Method of treating Parkinson's Disease and other movement disorders

Duke LICENSING & VENTURES

Value Proposition

Parkinson's Disease (PD) is one of the most prevalent neurodegenerative disorders. PD results from the death of dopamine neurons in the brain located in the substantia nigra pars compacta. This loss produces motor symptoms including rigidity, resting tremors, gait disturbances, and an inability to engage in voluntary sensorimotor behaviors. Currently, dopamine replacement therapy with levodopa is the most widely accepted pharmacological treatment for PD. Chronic use of levodopa, however, leads to long-term complications and reduced efficacy. In fact, a large percentage of patients become unresponsive to the drug after just a few years. The most common alternative to dopamine replacement therapy is direct electrical stimulation of deep brain areas, such as the nuclei of the basal ganglia and thalamus. Known as deep brain stimulation (DBS), this invasive procedure permits the reduction of dopaminergic medication, thus minimizing the long-term side effects associated with pharmacotherapy. Unfortunately, the success of DBS depends on surgical accuracy of targeting deep brain nuclei chronically and is associated with serious complications.

Technology

The invention encompasses a novel neurostimulation method for disrupting the type of pathological synchronous activity observed in the brain of PD patients, as well as other neurodegenerative movement disorders. Different from DBS, this method requires either minimally invasive or non-invasive stimulation of peripheral cranial nerves. The invention involves using chronically implanted peripheral nerve cuff electrodes, stimulators of the spinal cord, or electrical stimulators applied to the skin surface to generate an innocuous electrical stimulation of the trigeminal or vagus nerve. This stimulation is capable of disrupting aberrant synchronous neural activity caused by PD in higher motor brain centers, including motor cortex and nuclei of the basal ganglia. By disrupting this synchronous neural activity, the inventors intend to produce continuous relief of the motor symptoms experienced by PD patients. The inventors have *in vivo* electrophysiology data demonstrating the effectiveness of their novel neurostimulation methods, showing that electrical stimulation of peripheral nerves and the spinal cord restores locomotion in dopamine depleted rats.

Advantages

- Novel minimally invasive and non-invasive stimulation methods to treat movement disorders.
- Larger addressable market than current DBS technologies due to DBS often being restricted to patients in late stages of PD.

Duke File (IDF)

T-002837

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Patents

Patent Number: 9,943,687

Title: METHOD OF TREATING PARKINSON'S DISEASE AND OTHER MOVEMENT DISORDERS

Country: United States of America