Neurostimulation Devices Market to 2018
Technological Advances and Robust Pipeline with Multi-Indication Potential and Non-Invasive Therapies to Drive Growth
GBI Research Report Guidance

- The report includes an executive summary, capturing the key points that determine the dynamics of the neurostimulation devices market. Competition in the industry and key categories, segments and geographical regions are also outlined.

- The ‘Market Characterization’ chapter provides information on market size for the historic period (2004-2011) and the forecast period (2011-2018). It also has information related to the neurostimulation devices market trends, market dynamics, and the competitive landscape. In the market dynamics section, comprehensive information is provided on market drivers and restraints.

- The ‘Segment Analysis and Forecasts’ chapter discusses spinal cord stimulators, deep brain stimulators, vagus nerve stimulators, sacral nerve stimulators and cortical stimulators segments. Market size information for the historic period and the forecast period is discussed for each segment, along with market dynamics.

- This is followed by ‘Country Analysis and Forecasts’. Market size information for the historic period and the forecast period is provided for the US, Canada, the UK, France, Germany, Italy, Spain, Japan, China, India, Australia and Brazil. A cross-country analysis of these countries is also discussed.

- The ‘Competitive Assessment’ chapter gives profiles of the leading neurostimulation device companies and their key products.

- The ‘Pipeline Product Analysis’ chapter focuses on the pipeline products in various categories. Key pipeline products are listed and discussed in detail, and product approval and expected launch dates are also provided for a number of products.

- The ‘Consolidation Landscape’ chapter discusses the consolidation landscape in the neurostimulation devices industry. This chapter looks at the total number of deals that took place during the period 2007-2012 (Q1, Q2).
Executive Summary

The Global Neurostimulation Devices Market is Forecast to Witness High Growth During the Forecast Period

The global market for neurostimulation devices is forecast to reach $XXm by 2018, with a Compound Annual Growth Rate (CAGR) of XX% from 2011-2018. Spinal cord stimulation devices will be the largest segment in the market, with a value of $XXm by 2018.

The market is primarily expected to be driven during the forecast period by the large patient pool suffering from neurological disorders such as epilepsy, Parkinson’s disease, dystonia, depression, migraine, and chronic pain. Compelling clinical needs, expanding research activities and application in new indications will also accelerate technological innovations in neurostimulation devices. Moreover, a growing demand for safer, more effective, less-invasive and more cost-effective therapies for neurological disorders will lead to increased adoption rates for neurostimulation devices. Technological improvements, limited competition, long-term cost-effectiveness, and the increase in clinical trials for new indications will continue to drive market growth.
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2 Introduction

The neurostimulation devices market is rapidly growing, due to the increasing elderly population, an increase in the prevalence of neurological disorders, technological advancements, long-term cost-effectiveness, and the increase in clinical trials for the treatment of new indications such as Alzheimer’s disease, schizophrenia, heart failure, obesity and tinnitus. Neurostimulation devices are used in the treatment of neurological disorders such as epilepsy, Parkinson’s disease, chronic pain, major depression and dystonia. The neurostimulation devices market comprises spinal cord stimulators, deep brain stimulators, vagus nerve stimulators, sacral nerve stimulators and cortical stimulators. The market is constantly driven by R&D activities, which has helped companies to launch technologically advanced products.

The spinal cord stimulation devices segment is the fastest growing segment, and market growth is expected to be driven by an increase in awareness, long-term cost-effectiveness compared with drug therapies, and an increase in neurological diseases and disorders such as epilepsy and Parkinson’s disease. The neurostimulation devices pipeline is dominated by deep brain stimulation devices for emerging applications such as those for Alzheimer’s disease, stroke, essential tremor, obesity and traumatic brain injury. An increase in age-related neurological disorders will drive demand for neurostimulation devices. The market is dominated by Medtronic, St. Jude Medical, Boston Scientific Corporation and Cyberonics.

Technological advancements, increasing prevalence of neurological disorders and a growing demand for safer, more effective, less-invasive and more cost-effective therapies is expected to drive market growth.
4.3 Global Neurostimulation Devices Market, Key Company Share (%), 2010

Figure 3: Neurostimulation Devices Market, Global, Key Company Share (%), 2010

<table>
<thead>
<tr>
<th>Company</th>
<th>Revenue ($m)</th>
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<tbody>
<tr>
<td>Medtronic, Inc.</td>
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<tr>
<td>St. Jude Medical, Inc.</td>
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<tr>
<td>Boston Scientific Corporation</td>
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<tr>
<td>Cyberonics, Inc.</td>
<td></td>
</tr>
<tr>
<td>Others</td>
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</table>

Source: GBI Research’s proprietary database [accessed on April 12, 2012]. Primary research interviews with marketing managers and other industry experts.

