Introduction to Medicine- Written Assignment

Deep Brain Stimulation

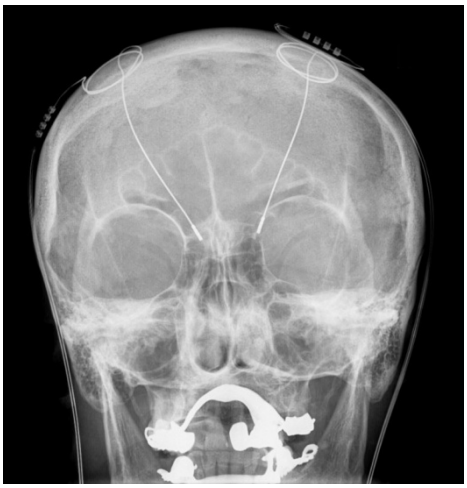
Deep Brain Stimulation or DBS is a procedure in which a small device called a neurostimulator or a brain pacemaker is implanted to deliver electrical stimulation to targeted areas of the brain, through implanted electrodes to treat movement disorders. I chose this treatment because DBS has already revolutionized the clinical management of treatment-resistant movement disorders like Parkinson's disease and offers novel treatment options for an increasing range of neurological and psychiatric illnesses.

As i mentioned before, doctors use DBS for movement disorders but also for neuropsychiatric conditions because medications have become less effective or their side effects interfere with a person's daily activities. DBS is important to medicine because it can help improve symptoms of tremors, stiffness, slowness, problems with walking, slowed movement, rigidity and other movement problems. It can also help with medicine therapy by decreasing the dose needed. Decreasing the dose of medicine can ease side effects of long-term medicine use. Many people see their symptoms improve for several years after the procedure. They are able to do basic activities, such as eating, toileting, and dressing. This procedure has been used to treat over 40,000 people with Parkinson's disease and essential tremor worldwide The clinical use of deep brain stimulation is among the most important advances in the clinical neurosciences in the past two decades.

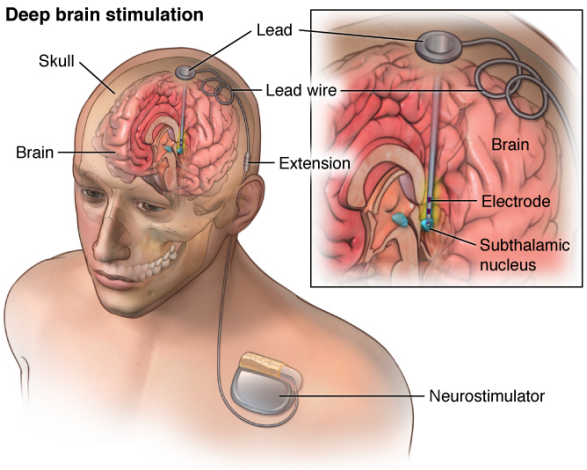
The development of modern deep brain stimulation is widely attributed to Alim Benabid, who discovered that electrical stimulation of the basal ganglia, a group of subcortical nuclei of varied origin, in the brain, which improved symptoms of Parkinson's disease in the late 1980s. In 2002, deep brain stimulation for the treatment of Parkinson's disease was approved by the US Food and Drug Administration. Over 160,000 patients worldwide have undergone DBS for a variety of neurological and non-neurological conditions, with numbers increasing each year. The development of DBS has lead into new opportunities to access and examine malfunctioning brain circuits and to test the therapeutic potential of regulating the output of these circuits in a lot of disorders.To date, few indications have been approved for DBS. As a surgical tool, DBS can directly measure pathological brain activity and can deliver adjustable stimulation for therapeutic effect in neurological and psychiatric disorders. As a scientific tool, DBS can be used to investigate the physiological underpinnings of brain dysfunction, which enables identification and correction of pathological neuronal signatures and helps to drive technological innovation and enhance safety and clinical outcomes. Furthermore, DBS has contributed to circuit theories of brain dysfunction by demonstrating that localize dysfunction and intervention can have profound influences on brain-wide networks. Despite its advantages, DBS remains an invasive surgery with low but potentially serious risks, like haemorrhage and infection. Although DBS has become standard of care in patients with movement disorders, its use in other disorders is limited to highly refractory patients and conditions, typically in the context of expert multidisciplinary care and clinical research. Also, Parkinson's disease is typical of both the promise and challenges of the technique. For example, although DBS is highly effective, stimulation at the most commonly used targets is ineffective for the treatment of gait and other axial symptoms and does little to improve speech.

Deep brain stimulation has provided substantial clinical improvement in patients with several different diseases and disorders. The understanding of how DBS works has advanced during the past 2 decades, but there is still much to be learned. Functional

imaging studies and electrophysiological monitoring have added greatly to the understanding of the effects of stimulation on the neurotransmitters and functional brain pathways. As a future direction additional technical and clinical challenges also exist. Technical innovation will focus on the improvement of practicability, including extension of battery life, design of smaller devices and development of more tailored and adaptive stimulation in addition to the integration of wireless technology. Clinically, the main challenge will be to meet the needs of an aging population worldwide and expand indications for DBS to circuitopathies other than Parkinson's desease, including depression and Alzheimer's disease. Determining the next steps in DBS science will help to define the future role of this technology in the development of novel therapeutics for the most challenging disorders affecting the human brain. Answers to these questions will shape not only which patients are offered surgery but also the direction of the field for years to come.Furthermore, crucial questions remain, including which brain areas should be targeted and in which patients.



" Skull X-Ray that shows the implanted electrodes"



"DBS Procedure"

-Christiana Georgakopoulou

Bibliography

Text:

Garcia, Nancy. "Deep Brain Stimulation Definition." *International Neuromodulation Society*,www.neuromodulation.com/DBS.

Deep brain stimulation. (2018, December 14). Retrieved from https://www.mayoclinic.org/tests-procedures/deep-brain-stimulation/about/pac-20384562

Gardner, John. "A History of Deep Brain Stimulation: Technological Innovation and the Role of Clinical Assessment Tools." *Social Studies of Science*, SAGE Publications, Oct. 2013,www.ncbi.nlm.nih.gov/pmc/articles/PMC3785222/.

"Deep Brain Stimulation." *Parkinson's UK*, www.parkinsons.org.uk/information-and-support/deep-brain-stimulation.

Images:

"Deep Brain Stimulation." *Wikipedia*, Wikimedia Foundation, 23 June 2019,en.m.wikipedia.org/wiki/Deep_brain_stimulation.

"Deep Brain Stimulation: Best Hospitals, Doctors & Cost India." *MedGurus*, www.medgurus.org/deep-brain-stimulation-dbs-best-hospitals-doctors-cost-in-india/.