Model-based optimization of spinal cord stimulation parameters

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Value Proposition

Spinal cord stimulation (SCS) is an FDA approved therapy for treating chronic lower back and limb pain. SCS is based on the gate control theory of pain, where an implanted pulse generator delivers electrical pulses to an electrode array placed in the epidural/extradural space. This electrical generation inhibits ascending projection neurons in the dorsal column of the spinal cord conveying pain information to the brain by activating cutaneous Ab fibers in the dorsal root (DR). Successful SCS depends on selective activation of dorsal column fibers without activating mixed fibers in the DR, thereby producing unintended effects. However, the optimal approach of selectively activating dorsal column fibers has not been achieved. A novel SCS technology to address this issue would enter a growing global neurostimulation market for chronic pain expected to reach nearly $2.9B in 2018.

Technology

This technology encompasses a novel computer implemented method, based on patient-specific computational modeling, to select stimulation parameters in SCS. The inventors' previously developed and validated a computational model of SCS that closely predicts the stimulation thresholds measured intraoperative during surgery in human subjects. The current technology claims how to use that model for optimal parameter selection during SCS. Specifically, thisnprocess is accomplished through proprietary model-based optimization using a rigorous mathematical approach with a defined cost function. This approach is in contrast to traditional trial-and-error experimentation. This technology is expected to reduce the time required to select appropriate parameters for effective treatment and to increase its efficacy.

Advantages

- Patient-specific approach to parameter selection for SCS
- Rigorous, novel computational approach to increase treatment efficacy
- Reduces time required to select appropriate parameters