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Risks, Advantages of Deep Brain Stimulation and Working of Deep Brain Stimulation System

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Deep Brain Stimulation System

Deep brain stimulation (DBS) includes implanting electrodes inside sure areas of the brain [1]. These electrodes produce electric impulses that regulate abnormal impulses. Or the electrical impulses can affect certain cells and chemicals within the brain.

The amount of stimulation in deep brain stimulation is managed via way of means of a pacemaker-like tool positioned under the skin in your upper chest. A wire that travels under your skin connects this device to the electrodes in your brain.

Deep brain stimulation is commonly used to treat some of conditions, such as Parkinson's disease, Essential tremor, Dystonia, Epilepsy and Obsessive-compulsive disorder.

How does deep brain stimulation work?

Movement-associated signs and symptoms of Parkinson's disorder and different neurological situations are caused by disorganized electric signals in the regions of the brain that control movement. When successful, DBS interrupts the abnormal signals that cause tremors and different movement symptoms.

After a series of tests that determines the optimal placement, neurosurgeons implant one or more wires, called "leads," in the brain. The leads are connected with an insulated wire extension to a very small neurostimulator (electrical generator) implanted under the person's collarbone, similar to a heart pacemaker. Continuous pulses of electrical current from the neurostimulator pass through the leads and into the brain [2].

A few weeks after the neurostimulator has been in place, the doctor programs it to deliver an electrical signal. This programming method can also additionally take more than one visit over a period of weeks or months to ensure the current is properly adjusted and imparting effective results. In adjusting the device, the medical doctor seeks an optimal stability between enhancing symptom control and limiting side effects.

Components of the DBS system

The lead (also referred to as an electrode) is a thin, insulated wire inserted through a small opening in the skull and implanted in the brain. The tip of the electrode is located within the targeted brain area [3].

The extension is an insulated wire passed beneath the pores and skin of the head, neck and shoulder, connecting the lead to the neurostimulator.

The neurostimulator (the battery pack") is the third component and is usually implanted under the pores and skin close to the collarbone. In a few instances it can be implanted lower in the chest or beneath the skin over the abdomen.

What are the advantages of deep brain stimulation (DBS)?

Deep brain stimulation (DBS) has many advantages:

Unlike a few other surgical alternatives, DBS does now no longer purpose permanent damage in any part of the brain.

- The electrical stimulation is adjustable and reversible as the person's disorder changes or his or her response to medications change.
- As DBS is reversible and causes no permanent brain damage, use of innovative not-yet-to be had treatment alternatives can be possible.
- The stimulator also can be turned off at any time if DBS is inflicting excessive side effects with none long-term consequences.

What are the Risks and Complications of Deep Brain Stimulation (DBS)?

As with any surgical procedure, there are risks and complications. Complications of DBS fall into 3 categories: surgical treatment complications, hardware (tool and wires) complications, and stimulation-associated complications.

Surgical complications include brain hemorrhage, brain infection, wrong location (misplacement) of the DBS leads, and much less than the best location (suboptimal placement) of the leads [4].

Hardware complications encompass movement of the leads, lead failure, failure of any a part of the DBS system, pain over the pulse generator device, battery failure, infection across the device and the device breaking through the skin because the thickness of skin and fat layer change as one ages.

Stimulation-associated complications arise in all patients all through the device programming stage. Common side effects are unintended movements (dyskinesia), freezing (feet feel like they're stuck to the floor), worsening of balance and gait, speech disturbance, involuntary muscle contractions, numbness and tingling (paresthesia), and double vision (diplopia) [5]. These side effects are reversible while the device is adjusted.

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