Closed-Loop Stimulation Device for Enhancing Motor Function After Stroke

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Technology description

UCSF investigators have developed a closed loop stimulation neural interface device to restore function and reduce disability after stroke for patients with moderate impairment. "Closed-loop" stimulation (CLS) directly targets and enhances specific patterns of neural activity, coupling electrical stimulation to task-based brain activity. UCSF researchers have identified neural activities associated with motor learning and function and have generated algorithms to target and enhance stimulation. Using a rodent model of stroke, researchers have shown that their CLS technique generates improved forelimb reaching function after stroke.
This novel brain stimulation device enhances motor function after stroke by modulating the neural network to be more excitable in a task-dependent manner.

Advantages

Stroke is the leading cause of motor disability in the United States, affecting over 700,000 patients each year. While there have been important strides taken towards optimizing rehabilitation, a substantial proportion of patients continue to experience significant disability. Therefore, it is critical to develop novel technologies to improve motor function after stroke.
Although otherneuromodulatory techniques (tDCS: transcranial direct current stimulation, TMS: transcranial magnetic stimulation, ECS: epidural cortical stimulation, PNS: peripheral nerve stimulation) have shown some promise in promoting motor learning and recovery, results have been inconsistent and marginal. Importantly, these techniques use an 'open-loop stimulation' design where the electric stimulation is continuously turned on for an extended period of time. As a result stimulation is uncoupled to behavior and is unsuited for task-based function.

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