Medtronic is the dominant player in the neurostimulation devices market, with a share of XX% of the total neurostimulation devices market, followed by St. Jude Medical and Boston Scientific Corporation, with market shares of XX% and XX% of the total neurostimulation devices market respectively. Cyberonics, which specializes in VNS therapy, occupied a small market share of XX% of the total neurostimulation devices market in 2011.
5.5 Deep Brain Stimulators Market, Global, Revenue ($m), 2011-2018

Figure 9: Deep Brain Stimulators Market, Global, Revenue ($m), 2011-2018

Source: GBI Research’s proprietary database [accessed on April 12, 2012]. Primary research interviews with marketing managers and other industry experts

Table 10: Deep Brain Stimulators Market, Global, Revenue ($m), 2011-2018

<table>
<thead>
<tr>
<th>Year</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
<th>2016</th>
<th>2017</th>
<th>2018</th>
<th>CAGR (%)</th>
</tr>
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<tbody>
<tr>
<td>Deep Brain Stimulators</td>
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</table>

Source: GBI Research’s proprietary database [accessed on April 12, 2012]. Primary research interviews with marketing managers and other industry experts

The global market for DBS was worth $XXm in 2011, and is forecast to grow at a CAGR of XX% to reach $XXm in 2018. The market is expected to be driven by the recent product approval of Medtronic’s Activa SC (Single Channel) system, launched in March 2011 for the management of symptoms of Parkinson’s disease and essential tremor in the US and Europe. The product is also approved for dystonia in Europe. The company’s Activa line of products (Activa PC, Activa SC, and Activa RC) is approved for use in Canada.
### 6.2.5 Neurostimulation Devices Market, the UK, Revenue ($m), 2004-2011

**Figure 21: Neurostimulation Devices Market, the UK, Revenue ($m), 2004-2011**

![Graph showing revenue growth for different neurostimulation devices in the UK from 2004 to 2011.](image)

Source: GBI Research’s proprietary database [accessed on April 12, 2012]. Primary research interviews with marketing managers and other industry experts.

### Table 22: Neurostimulation Devices Market, the UK, Revenue ($m), 2004-2011

<table>
<thead>
<tr>
<th></th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>CAGR (%)</th>
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<tr>
<td>Spinal Cord Stimulators</td>
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<td>Deep Brain Stimulators</td>
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<td>Vagus Nerve Stimulators</td>
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<tr>
<td>Sacral Nerve Stimulators</td>
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</tbody>
</table>

Source: GBI Research’s proprietary database [accessed on April 12, 2012]. Primary research interviews with marketing managers and other industry experts.

The neurostimulation devices market in the UK grew at a CAGR of XX% between 2004 and 2011, reaching $XXm in 2011. The SCS segment was the largest segment, with revenues of $XXm in 2011. The SNS segment was the fastest growing segment, with a CAGR of XX% and revenues worth $XXm in 2011, up from $XXm in 2004.
10 Appendix

10.1 Definitions

10.1.1 Neurostimulation Devices

The neurostimulation devices market comprises devices used for the electrical stimulation of specific nerves in the body for a controlled and desired result. The devices include a pacemaker for generation of electric signal, leads and electrodes. External neurostimulators are not tracked under this market. The types of implantable neurostimulators cortical stimulators, deep brain stimulators, sacral nerve stimulators, spinal cord stimulators and vagus nerve stimulators.

10.1.1.1 Cortical Stimulators

A Cortical Stimulator (CS) is a medical device used to revive neural activity in the nervous system of critical patients by delivering an electrical shock using leads and electrode arrays implanted on the surface of the brain to induce brain activity. One unit consists of one impulse generator, lead and electrodes.

10.1.1.2 Deep Brain Stimulators

A Deep Brain Stimulator (DBS) is an impulse generating device which is implanted surgically to send electrical impulses to specific parts of the brain. It consists of an impulse generator and electrode leads. Deep brain stimulators include implantable devices with their electrodes placed in the basal ganglia for the management of movement disorders, including Parkinson's disease, dystonia, and tremor. One unit consists of one impulse generator, lead and electrodes.

10.1.1.3 Sacral Nerve Stimulators

Sacral Nerve Stimulation (SNS), also termed sacral neuromodulation, involves the implantation of a programmable stimulator under the dura mater, which delivers low amplitude electrical stimulation to the S3 or S4 root. One unit consists of one impulse generator, lead and electrodes.

10.1.1.4 Spinal Cord Stimulators

A Spinal Cord Stimulator (SCS) or Dorsal Column Stimulator (DCS) is an implantable medical device used to treat chronic pain of neurological origin. An electric impulse generated by the device near the dorsal surface of the spinal cord provides a paresthesia sensation that alters the perception of pain by the patient. One unit consists of one impulse generator, lead and electrodes.

