**Docket #:** S17-270

# Safe and efficient vibrotactile multi-channel stimulation for the treatment of brain disorders

Stanford researchers have developed a non-invasive, vibrotactile stimulation device and procedure to safely and efficiently treat brain disorders characterized by abnormal neuronal synchrony such as Parkinson's disease, epilepsy, and dysfunction after stroke. The multi-channel stimulation proposed is favorably delivered to the fingertips. However, it can also be applied to other parts of the hand and, in general, to other parts of the body. This new treatment can induce long-lasting, sustained therapeutic effects that outlast cessation of stimulation, so that a few hours of stimulation delivered regularly or occasionally may provide substantial relief.

First in man study showed promising preliminary results. The recently published paper is listed below.

**Figure**

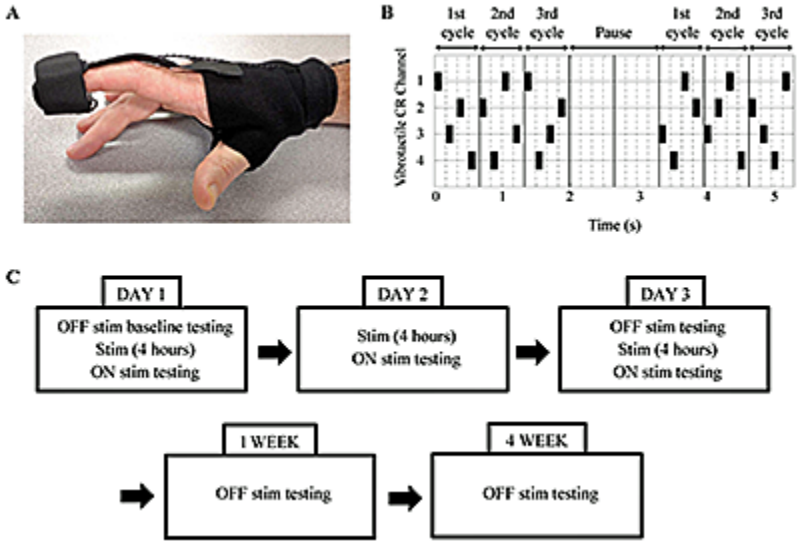



**Figure description -** (A) An example of a vibratory stimulator that patients wore on their hands in order to receive the stimulation. (B) The vibrotactile CR stimulation

pattern consisted of 3 consecutive cycles with randomized sequences of four equally spaced vibratory bursts, followed by two silent cycles off stimulation (“pause”). The 3 cycles on, 2 cycles off pattern was repeated periodically. (C) Protocol schedule diagram for the four patients who were off medications for all visits.

**Stage of Research**

- A first in man study based on vibrotactile coordinated reset stimulation (CRS) completed. CRS consists of spatiotemporal sequences of stimuli delivered to different sites in the brain.
- It is believed to be the first demonstration that vibrotactile CRS is safe and tolerable and improves gait and bradykinesia in Parkinson's disease.
- Moreover, there was still improvement one and four weeks after stimulation was stopped, suggesting a cumulative and long-lasting effect of the stimulation.

**Related Technologies:**
23-357: Apparatus for efficient vibrotactile stimulation, especially vibrotactile fingertip stimulation
23-359: Apparatus for efficient vibrotactile and electrotactile fingertip stimulation
23-360: Apparatus and method for efficient long-term multi-channel non-invasive stimulation for the treatment of disorders of the nervous system
23-373: Apparatus and method for efficient multichannel vibrotactile stimulation with compound pulses
23-406: Apparatus and method for efficient combined vibrotactile and electrotactile stimulation for the therapy of disorders of the nervous system
23-407: Apparatus for efficient electrotactile fingertip stimulation for the treatment of disorders of the nervous system
23-408: Apparatus and method for efficient wireless synchronization of multi-site non-invasive stimulation for the treatment of disorders of the nervous system
23-409: Method and apparatus for autonomous parameter adaptation of non-invasive multichannel stimulation

# Applications

- **Treatment of brain disorders** characterized by abnormal neuronal synchrony such as Parkinson's disease, epilepsy, dysfunction after stroke, and movement disorders (e.g. essential tremor, dystonia)

## Advantages

- This new device **is easy-to-develop, easy-to-test, and easy-to-implement**
- **Non-invasive**, thus avoiding risks associated with invasive treatments such as deep brain stimulation.
- **No medication administered**, thus eliminating side effects of medication
- **Treatment is favorably delivered to fingertips** but can be applied to other parts of the body.
- **Low risk with low costs**
- **Long lasting relief/benefits**
- **Superior efficacy and safety**

## Publications


- Tass P A (August 02, 2017) "Vibrotactile Coordinated Reset Stimulation for the Treatment of Neurological Diseases: Concepts and Device Specifications. " Cureus 9(8): e1535.


## Patents

- Published Application: 20210401664

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