Vagus Nerve Stimulation for Treatment of Rheumatoid Arthritis

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Abstract—Discusses a method of utilizing the nerve pathways in the body to inhibit rheumatoid arthritis, an inflammatory disease, that effects millions of people daily.

I. INTRODUCTION

Rheumatoid arthritis is a chronic inflammatory disease that effects 1.3 million Americans. It is caused by inflammation in the synovial membrane in joints which leads to severe discomfort and limited mobility. Scientists had made advancements using nerve stimulation to treat epilepsy and depression but they wanted to see if they could use it to treat other parts of the body. After discovering that by stimulating the vagus nerve they can reduce the production of tumor necrosis factor (TNF), a cytokine that causes the inflammation responsible for rheumatoid arthritis.

II. METHODS

To stimulate the vagus nerve scientists needed to surgically implant a stimulator into the patient. There are two parts, a disk generator and a subcutaneous lead with helical electrons that contact the vagus nerve. The pulse generator is inserted into the chest of the patient and then the subcutaneous lead goes toward the neck to contact the vagus nerve.

The pulse generator has a lithium thionyl chloride battery which allows it to send out the quick pulses to the vagus nerve most effectively. In the trials the scientists controlled the pulses released by the generator.

III. RESULTS

After using a control to prove that TNF is significantly reduced due to vagus nerve stimulation it was applied to rheumatoid arthritis patients. After receiving up to four stimulations for a period and then stopping the stimulations, the patients’ blood was tested and after stimulations the TNF level was significantly lower than before. After stopping treatment, the swelling returned and sometimes worse than before. Below is one of the diagrams that shows how the DAS28-CRP, which is how to measure the effects of rheumatoid arthritis depending on number of joints effected and severity, decreased throughout the study.

IV. DISCUSSION

Due to these clinical trials, it was shown that vagus nerve stimulation can help better the lives of patients suffering from rheumatoid arthritis. The implantable stimulator has been approved by the FDA to be used in patients suffering from epilepsy and depression and hopefully this device will be expanded to rheumatoid arthritis patients in the near future. Some limitations would be the accessibility of the implant and with any operation there is always risk. This method of treatment has the capacity to help so many patients suffering from rheumatoid arthritis and because of the development involving the inhibition of TNF this can possibly be applied to other inflammatory diseases like Crohn’s disease. With the knowledge of how this nerve effects the rest of the body there is a promising future for this treatment method that spans beyond rheumatoid arthritis.

REFERENCES


