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Non-invasive Deep Brain Stimulation for Alzheimer's Disease

This Phase I clinical trial will study whether a non-invasive brain stimulation technique can reduce brain changes observed in Alzheimer's.

PI

- Ph.D., Neuroscience, Imperial College London, 2010
- Lecturer (Assistant Professor), Imperial College London, 2017-
- Fellow, UK Dementia Research Institute (DRI), 2017-

STUDY

- CADRO category: Translational Research & Clinical Interventions

Background

The hippocampus is a brain region that is important for learning and memory. It is one of the brain regions most impacted in the early stages of Alzheimer's. Studies suggest that stimulating the activity in the nerve cells in the hippocampus may be a new therapeutic target that could benefit cognitive function.

Dr. Nir Grossman and colleagues have developed a new technique that can stimulate brain regions such as the hippocampus, non-invasively. Using mouse models and cognitively unimpaired individuals, the researchers found that stimulating the hippocampus may change the activity of nerve cells in the region. Dr. Grossman believes that this could improve nerve cell metabolism (chemical processes in the body that convert nutrients to energy) and functionality. They believe by impacting these biology systems, this may be a strategy for better cognition of individuals who may have these changes in these pathways.

Research Plan

Building on their preliminary findings, Dr. Grossman and colleagues will conduct a clinical trial with 24 participants with early Alzheimer's recruited from within the Imperial College National Health Service Trust and associated memory clinics in West London. The study will involve multiple sessions of non-invasive stimulation of the hippocampus over a period of fourteen days. Dr. Grossman's team will evaluate the safety and tolerability of the stimulation technique. Using brain scans (called PET or Positron Emission Tomography) the researchers will study the impact of the brain stimulation on activity of specialized structures inside cells called mitochondria – a powerhouse of energy generation for cells. In addition, they will use MRI (Magnetic Resonance Imaging) scans, to study the impact of brain stimulation on changes in blood flow in the brain regions (which could indicate brain activity).

To gain insight into the potential association between nerve cell metabolism and cognitive function, the researchers will measure cognitive performance before, during and after the stimulation period. They will then prepare for larger clinical trials.

Impact

The study results may provide important insights into how a non-invasive technique could be used to stimulate brain cell activity and evaluate if it impacts memory and cognition in individuals with early Alzheimer's.

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