

Deep Brain Stimulation

What is Deep Brain Stimulation (DBS) surgery?

Deep Brain Stimulation is a surgical procedure undertaken to treat symptoms of Parkinson's.

DBS uses electrical impulses to stimulate a specific area of the brain within the basal ganglia (referred to as the target). The targets chosen will be specific to the symptoms you are experiencing.

Fine probes, commonly referred to as leads, are surgically placed in specific areas of the brain to deliver electrical impulses. The electrical impulses modulate abnormal brain activity, stimulating underactive areas and blocking electrical activity in overactive areas. DBS helps stabilise fluctuations in Parkinson's symptoms.

How is DBS inserted?

In Australia, wires are inserted on both sides of the brain which is referred to as bilateral DBS. The target for the stimulation depends on your symptoms and is identified after extensive consultation with your Neurologist and mapping the brain with MRI and CT scans.

Most Neurologists involved in DBS have a team working with them, including a Neurosurgeon and other healthcare professionals such as Psychiatrists, Neuropsychologists, Nurses and

Physiotherapists. Once the electrical wires are implanted, they are placed under the skin and run behind the ear into a neurostimulator or Implantable Pulse Generator (IPG), which contains the battery. This sits under the skin in the chest like a cardiac pacemaker. It is usually placed just under the collar bone.

Who should consider DBS?

DBS may be considered as an option if your symptoms respond well to medication and you stand to gain noticeable benefits from the procedure. DBS may be considered in both early and later stages of living with Parkinson's.

There is no specific age limit for DBS; eligibility is determined based on your symptoms and overall health. If you are in good health both physically and mentally, you may be a suitable candidate for the procedure. However, if you are experiencing memory problems, hallucinations or severe depression, you may not be a suitable candidate until these are assessed and treatment is considered.

DBS is not suitable for everyone living with Parkinson's. If you are exploring DBS as an option, the first step is to discuss it with your Neurologist. They can evaluate your individual circumstances and advise whether DBS may be a suitable treatment option or refer you on to a Neurologist who offers DBS as part of their practice.

Is DBS safe?

DBS is a safe and effective procedure. As with any surgery, there are potentially serious risks and side effects, such as infection, seizure or a bleed/stroke during surgery. It's important to discuss these risks with your Neurologist before deciding on DBS as a treatment option.

Following DBS, some people report an alteration to speech fluency and volume, but these issues can often improve significantly with the help of speech therapy. Most side effects are mild and can be managed, such as weight gain, word-finding difficulties and decreased quality of speech. Certain side effects can be managed by adjusting the stimulation settings.

There is a minor risk of suicide ideation which is screened for in the regular follow-up appointments.

How are the electrodes implanted?

DBS may be performed while you are awake or asleep. DBS when you are awake is called stereotactic surgery. The procedure involves wearing a 'halo' or stereotactic frame to ensure precision when placing the electrodes into the predetermined target.

Asleep DBS is increasingly available and involves building a model of your brain and having an intraoperative MRI scan to check on the lead placement.

The insertion of the neurostimulator is carried out under general anaesthesia in the second stage of the surgery.

What happens after the procedure?

After DBS, your Neurologist will need to determine the best adjustment for the stimulation setting using a device that communicates with the neurostimulator and your medication. The length of your hospital stay will vary depending on your Neurologist's recommendation, but it is generally up to five days.

The optimal stimulation adjustment is usually reached three to six months after the procedure and after several visits to the Neurologist following DBS.

What are the key benefits of DBS?

- More time in the 'on' state, equivalent to when oral medications are working well.
- More predictable movement, less fluctuation between 'on' and 'off' states (motor fluctuations).
- In most instances people can reduce oral medication.
- Specific targets are selected depending on the key symptom whether it is tremor and stiffness or dyskinesia.
- DBS in STN (subthalamic nucleus) is effective in reducing tremor.
- DBS can reduce muscle stiffness and dystonia.
- Sleep can improve with DBS

When is the right time for DBS?

