Development of Epilepsy Focused Medical Devices

Published date: Aug. 24, 2016

Technology description

Using an advanced mouse model for Dravet syndrome to develop and test medical interventions for treatment-resistant epilepsy

Technology Overview

Dravet syndrome is a severe, life-threatening form of epilepsy that starts in infancy and presents with an array of co-morbidities besides seizures. These include sleep disorders, ataxia, cognitive dysfunction, and in some case, a phenomenon known as sudden unexpected death in epilepsy (SUDEP). Close to 30% of epilepsy cases, including those associated with Dravet, are resistant to treatment through traditional medication regimens, making it imperative to better understand the pathways involved in these diseases to improve outcomes for epileptic patients.

In an effort to mitigate symptoms and SUDEP rates in patients afflicted with treatment resistant epilepsy, Dr. Kalume is interested in developing and testing implantable devices to predict, monitor, and disrupt seizure activity. One such device could be designed to suppress bradychardia and maintain normal heart function during an epileptic seizure through vagus nerve suppression (a variant of the current vagus nerve stimulation technology) or via a modified cardiac electronic pacemaker. Another device is an intracranial implant that identifies early signs of seizure onset and responds with electrical stimulation to disrupt the progression of an attack.

Dr. Kalume and his collaborators at the University of Washington have developed a mouse model of Dravet syndrome that closely mirrors the primary symptoms and co-morbidities of human patients. It is known that the syndrome is caused by mutations in SCN1A, a gene that produces the sodium channel NaV 1.1. A further feature of Kalume’ s mouse model that makes it ideal to investigate Dravet syndrome is that seizures can be reliably triggered following acute increases in body temperature. This allows a high control of test conditions when new medications or treatments are being investigated. Kalume hopes to use these animal models and his expertise on Dravet syndrome pathology to aid in the further development of epilepsy focused medical devices.

Institution

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