



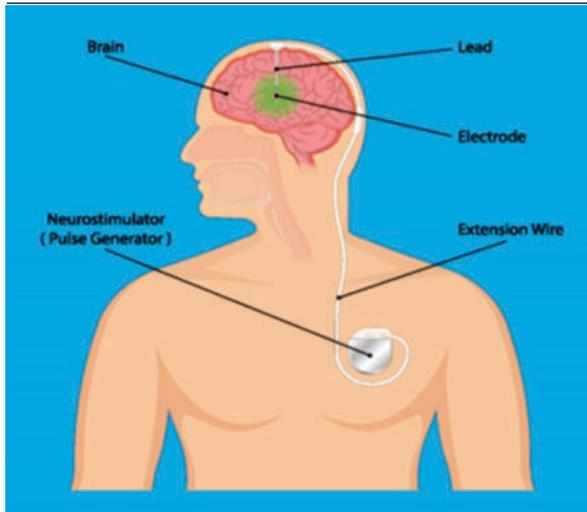
DEEP BRAIN STIMULATION (DBS)

Nursing

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KEYWORDS



It is a Neurosurgical intervention which involves the placement of a medical device called as a Neurostimulator, which sends the electrical impulses, through the implanted electrodes, to specific targets in the brain (the brain nucleus), which will be beneficial for the treatment of movement disorders like Parkinson's disease, essential tremor, dystonia, obsessive-compulsive disorder (OCD) and epilepsy, where this DBS directly acts by changing the brain activity in a controlled manner.¹

How does DBS works

Involuntary motor activity is seen in Parkinson's disease and other neurological conditions which are caused by disorganized electrical signals in the areas of the brain that controls the movement. After a successful procedure, DBS will inhibit the irregular signals that cause tremors and other movement symptoms.

After a detailed history and medical assessment, neurosurgeons implant one or more small wires (called as leads or electrodes) in the brain, these leads will be connected with an insulated wire extension to a very small Neurostimulator (electrical generator) placed under the person's collarbone, similar to a heart pacemaker. Steady stable pulses of electric current from the Neurostimulator will exceed through the leads and into the brain.

A few weeks after the Neurostimulator has been in place, the neurosurgeon programs it to deliver an electrical signal. This programming process may take more than one visit over a period of weeks or months to ensure the current is accordingly adjusted and performs well. While adjusting the device, the doctor explores an absolute balance between improving the symptoms and limiting side effects.

Need to Know

- Neurosurgeons implant one or more small wires (leads or electrodes) in the brain through surgical intervention
- The leads receive mild electrical stimulation from a small electrical generator which is implanted in the chest (Collar bone).
- Proper selection of patient, precise placement of the electrodes and adjustment of the pulse generator are essential for successful DBS surgery.
- DBS does not completely subside the symptoms of PD or other conditions, but yes, it can reduce the need for medications and

will help to improve the quality of life.²

Mechanisms

A variety of hypotheses try to explain the mechanisms of DBS:

- Depolarization blockade: Electrical currents interrupts the neuronal output at or near the electrode site.
- Synaptic inhibition: it leads to an indirect regulation of the neuronal output by stimulating the axon terminals with synaptic connections to neurons near the stimulating electrode.
- DE synchronization of abnormal oscillatory activity of neurons
- Antidromic activation either activating/blockading distant neurons or blockading slow axons

Who are in need?

- Dystonia
- Essential tremor
- Medication-resistant epilepsy
- Parkinson's disease (when this condition worsens and medication is not as effective).
- Medication-resistant obsessive-compulsive disorder (OCD)³

Adverse Effects

- Risk of major surgery complications like Hemorrhage, infections, swelling of brain tissue, mild disorientation and sleepiness.
- Neuropsychiatric side effects after DBS including apathy, hallucinations, hypersexuality, cognitive dysfunction, depression, and euphoria.

Components And Placement

DBS consists of three components:- implanted pulse generator (IPG), the lead and extension. The IPG is a battery-powered Neurostimulator encased in a titanium housing, which sends electrical pulses to the brain that interfere with neural activity at the target site.

DBS leads are placed in the brain according to the type of symptoms to be addressed. For non-Parkinsonian essential tremor, the lead is placed in either the ventrointermediate nucleus of the thalamus or the zona incerta; for dystonia and symptoms associated with PD (rigidity, bradykinesia/akinesia, and tremor), the lead may be placed in either the globus pallidus internus or the subthalamic nucleus; for OCD and depression to the nucleus accumbens; for incessant pain to the posterior thalamic region or periaqueductal gray; and for epilepsy treatment to the anterior thalamic nucleus.⁴

Special Precautions after Deep Brain Stimulation

In general, people who have had DBS surgery should:

- Always carry an ID card that states they have a DBS Neurostimulator. In addition, they may want to wear a medical identification bracelet indicating this information.
- People with a Neurostimulator should let airport security screeners know before going through the airport detectors. Many airport detectors are safe for pacemakers, but the small amount of metal in the Neurostimulator may set off the alarm. Patients selected for additional screening by hand-held detector devices should politely remind the screeners that the detector wand should not be held over the Neurostimulator for longer than a few seconds, since these devices contain magnets that may affect the function or programming of the Neurostimulator.
- Patients with leads and Neurostimulator may not have certain MRI procedures. Patients should always check with their physician before any type of MRI, though DBS can be compatible with MRI under certain circumstances. They should avoid places with large magnetic fields, such as power generators and automobile junkyards that use large magnets.

- Patients who have had DBS surgery should avoid using heat in physical therapy to treat muscles.
- They should also avoid high-voltage or radar machinery, such as radio or television transmitters, electric arc welders, high-tension wires, radar installations or smelting furnaces.
- When participating in a physical, recreational or sporting activity, patients should protect the Neurostimulator area from trauma. A blow to the chest near the pacemaker can affect its functioning and warrants a trip to the doctor.

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