DBS is not needed by everyone with Parkinson's. It can be considered as a treatment at any point of time as Parkinson's progresses, however increasingly it is being considered around two to three years post diagnosis

The EarlyStim clinical research (2013) into the optimal time to undergo DBS identified significant improvement in quality of life when surgery was performed earlier. However, many people choose to delay surgery while they are still having a good response to tablet-based therapy, even when they are experiencing some motor fluctuations.

It is a good idea to continue to discuss surgery with your neurologist as they can help you identify the right time for DBS.

Adaptive Deep Brain Stimulation

Adaptive DBS continuously "listens" to specific brain signals linked to symptom severity, then automatically adjusts the strength of stimulation in real time, rather than running at one fixed setting all day. This means you get more stimulation when needed and less when you don't, leading to better symptom control. It's still a fairly new approach and researchers are refining exactly which brain signals to track and how quickly the system should respond, but early studies and real-world use suggest it's a meaningful step toward more personalized, responsive treatment for Parkinson's. This may become available in Australia in the next few years.

Why consider DBS?

- The primary advantage is that it reduces motor fluctuations by providing continuous electrical stimulation and better control of symptoms for a longer period.
- It is adjustable – there are many different settings to deliver stimulation which can be adjusted to keep up with symptoms as Parkinson's progresses.
- DBS reduces the need for oral levodopa, which means fewer side effects, such as dyskinesia.

How often does the battery need to be charged?

If a rechargeable battery is inserted as part of DBS surgery, regular charging is required for approximately 90 minutes per week. It is recommended the device be charged on the same day each week. Rechargeable batteries may need to be changed every 10-12 years

Non-rechargeable batteries last for approximately four to five years, depending on the device and level of stimulation.

Learning how to properly use your patient programmer and recharger is an important part of ongoing DBS therapy.

What are the considerations when contemplating DBS?

There are some restrictions on having MRI (Magnetic Resonance Imaging) as it uses magnets which can alter the DBS settings. If you need to have an MRI, speak with your neurologist beforehand.

The DBS may need to be turned off, or switched to an MRI setting (if available) and the programming checked after the MRI.

When having any dental or minor procedures following DBS, taking antibiotics before and after procedures is usually required to minimise the risk of blood-borne infection affecting the implanted DBS.

If you are going into hospital, let staff know that you have DBS as it may interfere with hospital monitoring equipment, especially if you need an electrocardiograph (ECG). If you are having a surgical procedure, the surgeon will use a different technique of diathermy (bipolar). It is necessary to advise the anaesthetist and surgeon that you have electrodes in place.

Extra precautions are required when going through airports – you should avoid going through metal detectors. Let security personnel know you have Deep Brain Stimulation controlled by a pacemaker like device and they will scan you appropriately. Always carry your programmer and charger with you.

Activities exposing you to electrical currents (e.g. arc welding) need to be avoided as they may affect the DBS impulse generator.

Care is required when swimming as it can lead to difficulty coordinating limbs.

Caution is required - don't swim alone.

What is the cost of DBS surgery?

Currently the cost of DBS is not fully covered under Medicare as there are limited numbers undergoing the procedure in the public hospital system.

Most people access DBS surgery using private health insurance. All insurance policies are different and doctors have different billing schedules, there may be some out-of-pocket costs.

It is important to clarify the costs with your treating team to have a clear understanding of the financial implications.

Can I talk to someone who has had DBS surgery?

Fight Parkinson's runs a DBS Support Group which meets bimonthly. It is for people who have had DBS and for people who are contemplating the procedure.

This group is supported by a health professional from the Fight Parkinson's Health Team.

These meetings provide an ideal opportunity for people who are considering DBS to ask questions and hear firsthand from people who have had DBS recently or in years prior.

The meetings are facilitated online. For further details contact our Health Information Line on 1800 931 031 to register your interest.

Fight Parkinson's is a leading source of specialised health information and advice services. Through research, education and support, we strive to improve the lives of people living with Parkinson's, PSP, MSA and CBS.

Any medial information provided is for general information purposes only. You should always talk to your treating doctor and qualified healthcare providers for personal medical and health-related instructions.

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