A Pacemaker For Your Brain

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Abstract—Scientists have come up with ways to introduce artificial implants in the brain. These artificial implants in the brain produce electrical signals to normalize the electrical activity within the brain.

I. INTRODUCTION

MODERN medicine has overcome many problems that have arisen throughout history. Even with the advancements made, there will still be problems arising. For example, epilepsy, Parkinson’s disease, and even depression have all been studied throughout the years. Drugs have been found, over the years, to help cope with the affects or even slow down the on set of the degenerative diseases. Recently there have been many technological advances in medical devices that have the ability to “fix” the electrical rhythms in the brain, much like a pacemaker for the heart except for your brain.

II. METHODS

Brain pacemakers are medical devices that are surgically implanted into the brain. Wires are then implanted carefully into the brain so that the procedure does not do more damage to the brain, than what it was to solve. Due to the multitude of usages for the brain pacemaker, the locations at which the electrodes and wires are placed in the brain will vary depending on what is being treated in the patient. The pacemaker can also be planted outside of the brain on or near the spinal cord, around cranial nerves, or even peripheral nerves.

As of today, the brain pacemakers have been used to prevent/treat Parkinson’s disease, depression, epilepsy, anorexia, and much more.

III. RESULTS

Scientists and doctors have made the techniques, installation, and equipment more efficient over the years. In addition to technological advances, the advances have led to treat/prevent diseases all together. For example, in Canada doctors and scientists treated six people with the Deep Brain Stimulation (DBS) technique for anorexia. However, the purpose was to test the safety of the procedure rather than the effectiveness. Even with that in mind, three of the six patients did in fact come back with a body mass index greater than measured before. In regards to epilepsy, the implantation of pacemakers in the brain may control or eliminate seizures with programmed stimulation to targeted parts of the brain.

IV. DISCUSSION

Even though use of pacemakers for the brain is one of the newer concepts in Biomedical Engineering, I can see much promise for it in the future. The technology is at our fingertips since we do have pacemakers already used for the heart. This is a major design tradeoff since a similar pacemaker could be used for another reason. The difference between using a pacemaker for a heart and a brain would be the programming involved. The advantages of the introduction of electrical signals from a pacemaker into specific parts of the brain are numerous. So far it has been used to treat/prevent Parkinson’s disease, depression, epilepsy, and even anorexia. Currently, Alzheimer’s disease responding to electrical signals is being studied and should conclude in 2015. With many advantages, come disadvantages and limitations. To start, the procedure to implant the electrodes and wires into the brain is around five-hours long and is risky due to the fact that they are operating in your brain. Some disadvantages that are foreseeable are that the surgery time cannot be rushed or mistakes will be made, nothing is perfect and wires/electrodes can go bad over time, every person is unique so the time of recovery cannot be estimated perfectly.

Manufacturability of the pacemaker for the brain is not a new concept either. The main components of the pacemaker, electrodes, and wires are all the same with some specialized parts and programs for the brain rather than the heart. An upside on the sustainability is that almost everything is planted underneath the skin and the battery life is around three to four years, but neurological follow-ups are required. In the future I can see advances in the technology and the efficiency of the device and procedure.

REFERENCES