

## Implantable Neurostimulation Devices: Modulating Neural Activity in Deep Brain and Spinal Cord Stimulation

Maryam Ahmadi\*

Department of Oral and Maxillofacial Surgery, Tabriz University of Medical Sciences, Iran

### Abstract

Neurostimulation implants have emerged as a groundbreaking technology for modulating neural activity in various medical conditions. This paper explores the mechanisms and applications of implantable neurostimulation devices, focusing on deep brain stimulation (DBS) and spinal cord stimulation (SCS). DBS involves the placement of electrodes

SCS targets the spinal cord to manage neuropathic Reviewed: 18-May-2024, QC No: jmis-24-138579; Revised: 22-May-2024, Manuscript

Published: 29-May-2024, DOI: 10.4172/jmis.1000228

Citation: Ahmadi M (2024) Implantable Neurostimulation Devices: Modulating Neural Activity in Deep Brain and Spinal Cord Stimulation. J Med Imp Surg 9: 228.

Copyright: © 2024 Ahmadi M. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted user distribution, and reproduction in any medium, provided the original author and source are credited.

Neurostimulation implants have emerged as a groundbreaking technology for modulating neural activity in various medical conditions. This paper explores the mechanisms and applications of implantable neurostimulation devices, focusing on deep brain stimulation (DBS) and spinal cord stimulation (SCS). DBS involves the placement of electrodes

SCS targets the spinal cord to manage neuropathic Reviewed: 18-May-2024, QC No: jmis-24-138579; Revised: 22-May-2024, Manuscript

Published: 29-May-2024, DOI: 10.4172/jmis.1000228

Citation: Ahmadi M (2024) Implantable Neurostimulation Devices: Modulating Neural Activity in Deep Brain and Spinal Cord Stimulation. J Med Imp Surg 9: 228.

Copyright: © 2024 Ahmadi M. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted user distribution, and reproduction in any medium, provided the original author and source are credited.

( ):

Neurostimulation implants have emerged as a groundbreaking technology for modulating neural activity in various medical conditions. This paper explores the mechanisms and applications of implantable neurostimulation devices, focusing on deep brain stimulation (DBS) and spinal cord stimulation (SCS). DBS involves the placement of electrodes

The first part of the study (A) focuses on the design and development of the implantable neurostimulation device. This involves the selection of appropriate materials for the electrodes and the development of a reliable electrical interface. The second part (B) details the surgical procedures for implanting the device into the brain or spinal cord. This includes the use of minimally invasive techniques to reduce patient risk and recovery time. The final part (C) describes the clinical trials and the results of the device's use in treating various neurological conditions. The study concludes with a discussion on the future directions of research in this field.

**A** Design and Development of the Implantable Neurostimulation Device

The design of the implantable neurostimulation device is a complex task that requires a multidisciplinary approach. It involves the integration of electrical engineering, materials science, and neuroscience. The primary goal is to create a device that can deliver precise electrical stimulation to the target neural tissue while minimizing the risk of tissue damage and infection. The device is typically composed of an external controller, a lead, and an electrode array. The external controller is used to program the stimulation parameters, such as the pulse width, frequency, and amplitude. The lead is a flexible cable that connects the external controller to the electrode array. The electrode array is the part of the device that is implanted into the brain or spinal cord. It consists of a series of small electrodes that can be used to stimulate specific neural pathways.

