

Epilepsy Treatment: Vagus Nerve Stimulation

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BME 281 First Presentation, November 12, 2013 <sakounphom@gmail.com>

Abstract—Approximately 1 in 26 Americans will develop Epilepsy at some point in their lifetime. Despite intensive drug therapy, the number of patients with uncontrollable epilepsy is still high. The method of vagus nerve stimulation is a relatively new treatment for this chronic neurological disorder.

I. INTRODUCTION

Epilepsy is a condition that affects nearly 50 million people worldwide, including approximately 3 million Americans. It is defined to be a group of chronic neurological disorders best characterized by recurrent seizures. There is currently no cure for epilepsy, but there are various forms of treatment. Some common forms of treatment include antiepileptic drug therapy, surgery, a high-fat, low-carb plan known as the Ketogenic diet, and a relatively new form of treatment—vagus nerve stimulation. The method of VNS therapy was FDA approved for epilepsy treatment in 1997, and is known to be the first FDA approved device for treatment of epilepsy.

II. METHODS

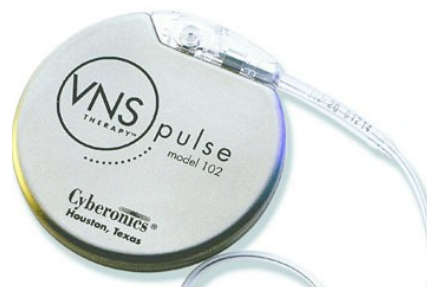
A VNS device is characterized by a flat, round battery about the size of a silver dollar. This “pacemaker”-like device is implanted under the skin on the chest wall, where a wire runs from it to the vagus nerve on the neck. After implantation, the stimulator sends mild pulses of electrical energy to the brain via the vagus nerve. A computer is used to generate the pulses of electricity at regular intervals, usually about thirty seconds for every five minutes, depending on the patient’s tolerance.



III. RESULTS

The response rate of Vagus Nerve Stimulation therapy for a patient can be comparable to trying different antiepileptic drugs to prevent seizure onset. Studies have shown that about one-third of patients have had the number of their seizures reduced by 50% or more. The other two-thirds of patients who have undergone VNS therapy have either shown little

benefit, with seizure frequency reduced by less than half, or even no worthwhile benefit at all. Still, less than 5% of these patients actually become seizure-free.



IV. DISCUSSION

Epilepsy is a serious neurological disorder that has afflicted humans since the dawn of our species. To this day, there is still no cure. Some advantages of undergoing VNS therapy include a decrease in seizure severity or a significant reduction in the frequency of one’s seizures. However, there are many risks involved in undergoing this therapy. Some disadvantages include risks to the vagus nerve or nearby blood vessels and risk of infection/bleeding. Total elimination of seizures after VNS treatment is rare, and it may not work for everyone. Patients have also exhibited signs of coughing, throat pain, and shortness of breath. Many patients have to continue the use of antiepileptic drugs after VNS treatment.

Despite the various forms of treatment, including VNS therapy, up to 25% of the 50 million people with epilepsy around the world are still unable to control their seizures with the currently available forms of medication/treatment. In the future, researchers hope to develop new forms of anti-seizure devices. To ensure the success of epileptic treatments, it is important to consider the questions of how to define a seizure, what exactly can cause one, and how it can be stopped.

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