some movement disorders. As a result, many patients achieve greater control over their body movements. The entire system is implanted inside the body and the procedure is reversible.

### Can I travel?

Notify your doctor/clinic of your travel plans. Your doctor will tell you about any necessary adjustments or when you must return to the doctor/clinic. He or she may need to make a referral before your departure. If your stimulator needs to be reprogrammed while you are away, use the Find a Physician tool on this site to find an appropriate physician closest to where you will be.

### Can I have an MRI?

You should contact your doctor before having magnetic resonance imaging (MRI) performed. Your doctor should discuss the procedure with the MRI staff to determine if it is safe and appropriate for you.

If you have a fully implantable Deep Brain Stimulation (DBS) system, MRI is possible, but only under a specific set of guidelines. This is because of the potential effects of exposure to the strong electromagnetic fields produced by MRI. If possible, a CT scan could be used instead. Your physician can review the guidelines and advise of the best option for you.

### Can I have diathermy?

No. Diathermy is a treatment that promotes the healing of tissue and reduces pain through heating tissues to reduce swelling and stiffness of joints and muscles. Diathermy (deep heat treatment and non deep heat treatment) should not be used with any implanted neurostimulation systems because the risks outweigh any possible benefit.

At least three forms of diathermy are in use in the medical community: radio frequency or shortwave diathermy, ultrasound diathermy, and microwave diathermy. The contraindication with implantable neurostimulation devices applies to all forms of diathermy.

Energy from diathermy can be transferred through the implanted system and cause tissue damage resulting in severe injury or death. The exact nature of the tissue or nerve damage depends on the location of the implanted electrodes and the extent of the exposure to diathermy treatment. Diathermy is further prohibited because it can damage the neurostimulator’s system components. This could lead to a loss of therapeutic effect or the need for surgery to revise or replace components. Injury or damage could occur whether the neurostimulation system is turned on or off.

This warning applies to any use of diathermy, regardless of where the diathermy treatment is targeted on the body. This warning also applies regardless of whether the neurostimulation system is turned on or off during diathermy treatment, and if any individual component (lead, extension, neurostimulator) of the neurostimulation system remains in the body.

You may want to consider obtaining a medical alert bracelet that lets emergency medical personnel know you have a neurostimulation system and therefore should not have diathermy. Contact your doctor for instructions on how to obtain a medical alert bracelet.
Will people notice the components of the Deep Brain Stimulation (DBS) system?
All DBS system components, with the exception of the hand-held patient controller, are placed inside the body. Depending on your build, the neurostimulator may be noticeable as a small bulge under the skin, but it usually isn’t noticeable under clothes. There also may be a slight bump on the top of your head, but this usually isn’t visible under hair. The doctor will try to implant the neurostimulator in a place that is most comfortable and cosmetically appealing, usually just below the collar bone.

What components make up the DBS system?
The DBS system consists of three implantable components:
• Lead - the lead is a thin insulated coiled wire with four electrodes at the tip that is implanted in the brain.
• Extension - The lead connects to the extension; a thin, insulated coiled wire that is threaded under the skin from the head, down the neck and into the upper chest.
• Neurostimulator - The extension connects to the neurostimulator; a small, sealed device similar to a cardiac pacemaker that contains a battery and electronics. It produces the electrical pulses needed for stimulation. These electrical pulses are delivered through the extension and lead to the targeted point in the brain. Your neurostimulator would be implanted beneath the skin of your chest.
• External components of the system include a physician programmer (used to adjust neurostimulator parameters) and the patient’s hand-held programmer. The hand-held programmer is placed over the neurostimulator to turn the neurostimulator off or on.

Can the battery be recharged?
No. With a totally implantable system, your doctor will remove the device and replace it with a new one when the battery needs replacing. This is a surgical procedure.

Is the DBS system safe near credit or debit cards?
Yes, although some older systems contain magnets which may damage such cards. You’ll be given a small instruction card with complete directions and precautions once your system is programmed.

Can I drive a car with my neurostimulation system?
That depends on the nature of your symptoms and how you respond to DBS therapy. You should avoid activities that could be unsafe to yourself or others should your symptoms return. You should discuss your medical condition with your specialist clinician before driving.

What is the typical length of hospitalisation for preoperative tests, implant, and recovery?
The length of the hospitalisation varies, but it is often just a few days.
Is there an effect on the DBS system when a patient is near electronics?

Sometimes. Most everyday electrical devices will not harm the DBS system. This includes household appliances, computers, office machines, mobile phones, and personal radios.

If the neurostimulator comes within close range of small permanent magnets (such as stereo speakers, radios, telephones, magnet therapy products, shoe magnets and refrigerator-door magnets) the neurostimulator could be turned on or off.

The DBS system may also interact with certain types of devices that generate electromagnetic energy. Theft detectors and airport/security screening devices may have enough electromagnetic energy to cause uncomfortable increases in stimulation, and it is best to avoid them if possible. Patients are advised to use care when approaching these devices. You’ll be given detailed instructions for approaching theft detectors and airport security screening devices.

You will also be given a special patient identification card that contains important information about your implanted system. This card should be carried at all times. In the event of an accident, the card will tell those in attendance that you have an implanted medical device. It supplies basic information about the neurostimulator and identifies your doctor. You may also present this ID card when moving through or near security devices (such as those in stores or airports) that may interfere with your neurostimulator.

