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Deep Brain Stimulation Settings Optimization Algorithm (20150160, Dr. Matthew Johnson)

Technology No. 20150160

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Aids Current Steering to Electrode Arrays

A unique algorithm quickly and accurately determines optimal stimulation settings for deep brain stimulation (DBS) electrode arrays. The algorithm generates a patient-specific “grid,” representing a target tissue to be activated, by compiling brain geometry and lead-specific geometry data. It then determines a maximum activation function value for each point on the grid and uses an optimization method to calculate optimal stimulation settings for each electrode on the DBS array. By steering current through a deep brain stimulation array (DBSA), clinicians may be able to more effectively treat symptoms of Parkinson’s disease, essential tremor, dystonia, severe obsessive compulsive disorder and other neurological and neuropsychiatric disorders.

Patient-Specific Stimulation Settings

Standard DBS leads, which effectively treat disorders like Parkinson’s disease and essential tremor, consist of only four electrodes. A DBSA, however, may a higher number of electrodes arranged along and around one or more DBS leads. While having more electrodes vastly increases current steering capability, it also presents new programming challenges. Conventional programming methods using clinical exams are often tedious and long in duration and do not take the unique structure of a patient’s brain tissue into account. Other computational modeling approaches require vast computational resources that a clinical setting may not have. This new optimization algorithm surpasses these obstacles by providing quick, patient-specific stimulation settings and recognizing that therapeutic “hot spots” may differ from patient to patient.

BENEFITS AND FEATURES OF OPTIMIZATION ALGORITHM FOR PROGRAMMING DEEP BRAIN STIMULATION ELECTRODE ARRAYS:

- Programming can be completed in less than an hour
- Based on individual patient brain geometry data and lead geometry data (e.g., from MRI or CT scans)
- Simple to implement and use
- Patient specific vs. consulting databases of accumulated patient data

Phase of Development Proof of concept

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