10.1.1.5 Vagus Nerve Stimulators

A Vagus Nerve Stimulator (VNS) is an impulse generating device which is implanted surgically to send electrical impulses to the vagus nerve. It consists of an impulse generator and electrode leads. An adjunctive treatment for patients with intractable epilepsy, particularly complex partial or secondarily generalized seizures; stimulation is delivered to the left vagus nerve in the neck by a stimulator implanted in the anterior chest wall. One unit consists of one impulse generator, lead and electrodes.

10.1.2 Prevalence or Diseased Population

Prevalence population is the estimated number of people at any given point of time in a year who are affected by neurological disorders.

10.2 Sources


- FDA (2011). CareFusion NicoletOne Software Used with CareFusion Cortical Stimulator Control Unit. Available from


10.3 Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
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<tbody>
<tr>
<td>Activa PC</td>
<td>Activa Primary Cell</td>
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<tr>
<td>Activa SC</td>
<td>Activa Single Channel</td>
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<tr>
<td>Activa RC</td>
<td>Activa Rechargeable Cell</td>
</tr>
<tr>
<td>AES</td>
<td>American Epilepsy Society</td>
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<tr>
<td>AF</td>
<td>Atrial Fibrillation</td>
</tr>
<tr>
<td>ASU</td>
<td>Arizona State University</td>
</tr>
<tr>
<td>CAGR</td>
<td>Compound Annual Growth Rate</td>
</tr>
<tr>
<td>CMS</td>
<td>Centers for Medicare and Medicaid Services</td>
</tr>
<tr>
<td>CR</td>
<td>Coordinated Reset-Capable Implant</td>
</tr>
<tr>
<td>CRDM</td>
<td>Cardiac Rhythm Disease Management</td>
</tr>
<tr>
<td>CRM</td>
<td>Cardiac Rhythm Management</td>
</tr>
<tr>
<td>CRPS</td>
<td>Complex Regional Pain Syndrome</td>
</tr>
<tr>
<td>CS</td>
<td>Cortical Stimulation / Cortical Stimulator</td>
</tr>
<tr>
<td>CV</td>
<td>Cardiovascular</td>
</tr>
<tr>
<td>DBS</td>
<td>Deep Brain Stimulation / Deep Brain Stimulator</td>
</tr>
<tr>
<td>DSC</td>
<td>Dorsal Column Stimulator</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
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<tr>
<td>EEG</td>
<td>electroencephalography</td>
</tr>
<tr>
<td>EMEA</td>
<td>Europe, Middle East, Africa</td>
</tr>
<tr>
<td>FBSS</td>
<td>Failed Back Surgery Syndrome</td>
</tr>
<tr>
<td>FDA</td>
<td>Food and Drug Administration</td>
</tr>
<tr>
<td>FES</td>
<td>Functional Electrical Stimulation</td>
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<tr>
<td>GERD</td>
<td>Gastroesophageal Reflux Disease</td>
</tr>
<tr>
<td>GPI</td>
<td>globus pallidus interna</td>
</tr>
<tr>
<td>HC</td>
<td>High Capacity</td>
</tr>
<tr>
<td>HDE</td>
<td>Humanitarian Device Exemption</td>
</tr>
<tr>
<td>HGNS</td>
<td>Hypoglossal Nerve Stimulation</td>
</tr>
<tr>
<td>IPG</td>
<td>Implantable Pulse Generator</td>
</tr>
<tr>
<td>IRB</td>
<td>Institutional Review Board</td>
</tr>
<tr>
<td>M&amp;A</td>
<td>Merger and Acquisitions</td>
</tr>
<tr>
<td>MCI</td>
<td>Mild Cognitive Impairment</td>
</tr>
<tr>
<td>MDDI</td>
<td>Medical Device and Diagnostic Industry</td>
</tr>
<tr>
<td>MHLW</td>
<td>Japanese Ministry of Health, Labor and Welfare</td>
</tr>
<tr>
<td>MIT</td>
<td>Massachusetts Institute of Technology</td>
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<tr>
<td>MRI</td>
<td>Magnetic Resonance Imaging</td>
</tr>
<tr>
<td>MSAC</td>
<td>Medical Services Advisory Committee</td>
</tr>
<tr>
<td>NHS</td>
<td>National Health Service</td>
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<td>NMD</td>
<td>Neuromodulation</td>
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<td>NP</td>
<td>New Parameters</td>
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<tr>
<td>OA</td>
<td>Osteoarthritis</td>
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<td>OverActive Bladder</td>
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<td>OBH</td>
<td>Otto Bock HealthCare GmbH</td>
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<tr>
<td>OCD</td>
<td>Obsessive Compulsive Disorder</td>
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<td>PE</td>
<td>Private Equity</td>
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<td>PTSD</td>
<td>Post-Traumatic Stress Disorder</td>
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<tr>
<td>R&amp;D</td>
<td>Research and Development</td>
</tr>
<tr>
<td>SAINT</td>
<td>Subcutaneous Array of Implantable Neural Transponders</td>
</tr>
<tr>
<td>SCS</td>
<td>Spinal Cord Stimulation / Spinal Cord Stimulator</td>
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<td>SIU</td>
<td>Southern Illinois University</td>
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<tr>
<td>SNS</td>
<td>Sacral Nerve Stimulation / Sacral Nerve Stimulator</td>
</tr>
<tr>
<td>SSU</td>
<td>Stimulus Switching Unit</td>
</tr>
<tr>
<td>STN</td>
<td>Subthalamic nucleus</td>
</tr>
<tr>
<td>TBI</td>
<td>Traumatic Brain Injury</td>
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<tr>
<td>TGA</td>
<td>Australian Therapeutic Goods Administration</td>
</tr>
<tr>
<td>TRD</td>
<td>Treatment-Resistant Depression</td>
</tr>
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</table>
**10.4 Research Methodology**

