

## **An optimization method for spinal cord stimulation electrodes**

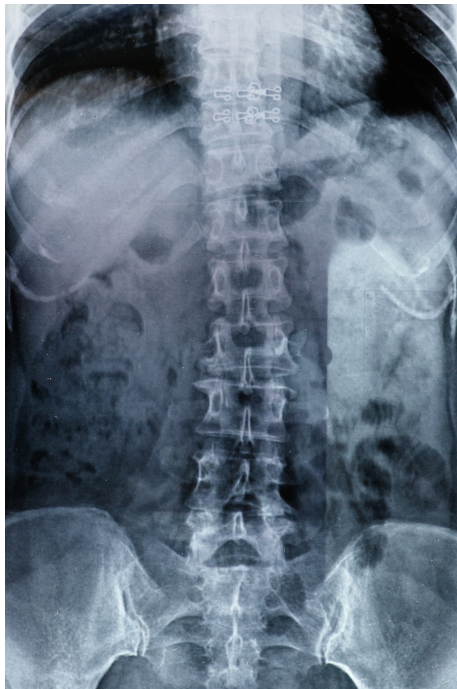
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### **Unmet Need**

Spinal cord stimulation is a trusted and proven treatment for patients with chronic pain, and spinal cord stimulator devices are implanted in 34,000 patients a year. Electrical stimulation is delivered via an implanted device along the spinal cord. Each patient may achieve remission of chronic pain symptoms with different parameters of electrical stimulation, such as the power level, frequency, and location of stimulation along the spine. These parameters can be modulated by reprogramming the device, but there are millions of possible stimulation patterns, and the process of finding effective parameters requires trial-and-error and a rigorous testing period before permanent implantation. This process may delay the delivery of effective pain management or leave the patient with sub-optimal treatment altogether, known as poor pain coverage. Therefore, there is an unmet clinical need for a fast and accurate method of optimization of these parameters to increase the efficacy of treatment and reduce the amount of time the patient suffers from pain due to device reprogramming during the trial period.

### **Technology**

Duke inventors have reported a method to select stimulation parameters and the optimal placement location for spinal cord stimulator implants. This technology is intended to be adapted into existing spinal cord stimulation devices and used by physicians to improve the therapeutic benefit for patients. The optimal parameters are determined before implantation using patient scans and modeling the interactions between an electroanatomic model of the patient and the electrodes of the spinal cord stimulator. This technology has been demonstrated by predicting



#### Duke File (IDF) Number

IDF #:T-004254

#### Patent Information

Patent #: 10,096,386  
Patent Title: SYSTEMS AND METHODS FOR MODEL-BASED OPTIMIZATION OF SPINAL CORD STIMULATION ELECTRODES AND DEVICES  
Country United States of America

#### Meet the Inventors

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Biomedical Engineering (BME)

#### Publication(s)

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#### External Link(s)

- [Issued US Patent 10,096,386](#)
- [Issued US Patent 10,576,271](#)

stimulation thresholds for five patient-specific models of spinal cord stimulation. The stimulation thresholds predicted by the model were compared to stimulation thresholds measured intraoperatively and achieved increased stimulation efficiency and reduced the power required to stimulate dorsal columns by more than 90%.

### Advantages

- Improves quality of therapeutic effect delivered by device by providing a patient-specific electrical stimulation pattern
- Reduces the amount of trial-and-error in programming stimulation after implantation, saving time for the physician and delivering optimal results to the patient faster
- Predicts the optimal location of the implant before surgery, reducing the need for corrective surgery
- Improves power efficiency of spinal cord stimulator implants, increasing the amount of time before recharging the device and potentially reducing the volume of future stimulators

