Modeling aerobic exercise regimens: prevention and amelioration of amyloid pathologies and cognitive impairment

https://neurodegenerationresearch.eu/survey/modeling-aerobic-exercise-regimens-prevention-and-amelioration-of-amyloid-pathologies-and-cognitive-impairment/

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Country

USA

Title of project or programme

Modeling aerobic exercise regimens: prevention and amelioration of amyloid pathologies and cognitive impairment

Source of funding information

NIH (NIA)

Total sum awarded (Euro)

€ 1,188,623.85

Start date of award

01/09/2015

Total duration of award in years

2

The project/programme is most relevant to:

Alzheimer's disease & other dementias

Keywords

Acquired Cognitive Impairment... Aging... Alzheimer's Disease... Alzheimer's Disease Related Dementias (ADRD)... Alzheimer's Disease including Alzheimer's Disease Related Dementias

(AD/ADRD)... Behavioral and Social Science... Brain Disorders... Cardiovascular... Cerebrovascular... Dementia... Neurodegenerative... Neurosciences... Physical Activity... Prevention... Vascular Cognitive Impairment/Dementia

Research Abstract

? DESCRIPTION (provided by applicant): Alzheimer's disease (AD) is a progressive neurodegenerative condition that is the sixth leading cause of death with a prevalence of every one in eight Americans of 65 and older in the United States. Presently, there are no effective pharmacological therapeutic agents to prevent or treat AD. In light of the present shortcomings, there is a growing call ""that a concerted effort be made to discover modifiable risk factors for dementia and exploit those already identified"". To this point, epidemiological studies have shown that demographic and lifestyle factors such as cardiovascular exercise are related to a lower risk of developing cognitive impairments as one ages and in AD. Of the lifestyle factors, cardiovascular exercise is particularly promising since reports suggest that moderate, but positive, benefits are produced when cardiovascular exercise has been introduced as an intervention in clinical trials for older adults in early stages of mild cognitive impairment. Additionally, while many benefits of cardiovascular exercise as an intervention and/or preventative lifestyle factor towards AD pathology and cognitive impairments are possible, the age of onset, duration and intensity of exercise required for improved outcomes is largely unknown. In this case, animal studies designed to answer these key questions comprehensively and in a manner that will inform prospective human clinical trials would be highly advantageous. Indeed, several studies have shown benefits of exercise in mouse models of AD pathology. However, in all of these studies exercise was generally presented as a qualitative treatment solely contrasted with a sedentary control condition rather than as a quantitative, dimensional factor having potential dose-response properties. Thus, the overall hypothesis of this proposal is ""that specific cardiovascular exercise regimens can provide prevention and/or interventional benefits towards cognitive impairment in the presence of Aß pathologies and in normal aging"". While earlier studies in humans and mouse models are encouraging, neither has systematically evaluated the beneficial effects of cardiovascular exercise based on age of onset, duration and intensity. Here, we plan to fill this critical void in the existing knowledge and determine the potential preventative and interventional benefits of varying levels of cardiovascular exercise on cognitive decline in normal aging mice and in two distinct mouse models of amyloid pathologies commonly associated with AD, with corresponding cognitive impairments. Presently, recruitments are underway for an NIH supported clinical trial to evaluate ""Cognitive Benefits of Aerobic Exercise Across the Age Span"" ://www.nia.nih.gov/alzheimers/clinical-trials/cognitive-benefits- aerobic-exercise-across-age-span. Therefore, our proposed studies are not only novel, but also very timely, and could provide invaluable translational information to further guide study design in human trials.

Lay Summary

PUBLIC HEALTH RELEVANCE: Alzheimer's disease (AD) and related disorders are characterized by the progressive loss of memory and cognitive functions. As key pathologies in AD, amyloid ß-protein (Aß) accumulates in brain in the forms of plaques in the parenchyma and as deposits along cerebral blood vessels, both linked to cognitive decline. Cardiovascular exercise may be beneficial to reduce cognitive impairment both in normal aging and in AD. However, the amount of exercise that may be beneficial is unknown. The purpose of this proposal is to fill this void in preclinical studies using normal mice and specific transgenic mous models to determine what levels of cardiovascular exercise are sufficient to lessen the onset

and/or severity of Aß pathologies in brain and improve cognitive performance.

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

Database Tags:
N/A