



TECHNOLOGY

Adjustable Focus Magnetic Stimulation Coil

OVERVIEW

Summary

The Adjustable Focus Magnetic Stimulation Coil is a medical device for transcranial or transdermal magnetic stimulation (TMS) promising to enhance treatment of neurological disorders. Its unique coil design permits modulation of magnetic fields to penetrate deeper brain regions while maintaining focality.

Market

This innovation addresses the limitations of current TMS devices. Despite the widespread clinical use of TMS over the past three decades, the design of TMS devices has seen minimal modifications, particularly concerning size and adaptability. The introduction of an adjustable focus magnetic stimulation coil directly addresses limitations of current technologies by offering a solution that not only enhances the precision and depth of neural stimulation but also provides the flexibility required for varied clinical applications.

The global TMS market, estimated at USD 1.13 billion in 2022, is expected to grow at a Compound Annual Growth Rate (CAGR) of 9.0% to reach USD 2.26 billion by 2030. This growth trajectory underscores the increasing demand for effective and non-invasive neurological treatments, propelled by the rising prevalence of neurological conditions such as Alzheimer's disease, Parkinson's disease, and depression. The Adjustable Focus Magnetic Stimulation Coil, with its innovative approach to deep and focused brain stimulation, is positioned to meet this demand by offering a technology that surpasses the capabilities of existing TMS devices in both functionality and clinical outcomes.

Technology

The Adjustable Focus Magnetic Stimulation Coil represents a significant leap forward in the field of medical devices, particularly in the realm of transcranial or transdermal magnetic stimulation (TMS). Developed to overcome the inherent limitations of conventional magnetic stimulators, this patented technology introduces a novel approach to achieving deeper brain stimulation without sacrificing precision and focality.

The core innovation of this technology lies in its unique coil design, which employs an adjustable wrapping angle of an electrically conductive coil around a magnetic core. This design principle allows for the modulation of the coil's magnetic field, enabling it to penetrate deeper brain regions while maintaining a focused effect. Unlike traditional TMS tools, which are constrained by a depth-spread tradeoff—wherein the magnetic field weakens and spreads as it penetrates deeper—this invention utilizes symmetry-breaking coil designs to concentrate the magnetic field and enhance its depth penetration capabilities.

One of the key aspects of this technology is its ability to adjust the focal spot size of the magnetic stimulation, offering unparalleled flexibility for various medical applications. By tilting the coil's wire wrapping angle relative to the magnetic core direction, the invention breaks the coil's circular symmetry, resulting in focused stimulations that are more precise and effective. This feature is particularly beneficial for targeting specific areas within the brain or body, making it an invaluable tool for treating neurological and neurodegenerative diseases.

The Adjustable Focus Magnetic Stimulation Coil boasts several advantages over existing solutions. Firstly, its innovative coil design facilitates better focality and depth penetration, allowing for targeted stimulation of deeper brain regions. Additionally, the adjustable focal spot size caters to diverse medical needs, enabling clinicians to tailor the stimulation to individual patient requirements. The technology also leverages iron core and tilted-angle coil designs to produce peak electric fields, further enhancing its effectiveness.

REFERENCES

[1] K. Pacheco-Barrios, AC Gianlorenco, et al., "Accelerating the development of noninvasive brain stimulation devices: using design thinking to facilitate its clinical use and acceptance," *Expert Review of Medical Devices*, 2024, Taylor & Francis. [Online]. Available: <https://www.tandfonline.com/doi/full/10.1080/14737175.2023.2292733>. [Accessed 22 Sept 2023].

[2] "Transcranial Magnetic Stimulation System Market Report 2030," Grand View Research, [Online]. Available: <https://www.grandviewresearch.com/industry-analysis/transcranial-magnetic-stimulator-market>. [Accessed 22 Sept 2023].

ADDITIONAL INFORMATION

- - **Potential Fields of Application:**
 - Non-invasive brain stimulation
 - Treatment of neurological and neurodegenerative diseases
 - Mental health disorder therapies
 - Neurological research
- - **Keywords:**
 - Transcranial Magnetic Stimulation (TMS)
 - Neurological Diseases
 - Non-invasive Brain Stimulation
- - **Advantages:**
 - Enhanced focality and depth penetration
 - Adjustable focal spot size for tailored stimulation

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Additional Information

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LICENSE STATUS

Available

CATEGORIES

- Devices

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EXTERNAL RESOURCES

- [K. Pacheco-Barrios, AC Gianlorenco, et al., "Accelerating the development of noninvasive brain stimulation devices: using design](#)
- [Transcranial Magnetic Stimulation System Market Report 2030," Grand View Research, \[Online\].](#)

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