entrainment. Resting-state EEG will be recorded for five minutes before and after tACS to monitor changes in neural oscillations. Participants will complete a sentence completion task requiring to produce a direct object (e.g., The man drinks a__), with a preparation time of 800-1000 milliseconds. EEG recordings during the task performance will be conducted to detect changes in neural oscillations, and response times and accuracy will be measured after stimulation. Additionally, an oral diadochokinetic task will assess the impact of stimulation on speech motor execution. This research provides insights into intact and impaired speech motor systems, such as stuttering, and contributes to the development of neuroscience-based intervention methods in the future.

Research Category and Technology and Methods

Translational Research: 8. Transcranial Alternating Current Stimulation (tACS)

Keywords

tACS, Speech motor control , Brain oscillations , stuttering

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P3.144

INTERMITTENT THETA BURST STIMULATION IN ADOLESCENTS AND YOUNG ADULTS WITH DEPRESSIVE DISORDERS: PROTOCOL OF A RANDOMIZED, SHAM-CONTROLLED STUDY WITH A NOVEL SEQUENTIAL BAYESIAN DESIGN FOR ADAPTIVE TRIALS

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Abstract

Intermittent theta burst stimulation (iTBS), a form of repetitive transcranial magnetic stimulation (rTMS), is an established treatment for major depressive disorder (MDD) in adults. However, its effectiveness in younger populations remains understudied. The EARLY-BURST trial addresses this gap by assessing the efficacy and safety of iTBS targeting the left dorsolateral prefrontal cortex (lDLPFC) in adolescents and young adults seeking treatment for depressive disorders.

The study utilizes an innovative sequential Bayesian, randomized, triple-blind, parallel-group, sham-controlled design. Up to 60 participants aged 16 to 26 years will be randomized to receive either active or sham iTBS, with data analyzed sequentially after 14 patients per group complete treatment. The primary outcome is the between-group difference in scores on the Montgomery-Åsberg Depression Rating Scale (MADRS) at week 6, controlling for baseline MADRS scores.

Since the trial's initiation in April 2024, four participants have been enrolled, with an average age of 21.5 years, an average depression onset age of 16.5 years, and a mean baseline MADRS score of 25.5. Preliminary results indicate a significant reduction in depression severity across both groups, with a mean post-treatment MADRS score of 10.

The EARLY-BURST trial not only investigates the potential of iTBS as an early intervention but also sets the stage for future adaptive platform trials to evaluate emerging and established rTMS protocols in youth populations. This trial represents a critical step toward refining therapeutic strategies in this rapidly evolving field.

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Research Category and Technology and Methods

Clinical Research: 10. Transcranial Magnetic Stimulation (TMS)

Keywords

depression, theta burst stimulation, adolescents, adaptive trial design

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P3.145

EFFECTS OF TRANSCRANIAL DIRECT CURRENT STIMULATION ON COGNITION IN MILD COGNITIVE IMPAIRMENT: A STUDY PROTOCOL FOR A RANDOMIZED CONTROLLED TRIAL

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Abstract

In recent years, transcranial direct current stimulation (tDCS), which regulates brain activity by increasing or decreasing brain tissue excitability, has become a commonly used brain stimulation method. Although few studies have investigated the effects of tDCS in people with mild cognitive impairment (MCI), the available evidence indicates the promising effects of cognitive enhancement after tDCS over the frontal scalp regions. However, the relevant previous studies are of limited value, as they included only a self-report measure, focused on memory performance, failed to assess long-term effect, and did not report their results in follow-up. Knowledge of the precise physiological consequences of tDCS on the brain tissue and related neural mechanisms in people with MCI also remains rudimentary.

The proposed randomized controlled trial investigates the effects of tDCS at the left dorsolateral prefrontal cortex on cognitive performance and explore the modulation of neural mechanisms associated with the use of tDCS. Forty-eight MCI participants are recruited and assigned to experimental or control groups randomly. The experiment consists of pre- and post-assessments and a 1-month follow-up assessment. Participants receives 10 sessions (2-3x/week for 4 weeks) of tDCS intervention (either real or sham, 20 min per session). Outcome measures includes digit span test, colour trail test, verbal fluency, Chinese version of the Verbal Learning Test, and the Hong Kong version of Montreal Cognitive Assessment. Participants will also have their brain waves recorded while completing a computer memory task at each assessment point. The task will require them to study and memorise certain Chinese characters and take a recognition memory test.

The study addresses the shortcomings noted above in previous studies, and breaks new ground by investigating multiple domains of cognition (e.g., attention, memory, executive function), the sustainability of the effects and include electroencephalography as an outcome measure with application to people with MCI.

Research Category and Technology and Methods

Clinical Research: 9. Transcranial Direct Current Stimulation (tDCS)

Keywords

tDCS, MCI, EEG

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P3.146

THE DECREASE IN CALCULATED BIOLOGICAL BRAIN AGE STRATIFIED BY TREATMENT RESPONSE

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Abstract

Introduction: The cognitive side effects of electroconvulsive therapy (ECT) have long raised concerns that it causes brain damage. Structural imaging studies have found an increase in brain tissue volume following a course of ECT. We hypothesized that the increase in volume seen following ECT in depressed individuals would be sufficient to decrease the brain age calculated by the BrainAgeR machine learning based algorithm. **Methods:** structural magnetic resonance imaging (MRI) scans from 37 subjects who underwent treatment with ECT, aged 19-65, 20 males, were found to have completed a pretreatment and post treatment scan suitable for analysis. Depression rating scales obtained prospectively included the Quick Inventory of Depressive Symptomology (QIDS) and the 28-item Hamilton Depression Rating Scale (HAMD-28). Biological brain age was estimated for each scan using the BrainAgeR algorithm. Since we had a priori hypothesized that calculated brain age would decrease, pre- and post-ECT