



## NEUROSTIMULATION AND DBS THERAPY

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In spite of the medical advances made by top scientists and researchers, the human brain remains as one of today's largest medical anomalies. Composed of over 100 billion neurons, little of the electrical and hormonal activities responsible for everyday functions are fully understood. However, through observational techniques like EEGs and fMRIs, scientists are beginning to recognize the regions of the brain responsible for movements, thoughts, and sensory information and other common functions.

One of the recent breakthroughs in the study of the human brain is the treatment of neurological diseases and their symptoms. Deep Brain Stimulation (DBS) is one of these recent treatment options that have gained much popularity in the last 10 years. DBS works by applying a low electrical current directly to a targeted area of the brain or spinal cord. By interrupting the body's natural electrical activity, doctors are able to block the signals that are responsible for causing the symptoms associated with a variety of neurological disorders, ranging from the involuntary muscle movement seen in Parkinson's disease, essential tremor, and dystopia to the pain signals experienced by those suffering from chronic pain. DBS has even proven effective in the treatment of psychological disorders as well.

The Medtronic DBS System consists of three implanted components. First, the neurostimulator itself is implanted beneath the clavicle of the patient. Composed of a titanium shell, it contains the electronics to produce the electrical impulses and is powered by a battery. Second, the neurostimulator is connected to an extension that is threaded under the skin to the brain or spinal cord along the neck. Finally, the extension is attached to a lead, which consists of four thin-coiled, insulated wires. At the end of the wires are the electrodes that are implanted into the targeted brain tissue or the epidural space of the spinal cord.

In contrast with most invasive procedures, the patient is kept awake while the electrodes are being implanted. This is done so that they can respond to the team of neurosurgeons as they place the electrodes in the correct positions. Following a brief post-operative stay in

the hospital, patients must periodically meet with a neurologist to adjust the specific settings of the neurostimulator, including the amplitude, width, and frequency of the pulse signal. This can be done non-invasively using a magnetically-operated hand-held controller.



Since 1997, over 40,000 patients around the world have used Medtronic DBS Therapy. The reason for its growing popularity is that it has proven to be highly effective, adjustable, and even reversible. Patients with movement disorders generally experience between 25 and 75% better motor control, depending on the accuracy of the electrodes' placement. Patients with chronic pain typically experience at least a 50% reduction in pain. The risks of receiving a neurostimulator include the usual risks related to invasive neurosurgery, including paralysis, intracranial hemorrhaging, and seizures. Patients may also experience temporary tingling or numbing sensations as well. Although not a cure for the underlying conditions, Medtronic's DBS System serves as a major advancement in neurological treatment.

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### REFERENCES:

<http://www.medtronic.com>  
<http://www.medicalnewstoday.com>