Other devices may have enough magnetic field strength to turn the neurostimulator on or off and should be approached carefully. These include:

- Large stereo speakers with magnets
- MRI equipment
- Manufacturing and heavy industrial equipment
- Electric arc welding equipment
- Electric induction heaters used in industry to bend plastic
- Electric steel furnaces
- Power lines
- Electric substations and power generators
**Is there a concern with the implanted DBS system interfering with other medical tests?**

People implanted with the DBS system should consult their physician before engaging in any medical treatment. If a medical test is prescribed, the testing physician must be told about the implanted DBS system.

The following procedures may affect your DBS system:

- **Diathermy** provides optional treatments for the following purposes: relieve pain, stiffness and muscle spasms, reduce joint contractures, reduce swelling and pain after surgery, promote wound healing. This may affect the neurostimulator output and/or damage its electronics. Diathermy’s energy can be transferred through the implanted system which can cause tissue damage and can result in severe injury or death.
- **Therapeutic ultrasound**, electrolysis, radiation therapy, and electrocautery also should not be used directly over the implant site.
- **Diagnostic x-rays** do not cause a problem but some that require tight enclosure of the area where your neurostimulator is implanted, such as mammograms, may require additional adjustment of the x-ray equipment.
- **Tell your dentist** where your neurostimulator is implanted, so that he or she can take precautions with the dental drills and ultrasonic probes used to clean your teeth. These devices should not be used directly over the implant site.
- **MRI procedures** for patients who have a DBS system are not recommended.
- **The electrical discharge from defibrillators** may damage your neurostimulator’s electronics.
- **In the event of patient death**, the neurostimulator must be removed prior to cremation.

**What can a patient expect after the implant procedure?**

Some time after surgery, you will return to the physician for initial programming of the neurostimulator. This will be done to optimise symptom control and minimise any side effects. Your physician will schedule follow-up appointments to maximise the benefits.

**Is DBS a new therapy? What is its history?**

Neurologists and neurosurgeons have used electrical stimulation since the 1960s as a way to locate and distinguish specific sites in the brain. In the process, they discovered that stimulation of certain brain structures suppresses the symptoms of neurological disorders such as Parkinson’s disease, Essential Tremor and dystonia. Medtronic developed brain stimulation technology in the 1980s in conjunction with leading physician researchers. In 1987, Professors Alim-Louis Benabid and Pierre Pollak of the University of Grenoble in France published the results of the first application of deep brain stimulation for the treatment of movement disorders.

DBS for Parkinson’s disease, which has been available in Australia since 1997, extends the use of brain stimulation technology to benefit patients with advanced, levodopa-responsive Parkinson’s disease. DBS targets specific areas within the brain to suppress symptoms of Parkinson’s disease and some other movement disorders.

**How long does the neurostimulator battery last?**

Battery longevity varies, depending on the parameter settings and number of hours the neurostimulator is turned on each day. At typical therapeutic settings, the battery lasts an average of three to five years, but it could be less than three years depending on your individual requirements. A simple surgical procedure is used to replace the neurostimulator when the battery fails, but the extension and lead are typically not replaced.
**Can I use a TENS unit?**
The neurostimulator should not be affected by the therapy pulses from the TENS unit. However, since there are many different types of TENS units, and since they have not all been tested with neurostimulators, you should use caution and notify your doctor if you feel that the TENS unit may be interfering with your neurostimulator.

**Does DBS therapy cure the cause of tremor?**
There is no cure for tremor at this time. DBS treats tremor, but does not cure the underlying condition. If the therapy is discontinued, the patient’s tremor will return.

**How does the DBS system work?**
The neurostimulator generates electrical pulses that are delivered via the extension and lead to targeted structures within the brain. These pulses can be non-invasively adjusted by a clinician using a physician programmer. Programming signals are transmitted painlessly to the implanted neurostimulator using radio telemetry. Researchers have found that the electrical pulses block brain signals that cause the symptoms of Parkinson’s disease and some other movement disorders. You may turn your DBS system on and off with a small, hand-held programmer that is held against the area where your neurostimulator is implanted (usually below the collarbone) for one or two seconds.

**What does the stimulation feel like?**
Most people who have undergone deep brain stimulation will not feel the stimulation at all, but will feel the effects of stimulation when it reduces some of the symptoms of their movement disorder. However, some people may feel a brief tingling sensation when the therapy is first turned on.

**How is the therapy paid for?**
If you are an Australian resident or a category of visitor to Australia who is eligible for the Australian Medicare program, this information should apply to you, however, you should talk to your doctor about funding options for the device and associated medical costs.

If you have hospital level private health insurance and undergoing DBS therapy due to intractable Parkinson’s, the device should be fully funded as a prosthesis. You will need to check your policy for any waiting periods, exclusions or excess payments that may be required. The hospital procedure will be funded by Medicare and your private health insurance to the amount specified by the Medicare Benefits Schedule. You should check with your doctor about any additional fees and charges.

If you do not have private health insurance, or are undergoing DBS therapy for a condition other than intractable Parkinson’s, you may be able to receive treatment as a public patient, however, this may incur a waiting period. You should check this with your doctor.

There are provisions to minimise the out-of-pocket medical expenses for Australians. These include the Medicare Safety Net for out-patient procedures, the Pharmaceutical Benefits Safety Net and taxation rebates for medical expenses. You should check with Medicare about these.