Safe And Targeted Electric Stimulation Of The Human Cranial Nerves

Tech ID: 26010 / UC Case 2016-332-0

BRIEF DESCRIPTION

Neuromodulation (electrical stimulation of the nervous system) is used in cochlear and retinal implants, or deep brain stimulation devices to treat various neurological disorders (i.e. depression, Parkinson’s Disease). However, such approaches tend to be invasive and expensive.

Researchers at UCI have developed a novel approach and device to stimulate the cranial nerves that is targeted, safe, and minimally-invasive for the treatment of diseases or the activation of senses.

FULL DESCRIPTION

Neuromodulation, or electrical stimulation of the nervous system, is an effective method by which to restore sensory functions. For example, cochlear and retinal implants utilize this technology to assist in hearing and vision, respectively. Additionally, deep brain stimulation through implantable devices is effective in treating multiple neurological disorders, such as depression and Parkinson’s Disease. However, such devices are not only expensive for the patient and the healthcare system, but also require invasive surgery. On the other hand, surface-mounted electrode stimulation is a non-invasive technique, but prolonged use may be unsafe, as the stimulation sources may cause undesired tissue growth or even damage.

Researchers at UCI have developed a novel device and method for providing electronic stimulation of the cranial nerves that avoid the pitfalls of current techniques. This innovative technology has two key features:

1.) charge-balanced electrical stimulation, which is safer to use long-term, and
2.) specifically chosen electrode sites that maximize effectiveness and ability to target specific nerves, while minimizing widespread side effects.

This device has been developed specifically to treat tinnitus, a condition wherein people hear a constant ringing in the ears, but also has applications ranging from treating a number of neurological diseases to recreational use in virtual reality and gaming systems.

SUGGESTED USES

1. Tinnitus treatment/management
2. Virtual realities, video games
3. Treatment for nausea in virtual reality equipment

ADVANTAGES

§ Wide range of uses, from medical devices (treatment of neurologic disease) to commercial applications (video games)
§ Less costly and invasive than other neuromodulation devices
§ Safe electric stimulation long-term by using charge-balanced current sources
§ Focused and targeted stimulation maximizes effectiveness
§ Minimal side effects

PATENT STATUS

Patent Pending

STATE OF DEVELOPMENT

Prototype developed, safety and technical feasibility established, tested in healthy (non-impaired hearing) subjects and individuals with tinnitus

§ Capable of evoking auditory sensation
Ongoing studies testing electrode sites for hearing devices
Currently investigating light stimulation methods

RELATED MATERIALS

» Tinnitus treatment with precise and optimal electric stimulation: opportunities and challenges - 10/01/2015