Libyan International Medical University

Faculty of Basic Medical Science

Brain pacemaker in Alzheimer disease

Submitted by :Ayatullah Salem Muftah Eltajouri , student of faculty of basic medical science.Libyan international medical university

No: 1257

Supervisor: Sara Elmegrhi

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Abstract:

For the first time ever, thin electrical wires were surgically implanted into the frontal lobes of the brains of patients with Alzheimer's disease, this device is called Deep brain stimulating (DBS).

The deep brain stimulation (DBS) implant is similar to a cardiac pacemaker device, except that the pacemaker wires are implanted in the brain rather than the heart.

Introduction:

Alzheimer's disease is the most common form of degenerative dementia, affecting more than 5 million American. By 2050, this number could rise as high as 16 million, according the Alzheimer's association.

The disease which have no cure, and is not easily managed becomes progressively disabling with loss of memory, cognition and worsening of behavioral function, in addition to a gradual loss of independent functioning.

Researches have studied how using and implant linked to a pacemaker for the brain can help Alzheimer's patients to retain cognitive, behavioral and functional abilities longer while also improving quality of life[2].

Discussion:

The frontal lobes are responsible for our abilities to solve problems, organize and plan, and utilize good judgments. By stimulating this region of the brain, the Alzheimer's subjects cognitive and daily functional abilities as a whole declined more slowly than Alzheimer's patients in a matched comparison group not being treated with DBS.

We have many memory aides, tools and pharmaceutical treatments to help Alzheimer's patients with memory, but we don't have anything to help with improving their judgments, making good decisions, or increasing their ability to selectively focus attention on the task at hand and avoid distractions. These skills are necessary in performing daily tasks such as making the bed, choosing what to eat and having meaningful socializing with friends and family.

The pilot study found that DBS targeting frontal brain regions can reduce the overall performance decline typically seen in people with mild or early stage Alzheimer's.

The participant with the implants where compared to a group of about 100 people with Alzheimer disease who were around the same age and have similar levels of cognitive impairment but did not receive DBS.

This same technology has been successfully used to treat more than 135,000 patients worldwide with Parkinson's disease. Our findings suggest that frontal network modulation to improve executive and behavioral deficits should be further studied in patients with Alzheimer's disease.

The researchers found that two of three patients who received the implants showed significantly less decline in their test scores. Compared to the participants who did not receive the implant.

One of the DBS participants, 85 years old LaVonne moore of delawere, Ohio, even showed some improvement in her daily activities. For example when moore started in the study in 2013, she was not preparing her own meals, but after two years with the implant, she could cook a simple meal.

Other researches want to take brain implants even further, scientists at the university of southern California and wake forest university are attempting to build a memory prosthesis to produce an electrical signals associated with memories and feed them to the brain using electrodes, computers and complex mathematical models, they are working to decode the brain activity during learning and memory so they can recreate the signals if they are forgetten ,so far, the scientist have succeeded in creating memory related signals from learning activity in rats and monkeys, but they have not yet tested the technology in humens.

Next, Ohio State researchers want to explore non-surgical methods to stimulate the frontal lobe, which would be a less invasive treatment option to slow down the symptoms of Alzheimer's disease[1].

Conclusion:

While most treatments for Alzheimer's disease focus on improving memory, researchers at The Ohio State University Wexner Medical Center conducted a study aimed at slowing the decline of problem-solving and decision-making skills in these patients.

References:

1)Materials provided by The Ohio State University Wexner Medical Center. Note: Content may be edited for style and length.

2)Douglas W. Scharre, Emily Weichart, Dylan Nielson, Jun Zhang, Punit Agrawal, Per B. Sederberg, Michael V. Knopp, Ali R. Rezai. Deep Brain Stimulation of Frontal Lobe Networks to Treat Alzheimer’s Disease. Journal of Alzheimer's Disease, 2018; DOI: 10.3233/JAD-170082.