

AD Pilot Clinical Trials: Spatiotemporal Brain ERP Measures

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Country

USA

Title of project or programme

AD Pilot Clinical Trials: Spatiotemporal Brain ERP Measures

Source of funding information

NIH (NIA)

Total sum awarded (Euro)

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Start date of award

15/08/2012

Total duration of award in years

5

The project/programme is most relevant to:

Alzheimer's disease & other dementias

Keywords

Acquired Cognitive Impairment... Aging... Alzheimer's Disease... Alzheimer's Disease including Alzheimer's Disease Related Dementias (AD/ADRD)... Brain Disorders... Clinical Research... Clinical Research - Extramural... Clinical Trials and Supportive Activities... Dementia... Neurodegenerative... Neurosciences... Translational Research

Research Abstract

DESCRIPTION (provided by applicant): To promote the success of clinical trials testing interventions for Alzheimer's disease (AD), it is imperative that researchers establish proper subject enrollment and measure the clinical efficacy of the treatment. Brain Event-Related Potentials (ERPs), which are obtained while subjects do tasks with designed perceptual/cognitive demands, offer a noninvasive method of measuring brain activity affected by AD that, once developed, can be implemented for clinical and research use without special equipment or special expertise. In conjunction with sophisticated multivariate analytic techniques, temporal ERPs have been shown to detect AD and predict AD progression in individuals with pre-clinical form of the disease. Our aim is to expand the study of ERPs to incorporate both their temporal and spatial properties in novel and innovative composite measures to: 1) define and refine the AD subject population to improve proper subject enrollment in clinical trials even in predementia AD, and 2) develop measures of brain activity that can detect change in subjects over time in order to gauge the effects of AD treatments. Using a cognitive paradigm known to elicit ERPs representative of memory encoding and retrieval, stimulus expectancy, and executive functioning, we will collect ERPs from AD patients early in the course of the disorder, MCI patients (a sizeable percentage of whom develop AD within a few years), and normal elderly. We will then apply new multivariate techniques, including Two-step Spatiotemporal Principal Components Analysis and Parallel Factors Analysis to define and measure the underlying spatiotemporal components of the ERPs, in order to combine both the temporal waveforms of the ERPs and their spatial distributions into useful composite measures. These spatiotemporal ERP measures will be linearly combined into discriminant functions that can be used to make group assignments with a quantitative measure of confidence in each subject's assignment through posterior probabilities of group membership. This technique will also be studied to detect change over time by reanalyzing group placements longitudinally. If successful, these ERP measures and multivariate methods will provide important tools for improving the validity of clinical trials while addressing the difficult barrier of empirically and quantitatively combining spatial and temporal ERP measures for use in evaluating AD across its course.

Lay Summary

Alzheimer's disease (AD), a persistent and devastating dementing disorder of old age, is a major public health burden whose impact is rising dramatically with the burgeoning aging population. This study aims to improve clinical trials testing treatments for AD by developing brain ERP measures as tools to ensure proper subject enrollment in clinical trials and to measure clinical efficacy of the treatment.

Further information available at:

Types:

Investments > €500k

Member States:

United States of America

Diseases:

Alzheimer's disease & other dementias

Years:

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