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Brain Implants Market Size and Forecasts (2020 - 2030), Global and Regional Share, Trends, and Growth Opportunity Analysis By Treatment (Deep Brain Stimulation, Spinal Cord Stimulation, Vagus Nerve Stimulator, Invasive and Non-Invasive Brain–Computer Interface, Responsive Neurostimulation for Seizures, Auditory Brainstem Implant, and Ophthalmic Aid/Implant), Application [Chronic Pain, Parkinson's Disease, Alzheimer's Disease, Epilepsy, Essential Tremor, Depression, Dystonia, Amyotrophic Lateral Sclerosis (ALS), and Neurofibromatosis 2], End User (Hospitals and Specialized Clinics/Neurological Centers), and Geography (North America, Europe, Asia Pacific, Middle East & Africa, and South & Central America)

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Abstracts

The brain implants market size is expected to grow from US$ 7.205 billion in 2022 to US$ 17.647 billion by 2030; it is estimated to record a CAGR of 11.8% during 2022 to 2030.

The brain implants market growth is attributed to the surging prevalence of neurological disorders with increasing geriatric population and rising number of spinal cord injuries.

Advancements in technology have led to the development of smaller, more compact brain implants, making them more suitable for noninvasive or minimally invasive surgical procedures. Improved electrode designs, advanced programming algorithms, 3D printing, brain-computer interfaces (BCI), motor neuron prostheses, self-charging implants, memory chips, and miniaturization are a few of the modern trends in the brain implants market, which are likely to improve the effectiveness of treatments. These innovations provide patients with greater customization, adaptability, and other long-term benefits. In addition to the development of smaller and more flexible implants, advancements in wireless communication and power delivery systems can enhance the functionality and usability of brain implants. By reducing the invasiveness and improving the user experience, these advancements can expand the potential applications of brain implants and attract a broader patient population. Furthermore, these advancements benefit patients who require long-term implants, as smaller devices can lower the risk of complications and allow for easier placement and removal.

The integration of artificial intelligence (AI) and machine learning algorithms can further optimize the performance of brain implants by enabling personalized therapies and real-time adaptive stimulation. AI-powered neural implants have the potential to improve patients' quality of life, particularly those suffering from Alzheimer's disease. Recent research indicates that AI-powered brain–machine interfaces can effectively identify and track the progression of Alzheimer's, leading to earlier diagnosis and intervention. Innovations in BCI technology have provided new ways for communication and control for individuals with severe disabilities. BCIs can enable individuals with locked-in syndrome or spinal cord injuries to interact with their surroundings using their thoughts. These implants can decode neural signals and translate them into commands for external devices, such as prosthetic limbs or computer interfaces.

Companies such as Medtronic, Neuropace, and St. Jude Medical are developing systems to actively monitor brain activity. Some monitoring systems are used in conjunction with other assistive devices, such as robotic aids, to help patients suffering from neurological disorders to regain lost motor function. Companies such as Emotiv and NeuroSky are focused on advancing BCIs for improved device control. In May 2023, Neuralink, a brain implant company, received US FDA approval to begin the first-in-human clinical study of its brain implants in human subjects. The company is working on developing implants that promise to incorporate human brains with computer interfaces via AI. Similarly, in February 2023, Precision Neuroscience began working on its plan to introduce its groundbreaking medical technology to benefit paralyzed patients or those with other forms of limited mobility. Precision's brain implant device is a super thin film, about one-fifth of the width of a human strand of hair, that has a related consistency to that of a scotch tape. The company has plans to roll out the functionality of this device in stages.

End User-Based Insights

Based on end user, the brain implants market is segmented into hospitals and specialized clinics/neurological centre. The hospitals segment held a larger market share in 2022 and is anticipated to register a higher CAGR during 2022–2030. Hospitals are complex organizations that provide healthcare services by using complicated but specialized scientific equipment. They employ teams of professionals trained to address the problems of modern medical sciences. They are all coordinated together for the common goal of restoring and maintaining good health. As specialized healthcare facilities, hospitals have key set-ups for the diagnosis, treatment, and management of various neurological conditions that may require brain implant interventions. Hospitals provide pre- and post-operative care, which includes the assessment and selection of suitable candidates for brain implants. They also provide continuous monitoring and programming, and schedule follow-up visits to ensure the proper functioning of these implants, eventually optimizing outcomes for patients undergoing implantation procedures. Hospitals serve as centers of expertise, housing multidisciplinary teams of neurologists, neurosurgeons, nurses, and other healthcare professionals, who collaborate to provide specialized care for patients receiving brain implants.

Hospitals also play a crucial role in conducting research and clinical trials to advance knowledge, improve technologies, and expand the applications of brain implant devices. They serve as educational and training centers, providing opportunities for healthcare professionals to enhance their expertise in brain implantation area through specialized training programs and continuous medical education.

Europe is the second leading region in the market. In the region, Germany held the largest share of the market in 2022. According to a study published at Charit?—Universit?tsmedizin Berlin, titled 'Deep brain stimulation for Parkinson's disease: new algorithm for the adjustment of stimulation settings developed,' published in 2022, Parkinson's disease (PD) is the second most common neurodegenerative disease after Alzheimer's. ~400,000 people were affected by the disease in the country, and the numbers are increasing due to demographic aging. A growing number of people, including younger people, suffer from neurodegenerative diseases. As per DZNE, German Center for Neurodegenerative Diseases, over 2 million people have dementia or PD in the country. Brain implants have emerged as a potential treatment for PD. These implants, also known as deep brain stimulation (DBS), involve the surgical placement of electrodes in specific areas of the brain.

According to the German government's statistics, 19,356 people required hospital care as a result of Alzheimer's in 2020. The increase in hospitalizations and deaths with Alzheimer's diagnosis is highly dependent on the aging population in Germany. Out of 19,356 cases, 11,188 were people aged 80 and above; only 1,026 cases were recorded among individuals aged 65 or younger. Brain implants include medical devices such as deep brain stimulator and vagus nerve stimulator. These devices help monitor brain and brain functions in patients suffering from neurological diseases. Therefore, the above-mentioned factors are expected to boost brain implants market growth in Europe.

German government's statistics, Parkinson's Foundation UK, Alzheimer's Disease Research Factsheet, and the World Health Organization (WHO) are among the primary and secondary sources referred to while preparing the brain implants market report.

Contents

7. GLOBAL BRAIN IMPLANTS MARKET – REVENUE AND FORECAST TO 2030 – BY TREATMENT.

8. GLOBAL BRAIN IMPLANTS MARKET – REVENUE AND FORECAST TO 2030 – BY APPLICATION

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11. BRAIN IMPLANTS MARKET–INDUSTRY LANDSCAPE

12. COMPANY PROFILES

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