Novel Neuromodulation Devices for Chronic Pain, Sleep-Related Respiratory and Blood Pressure Disorders

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OTHER INFORMATION

KEYWORDS

Neuromodulation, migraine, sleep apnea, neuropathic pain, chronic pain, medical device

CATEGORIZED AS

- **Medical**
  - Devices
  - Disease: Cardiovascular and Circulatory System
  - Disease: Central Nervous System
  - Disease: Respiratory and Pulmonary System

RELATED CASES

2014-299-0

SUMMARY

Dr. Ron Harper, a Distinguished Professor of Neurobiology at UCLA, and colleagues have developed novel neuromodulation devices and methods for treating chronic migraine pain, obstructive sleep apnea, and other cardiovascular and respiratory disorders.

BACKGROUND

The Center for Disease Control (CDC) estimates that about 70 million individuals in the U.S. suffer from chronic sleep loss and sleep disorders. Numerous health problems have been associated with sleep loss, such as obesity, depression, cognitive impairments, and cardiovascular risk. Specifically, obstructive sleep apnea (OSA) is the most common form of sleep-disordered breathing. Continuous positive airway pressure devices are a major and growing segment of OSA treatments, but have extremely poor patient compliance rates and significant side effects, including facial bone distortion. Globally, the sleep apnea devices market reached $7 billion in 2010, and both the global and U.S. markets are expected to grow rapidly (~8% CAGR) through 2017.

Migraine and chronic migraine headache have estimated market sizes of $4 billion and $5 billion, respectively. Approximately 18% of American women and 6% of men suffer from migraine, and the migraine drug market is estimated at $3 billion. Pain management devices have been a growing segment (4.3% CAGR) of the greater pain management sector ($35.4 billion).

INNOVATION

Dr. Ron Harper, a Distinguished Professor of Neurobiology at UCLA, and colleagues have developed novel neuromodulation devices and methods for treating chronic migraine pain, obstructive sleep apnea, and other cardiovascular and respiratory disorders. The technology developed by Dr. Harper's team employs non-invasive, non-pharmacological stimulation of specific neural pathways involved in each condition. The devices have been prototyped and are portable and customizable to a patient's anatomy. The devices have also been designed to allow control and data integration with personal wireless devices. Dr. Harper's group has initiated studies in human patients and established preliminary efficacy for the conditions of chronic migraine pain and sleep disruption. Patients have reported significant improvement in pain intensity or a complete abrogation of pain following a short intervention with the device.

The device is non-invasive (Class II) and integrates stimulation controls through a customized software application that is enabled from a personal mobile device. Preliminary data suggests the device may also be useful for treating other types of neuropathic pain, including trigeminal neuralgia, other chronic pain syndromes, and surgical-, dental-, or trauma-associated pain.

APPLICATIONS

- Chronic migraine pain
- Trigeminal neuralgia
- Chronic pain syndromes
- Surgical-, dental-, or trauma-associated pain
- Other types of neuropathic pain
- Obstructive sleep apnea
- Other cardiovascular and respiratory disorders

ADVANTAGES

- Non-invasive
- Non-pharmacological
- Customized software application on mobile device

PATENT STATUS

Country	Type	Number	Dated	Case
United States Of America	Issued Patent	11,471,372	10/18/2022	2014-299
Belgium	Issued Patent	3071279B	09/08/2021	2014-299
Switzerland	Issued Patent	3071279B	09/08/2021	2014-299

Germany	Issued Patent	3071279B	09/08/2021	2014-299
France	Issued Patent	3071279B	09/08/2021	2014-299
United Kingdom	Issued Patent	3071279B	09/08/2021	2014-299
Netherlands (Holland)	Issued Patent	3071279B	09/08/2021	2014-299
United States Of America	Issued Patent	10,045,907	08/14/2018	2014-299

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