Deep brain stimulation

About insertion of a deep brain stimulator

- The deep brain stimulator sends electrical impulses to the brain interrupting the abnormal signals that are causing the symptoms.
- The impulses are adjusted by the neurologist or nurse specialist using a hand held device.
- The wires will remain in place for the rest of your life. The battery has a limited life and will need to be replaced every three to five years. This procedure requires you to undergo further surgery.

Before your procedure

- Most patients attend a pre-admission clinic, when you will meet members of the functional neuroscience team.
- At this clinic, we shall ask you for details of your medical history and carry out any necessary clinical examinations and investigations. This may involve blood tests, an x-ray and skin swabs. This is a good opportunity for you to ask us any questions about the procedure, but please feel free to discuss any concerns you might have at any time.
- You will be asked if you are taking any tablets or other types of medication - these might be ones prescribed by a doctor or bought over the counter in a pharmacy. It helps us if you bring details with you of anything you are taking (for example: bring the packaging with you) you may be advised not to take your medication on the day of surgery. In particular blood thinning drugs such as Warfarin must be stopped before surgery. You must let your surgeon know if you are taking these kind of drugs. **Aspirin should be stopped 10 days before surgery.**
- This procedure involves the use of general and local anaesthesia. See below for further details about the types of anaesthesia we shall use.
- Most people who have this type of procedure will need to stay in hospital for three to four days. Sometimes we can predict whether you will need to stay for longer than usual - your doctor will discuss this with you before you decide to have the procedure.
- You may require a magnetic scan (MRI) or an xray scan (CT) of your brain before surgery. This helps us to plan where the wires should go. If you have a pacemaker you...
cannot have an MRI scan so your planning will be done using CT scans only and the surgical target may change. Please inform your surgeon if you have a pacemaker.

**During the operation**

- You will be taken to the neurosurgical theatres on your hospital bed. You may be awake or asleep for the first part of the operation.
- A frame will be attached to your head. This is called a stereotactic frame. It is fixed to the head by four screws. Local anaesthetic is injected where the screws will go before the frame is screwed into place. Once the frame is fitted you will have another scan before returning to theatre.
- A small area of your hair will be shaved and some local anaesthetic injected into your scalp before two small holes are made in your skull. The surgeon tests where the wires should go. When the right spot has been found the permanent wires will be put in. If you are awake you may feel some unusual sensations but no pain.
- A further scan will be done to check that these are in the correct place. If the wires are in the correct place the frame is removed. Then the second part of the surgery begins.
- The second part is always carried out under general anaesthetic. The battery is placed under the skin, usually in the chest and connected to the wires.
- The whole operation takes five to seven hours.

**After the procedure (operation/treatment)**

- Your stimulator will remain switched off.
- You will wake up in the recovery room after your operation. You might have an oxygen mask on your face to help you breathe. You might also wake up feeling sleepy.
- After this procedure, most people will have a small, plastic tube in one of the veins of their arm. This might be attached to a bag of fluid (called a drip), which feeds your body with fluid until you are well enough to eat and drink by yourself.
- Sometimes the surgeon recommends closer observation, and in this case you would be transferred to our Neurosciences Critical Care Unit (NCCU)
- While you are in the recovery room, a nurse will check your pulse and blood pressure regularly. When you are well enough to be moved, you will be taken to a ward.
- Sometimes, people feel sick after an operation, especially after a general anaesthetic, and might vomit. If you feel sick, please tell a nurse and you will be offered medicine to make you more comfortable.
- After this procedure, you should not have anything to eat or drink until your nurse considers it to be safe - this is usually a few hours. After this procedure, we will try to get you mobile (up and about) as soon as we can to help prevent complications from lying in bed. Typically, this will be the next day. If we think you will have problems getting about, we will arrange for extra assistance, for example nursing help and physiotherapy advice/exercises.
- You wounds will feel painful for a few weeks and it is normal for the skin over the
battery to feel a bit tight. You may notice bruising on your head and this will resolve over a few weeks. You may notice some slight swelling where the surgeon drilled the holes. This usually improves over a few months.

- **When you can leave hospital**: Most people who have had this type of procedure under general anaesthetic will be able to leave hospital after three to four days. The actual time that you stay in hospital will depend on your general health, how quickly you recover from the procedure and your doctor’s opinion.
- **When you can resume normal activities including work**: Most people who have had this procedure can resume normal activities after a few days. You might need to wait a little longer before resuming more vigorous activity. When you will be ready to return to work will depend on your usual health, how fast you recover and what type of work you do. Please ask your doctor for his/her opinion. Many patients feel very tired for up to six weeks after surgery.
- **Special measures you need to take after the procedure**:
  - You should continue to take your medication as normal. We will advise you when to restart Aspirin.
  - You should not drive until you have informed the DVLA and follow any specific instruction they give you. You will be able to drive again once you have recovered from your operation.
  - You should not have an MRI (Magnetic Imaging) scan unless this is discussed with the neurosurgeon or neurologist as this can potentially cause you significant damage.
  - Inform doctors and dentists before any treatments are carried out as you may need antibiotic cover.
  - Diagnostic ultrasound is permissible but not ultrasound treatment.
  - If you have further surgery only Bipolar diathermy can be used.
  - Stimulators can activate airport detectors and security devices in shops. The magnets in these devices can switch off your stimulator, so it is important to carry your identity cards which will usually allow you to bypass them. If you are not able to, then walk through the centre of them.
  - **Check-ups and results**: Before you leave hospital, you will be given details of when you need to return to see us in the outpatient clinics to have your stimulator switched on. At this time, we can check your progress and discuss with you any further treatment we recommend.

**Intended benefits of the procedure**

- To improve neurological symptoms such as tremor, rigidity, stiffness and slow movement.
- For some patients we will be able to reduce your medication and thereby reduce side effects you experience.
Who will perform my procedure?

- The procedure will be performed by a surgeon with specialist training in this kind of surgery. He may be assisted by another specialist and/or a trainee.
- Your neurologist and specialist nurse may also be in the operating room to assess you during the operation and to help with the procedure. Alternative procedures that are available.
- The alternative to this surgery is to decide not to have surgery and to continue with your medication.

Specific risks of DBS

- Short term adverse effects of stimulation: These are common and usually reversible with adjustments in stimulation
  - Eyelids closing
  - Difficulty talking
  - Limb or face contractions
  - Jerky movements
  - Visual flashes
  - Numbness or tingling in limb or face
  - Anxiety and nausea

Long term adverse effects of stimulation

These problems have been reported in a small number of patients:

- Side effects caused by the stimulation as described above that the patient finds intolerable so that the stimulator is turned off
- Long term weight gain
- Depression
- In a small number of patients the equipment itself may break or fail.

General Risks of DBS

The risks of surgery in general includes problems with the wound (for example infection) problems with breathing, such as chest infection and blood clots, for example in the legs and, less frequently, the lungs.

According to published scientific literature theses risks associated specifically with deep brain stimulation are:
• Blood clot in the brain causing permanent disability: two patients out of 100
• Stroke or other neurological deficit: one patient out of 100
• Infection of the leads: five patients out of 100
• Meningitis: less than one patient in 100
• Erosion of the wires through the skin: two patients out of 100
• Seizures: less than one patient in 100
• Weakening of the voice: five patients out of 100
• Short term confusion: five patients out of 100
• Death due to a blood clot: less than one patient in 100

Risks associated with all major operations:

General risks include chest infection, blood clot in the leg (deep vein thrombosis) and nausea/vomiting. The team treating you will ensure that these risks are minimised.