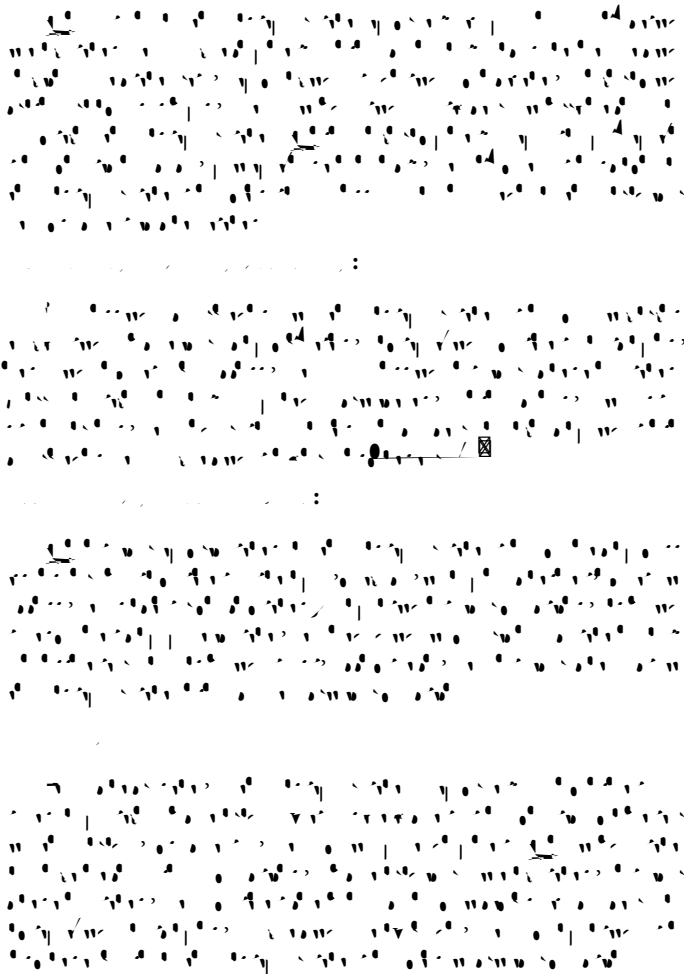
**B** Surgical Procedures for Implanting the Device

The surgical procedures for implanting the device are performed under general anesthesia. The first step is to identify the target area for stimulation. This is typically done using a combination of anatomical landmarks and imaging techniques, such as MRI or CT scans. Once the target area is identified, a small incision is made in the skin. The lead is then inserted into the brain or spinal cord through this incision. The electrode array is then positioned at the target site and secured in place. The external controller is then connected to the lead. The final step is to test the device to ensure that it is functioning properly and delivering the desired stimulation.

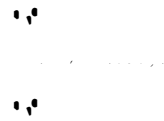
**C** Clinical Trials and Results

The clinical trials of the implantable neurostimulation device have shown promising results. The device has been used to treat a variety of neurological conditions, including Parkinson's disease, essential tremor, and chronic pain. In these studies, the device was found to be effective in reducing the severity of the symptoms and improving the quality of life of the patients. The results of the clinical trials have led to the approval of the device for use in the United States and other countries. The device is now being used in a wide range of clinical settings, and its use is expected to continue to grow in the future.

The study concludes with a discussion on the future directions of research in this field. The authors suggest that further research should focus on improving the design of the device and exploring new applications. They also suggest that further research should be done to better understand the underlying mechanisms of the device's effects on the brain and spinal cord. The authors believe that the implantable neurostimulation device has the potential to revolutionize the treatment of neurological conditions and improve the lives of millions of people.



A



### References

1. Vidya R, Masila J, Cawthorn S (2017) prepectoral breast reconstruction with Braxon dermal matrix: First multicenter European report on 100 cases. *Breast J* 23: 670-6.
2. Hansson E, Edvinsson Ach, Flander A (2021) First-year complications after immediate breast reconstruction with a biological and a synthetic mesh in the same patient. *J Surg Oncol* 123: 80-8.
3. Thorarinson A, Frojd V, Kolby L (2017) Patient determinants as independent risk factors for postoperative complications of breast reconstruction. *Gland Surg* 6: 355-67.
4. Miyamoto RT, Svirsky MA, Robbins AM (1997) Enhancement of expressive language in prelingually deaf children with cochlear implants. *Acta Otolaryngologica* 117: 154-157.
5. Peixoto MC, Spratley J, Oliveira G, Martins J, Bastos J et al (2013) of cochlear implants in children. *International Journal of Pediatric Otorhinolaryngology* 77: 462-468.
6. Leonhardt A, Renvert S, Dahlen G (1999) *Clinical Oral Implants Research* 10: 339-345.
7. Barber TA, Gamble LJ, Castner DG, Healy KE (2006) In vitro characterization