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Background

The existing rTMS technology is unable to individualized locating the magnetic stimulation target, resulting in poor treatment effect. Present project intends to locate the magnetic stimulation target based on the individualized cortico-hippocampal connectivity, and provide key technical and theoretical support for the individualized and precise treatment of AD with rTMS.

Idea/Project

Summary: The source item of project based on that the stimulation target can be located by cortico-hippocampal connectivity on the cortex of each subject individually. We hypothesized that stimulating these targets can better improve the Working Memory in Alzheimer's Disease.

Innovation: 1) From the perspective of the clinical application of rTMS in the treatment of Alzheimer's disease, this project researches the method of accurately positioning magnetic stimulation targets based on the individualized cortico-hippocampal connectivity, which provides innovative ideas and key technologies for the personalized treatment of Alzheimer's disease with rTMS. 2) Combining neuroimaging and rTMS memory behavior experiments, the correlation analysis of individual differences in target location and individual differences in memory behavior results after stimulation was carried out, and all these works provided theoretical support for the individualized treatment of Alzheimer's disease with rTMS.

Effect: rTMS is the most accurate non-invasive neuromodulation technology currently available in the world. Under the guidance of precision positioning and navigation technology, rTMS performs targeted stimulation on specific areas of the cerebral cortex of the subject. The transcranial magnetic stimulation technology and the corresponding precision positioning and navigation technology are the preliminary technology accumulation of this project. Therefore, regarding the problem of individualized precise magnetic stimulation treatment for Alzheimer's disease. This application project has a rich preliminary research foundation and a wide range of clinical application prospects.

Scope of application: At present, the number of elderly people in China exceeds 200 million.

With the aging of the population, the prevalence of Alzheimer's Disease (AD) is increasing year by year, and it has become one of the major diseases of the current society. AD is a progressive neurodegenerative disease. The purpose of this study is to better improve the working memory function of AD patients

Project Status

This project includes three main research contents. We have completed the design and testing of the software module, and integrate it into the transcranial magnetic stimulation navigation system, shown in Figure 1. Figure 2 presented the software interface of the home-made navigation system. Now, 16 healthy people were recruited as subjects to collect magnetic resonance imaging data. Seven subjects have collected 10 sets of resting state fMRI data. We are now analyzing cortico-hippocampal connectivity of each subject and locating the stimulation targets. Then, based on the calculated stimulation targets, the rTMS memory behavior experiment will be carried out.

(1) Software module construction of individualized cortex-hippocampus connection to locate magnetic stimulation targets based on Granger causality model

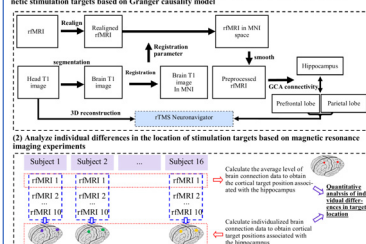
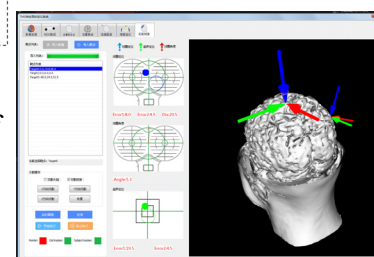


Figure 1 Block diagram of the project research content

Figure 2 software interface of the home-made navigation system.



Future Direction

In this project, aiming at the difficult problem of rTMS in the individualized and precise treatment of Alzheimer's disease, the magnetic stimulation target location method is proposed based on the individualized cortico-hippocampal connectivity. It is expected to provide key technical and theoretical support for rTMS in the individualized treatment and application of Alzheimer's disease. In the future, we will use real AD patients to expand our research clinically