Development of MRI microvascular biomarkers in cognitive impairment and dementia

https://neurodegenerationresearch.eu/survey/development-of-mri-microvascular-biomarkers-in-cognitive-impairment-and-dementia/

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Country

USA

Title of project or programme

Development of MRI microvascular biomarkers in cognitive impairment and dementia

Source of funding information

NIH (NIA)

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€ 2,028,860.55

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30/09/2016

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1

The project/programme is most relevant to:

Alzheimer's disease & other dementias

Keywords
Research Abstract
Project Summary/Abstract: Small vessel cerebrovascular disease is a major risk factor in Alzheimer's disease. However, quantitative biomarkers that are suitable for use as endpoints in clinical trials for these conditions are still lacking. The goals of the present project are to 1) in the UH2 phase, evaluate and identify MRI-based microvascular biomarkers that are diagnostic and predictive, with a particular focus on a novel marker referred to as cerebrovascular reactivity; 2)

in the UH3 phase, work with the Coordinating Center and other projects in the consortium to further evaluate the most promising biomarker candidates in a multi-site setting. Conventional anatomic imaging (e.g. T2-FLAIR) can identify white matter hyperintensities that represent the consequence of small vessel damage. In this project, we will emphasize several newer techniques that probe the potential physiological driving force of small vessel cognitive impairment and dementia (VCID). Specifically, we will focus on a marker indexing the dynamic coupling capacity of the neurovascular unit, referred to here as cerebrovascular reactivity (CVR). Our previously studies on CVR have revealed that: 1) CVR is three times as sensitive to age as resting perfusion. 2) CVR is diminished in patients with AD dementia. 3) Decline in processing speed (over four years) is significantly associated with CVR decline (over four years). 4) CVR of the brain is strongly correlated with structural lesions as seen on T2-FLAIR. Therefore, the present project will emphasize the development of CVR MRI as a small vessel imaging biomarker, with additional consideration of several other microvascular parameters including microbleeds count and cerebral blood flow (CBF). These small vessel measures (vascular imaging markers) will be combined into a composite index based on their contributions to cognitive impairment, which will form a composite imaging biomarker for diagnosis, prediction, and target engagement of VCID. Our Specific Aims in the UH2 phase are: 1) Examine the association between cognitive function and candidate vascular imaging markers in a group of elderly individuals with mixed vascular and Alzheimer's pathology; 2) Conduct technical assessment of the vascular imaging methods to show that they are multi-site ready in terms of applicability and reproducibility; 3) Work with Coordinating Center and other Development Projects to establish the consortium in preparation for the UH3 phase. Quantifiable milestones have been defined for these aims and for the readiness of the project to enter the UH3 phase, in which the specific aim is to perform collaborative studies as part of the small vessel biomarker consortium to further evaluate and develop the most promising biomarker candidates. Impact: Upon the completion of this project, we will have developed a small vessel imaging biomarker that is ready for large scale multi-site clinical validation studies.

Lay Summary
Small vessel disease can contribute significantly to cognitive impairment and dementia. This project will develop image-based biomarkers of key vascular processes that are of predictive, diagnositic, and target- engagment values in these conditions.

Further information available at:

Types:
Investments > €500k

Member States:
United States of America

Diseases:
Alzheimer's disease & other dementias

Years:
2016

Database Categories:
N/A

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