Closed-Loop Neuroprosthetic Microstimulation Device for Treating Epileptic Seizures

Published date: May 14, 2019

Technology description

Delivers Controlled Therapeutic Stimulation to Specific Neural Pathways According to Seizure Strength and Duration

This closed-loop neuroprosthetic microstimulation device treats epileptic seizures. Epilepsy is the third most common neurologic disorder, affecting nearly 2.7 million Americans and causing 200,000 new cases every year. Annual healthcare and workplace-related costs due to epilepsy total nearly $12.5 billion, which makes it one of the most costly neurologic diseases. Because the incidence of epilepsy increases as people age, the U.S. population will see more cases of epilepsy due to the rapidly expanding number of elderly Americans. The standard therapy for epilepsy is anti-epileptic drugs. However, these drugs cause side effects, and about one-third of all patients remain unresponsive to available anti-epileptic medications.
Researchers at the University of Florida have created a neuroprosthetic device that interacts with the brain to identify abnormal brain electrical activity and deliver timed specific levels of therapeutic stimulation that treat epileptic seizures before they occur. The device responds to changes in a patient’ s condition to deliver rapid, targeted stimulation with intensity and duration suitable for each seizure.

Technology

Whereas anti-epileptic drug treatments cannot respond to changes in a patient's condition, this invention measures microscopic brain electrical activity, interprets the information, and delivers appropriate therapy via a "closed-loop" electronic signal. Compared to drug therapies, electrical stimulation of this type offers rapid dosage delivery to specific neural pathways. Though other neuroprosthetics are available, they deliver large-scale stimulation of predetermined strength and duration, regardless of the strength and duration of the seizure. This lack of control creates many of the same challenges associated with drugs, and the lack of specificity may result in excessive or insufficient delivery of an electrical stimulus. The closed-loop neuroprosthetic device invented here measures brain activity on the single neuron level and delivers therapeutic microstimulation that maintains or modifies

the dosage as needed. Because of this patient-specific adaptability, this invention delivers a stimulus of strength and duration appropriate to control abnormal neural activity and seizure.

Application area

Neuroprosthetic device that prevents and treats epileptic seizures

Advantages

Responds to individual abnormal neurons rather than global markers of seizure, increasing the overall effectiveness of the therapy over that of anti-epileptic medications
Provides treatment specific to each epileptic seizure, ensuring suitable therapy for individual patients
Proactively treats epilepsy and similar disorders, delivering therapeutic stimulation to the brain before the seizures occur

Institution

University of Florida

Inventors

Justin Sanchez
Associate Professor
BIOMEDICAL ENGINEERING
Paul Carney
Professor and Director of Pediatric Neurology
Neurology

联系我们

叶先生

电 话：021-65679356

手 机：13414935137

邮 箱：yeyingsheng@zf-ym.com