Dysphagia Rehabilitation (Swallowing Recovery): Vibro-Tactile Stimulation Device and Method for Motor Control Recovery

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Technology description

Summary

Available for licensing and/or commercial development under a scientific collaboration, are device and method patents for volitional swallowing with a substitute sensory system. The inventions are potentially applicable to a wide variety of indications, including recovery post-stroke and post ex-tubation for example, after coronary bypass surgery. The device is being tested in dysphagic patients in two, on-going clinical trials at the National Institutes of Health. A collaborator or licensee is needed to support further clinical trials, validation studies, and final package development.

Device:

For the device patent, upon activation a vibrator moves and vibrates the larynx. Patients can initiate sensory stimulation immediately prior to the patient's own initiation of a swallow. Specifically, the device allows the patient coordinate muscular movement with a button press to permit volitional swallowing. The device can also include a movement sensor for monitoring pressure on the patient's larynx and a swallowing detector. The swallowing detector includes a piezoelectric stretch receptor and a stimulator, coupled to the movement sensor, for applying pressure to a patient's larynx prior to swallowing. The device can also be used to automatically trigger and retrain swallowing to prevent aspiration pneumonia post stroke or post extubation.

Method:

For the method patent, the instant device has also been claimed in a patent application asserting rights for improving voluntary initiation of swallowing in neurologically impaired patients. Swallowing recovery alleviates the risk of aspiration by augmenting volitional control using a simultaneous motor act (e.g., such as pressing a button to indicate when they are ready to swallow). It is believed that such motor training also initiates sensory stimulation, immediately preceding the motor act, and that such sensory stimulation enhances excitation of a central pattern generator in the brain stem that augments the volitional control of swallowing. This principle is applicable to other neurological impairments; their

associated enhancement of voluntary motor act control by the patient initiating immediately concurrent and related sensory stimulations. Neurological impairments that are contemplated include reflex actions involving interactions between afferent and efferent paths (at the spinal cord or in the brain stem) as well as higher order interactions. This invention includes methods for treating neurologically impaired humans using devices such as those that produce vibratory stimulation, pressure stimulation, auditory stimulation, temperature stimulation, visual stimulation, olfactory stimulation, taste stimulation, or a combination of these. Combinations of two or more stimulation types are particularly useful. For example, the combined use of button press training with simultaneous vibratory and pressure stimulation on the neck to augment feedback to the brain stem swallowing centers to facilitate voluntary control of swallowing (thought to be largely an involuntary brain stem function) is particularly useful for treating dysphagic patients. Alternatively automatic cycles of stimulation at intervals during the day can be used for intensive retraining of swallowing post stroke or post-extubation to prevent aspiration.

Institution

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