GBI Research’s dedicated research and analysis teams consist of experienced professionals in marketing and market research with consulting backgrounds in the medical devices industry and advanced statistical expertise.

GBI Research adheres to the codes of practice of the Market Research Society (www.mrs.org.uk) and the Strategic and Competitive Intelligence Professionals (www.scip.org).

All GBI Research databases are continuously updated and revised. The following research methodology is followed for all databases and reports.

### 10.4.1 Secondary Research

The research process begins with exhaustive secondary research on internal and external sources being carried out to source qualitative and quantitative information relating to each market.

The secondary research sources that are typically referred to include, but are not limited to:

- Company websites, annual reports, financial reports, broker reports, investor presentations and SEC filings.
- Industry trade journals, scientific journals and other technical literature.
- Internal and external proprietary databases.
- Relevant patent and regulatory databases.
- National government documents, statistical databases and market reports.
- Procedure registries.
- News articles, press releases and web-casts specific to the companies operating in the market.

### 10.4.2 Primary Research

GBI Research conducts hundreds of primary interviews a year with industry participants and commentators in order to validate its data and analysis. A typical research interview fulfills the following functions:

- It provides first-hand information on the market size, market trends, growth trends, competitive landscape and future outlook.
- It helps in validating and strengthening the secondary research findings.
- It further develops the analysis team’s expertise and market understanding.

Primary research involves email correspondence, telephone interviews and face-to-face interviews for each market, category, segment and sub-segment across geographies.

The participants who typically take part in such a process include, but are not limited to:

- Industry participants: CEOs, VPs, marketing/product managers, market intelligence managers and national sales managers.
- Hospital stores, laboratories, pharmacies, distributors and paramedics.
- Outside experts: investment bankers, valuation experts, research analysts specializing in specific medical equipment markets.
- Key opinion leaders: physicians and surgeons specializing in different therapeutic areas corresponding to different kinds of medical equipment.
10.4.3 Models
Where no hard data is available GBI Research uses modeling and estimates in order to produce comprehensive data sets. The following rigorous methodology is adopted:

Available hard data is cross referenced with the following data types to produce estimates:

- Demographic data: population, split by segment.
- Macro-economic indicators: Gross Domestic Product, Inflation rate.
- Healthcare Indicators: health expenditure, physicians base, healthcare infrastructure and facilities.
- Selected epidemiological and procedure statistics.

Data is then cross-checked by the expert panel.

All data and assumptions relating to modeling are stored and are available to clients on request.

10.4.4 Forecasts
GBI Research uses proprietary forecast models. The following four factors are utilized in the forecast models:

- Historic growth rates.
- Macro indicators such as population trends and healthcare spending.
- Forecast epidemiological data.
- Qualitative trend information and assumptions.

Data is then cross-checked by the expert panel.

All data and assumptions relating to modeling are stored and are available to clients on request.

10.4.5 Expert Panels
GBI Research uses a panel of experts to cross verify its databases and forecasts.

GBI Research’s expert panel comprises marketing managers, product specialists, international sales managers from medical device companies; academics from research universities, KOLs from hospitals, consultants from venture capital funds and distributors/suppliers of medical equipment and supplies.

Historic data and forecasts are relayed to GBI Research’s expert panel for feedback and adjusted in accordance with this feedback.
10.6 Disclaimer

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