Microelectrode Stimulation for Treatment of Epilepsy

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Technology description

Technical Summary

Epileptic seizures are characterized by the paroxysmal, synchronous discharge of large neuronal populations. The electroencephalogram (EEG) has been used for decades to measure the electric field induced by the seizures and has shown that burst of extracellular action potentials (EAPs) are characteristic of epileptic neurons in cell culture, epileptic tissuein vitro, animal models of epilepsy, as well as in the human epileptic brain. To treat intractable focal-onset epileptic seizures, Emory inventors have developed a novel approach in which electrical stimulation - continuously delivered by low voltage and low frequency to the epileptic focus through arrays of microelectrodes - is tuned to maintain neural activity in a range from which epileptic seizures cannot arise.

The inventors have been successful in suppressing epileptiform bursts of actions potentials in a cell culture model using this method. Results from the study showed that electrical stimulation of the cultures was able to prevent seizures from arising, rather than attempting to terminate seizures after they appeared.

The current invention maybe an improvement on deep brain stimulation (DBS) for several reasons because the required electrodes are smaller in size and one can use lower frequency than those used in DBS.

Application area

Treatment of intractable, drug resistant, focal-onset epileptic seizures

Along with being used for treatment of epileptic seizures, this invention may be of significant use in the treatment of other neurological disorders including Parkinson's disease, clinical depression, and Tourette's syndrome.

Advantages

Method prevents seizures as opposed to aborting them after onset.

Low voltage, low frequency microstimulation continuously applied to prevent seizures.

Institution

Emory University

Inventors

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SOM: Neurosurgery: Admin