Computational Algorithms for Identifying, Suppressing and Reversing Epilepsy

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The Wisconsin Alumni Research Foundation (WARF) is seeking commercial partners interested in developing a new treatment that identifies epileptogenic conditions and then suppresses and reverses epileptogenesis.

Overview

Epileptogenesis, or the occurrence of spontaneous seizures, is considered to be a learned response due to brain plasticity. The development of the condition requires circuits in the brain to possess three conditions: (1) neuronal hyperexcitability, (2) overconnectivity in space and (3) overconnectivity in time.

Current techniques using electrical stimulation for the treatment of epilepsy target only neuronal hyperexcitability, but do not consider other patterns of neural activity. It also is unclear why any of these methods work, and therefore it is impossible to optimize these methods aside from a trial-and-error approach. A method using a logical framework that provides parameters to be monitored and algorithms for monitoring is needed to achieve optimal treatment.

The Invention

UW-Madison researchers have developed a protocol that accounts for each of the conditions required for the development of epileptogenesis and determines a treatment to reverse, or "unlearn," epilepsy. Because this protocol addresses factors in addition to neuronal hyperexcitability, it may prove more effective than current methods.

The new technique involves acquiring and analyzing neural activity data from a subject to determine epileptic patterns based on neuronal hyperexcitability, spatial connectivity and temporal connectivity. Treatment using an electrical stimulus then is focused based on the determined patterns and administered to the subject.

Applications

- Designing through logic an optimal protocol for a single individual or condition, as opposed to a trial-and-error approach
- Identifying and reducing a risk of epilepsy based on factors related to brain plasticity as well as neuronal hyperexcitability

Key Benefits

- Addresses two key conditions of neural circuits leading to epileptogenesis that are not included in any current method
- Provides a logical framework to optimize treatment based on individual patterns and response

Additional Information

For More Information About the Inventors

- David Hsu

Tech Fields

- Medical Devices : Diagnostics & monitoring tools
- Medical Devices : Neurological devices

For current licensing status, please contact Jeanine Burmania at jeanine@warf.org or 608-960-9846