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Integrating behavioural, imaging and transcriptional profiling to discover the impact of midlife stress in Alzheimer's disease

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Western BrainsCAN
Transforming brain research.

Project **Summary**

KNOWLEDGE MOBILIZATION & IMPACT

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Background

In Canada, one in 13 people between 65 and 74 are affected by Alzheimer's disease. By the time we reach the age of 85, that has risen to one in four. The impacts of Alzheimer's and related dementias are very broad - the individual suffering of the patient, the stress and responsibility for caregivers and the economic burden on the health service.

Strategies to delay the onset of the disease or to prevent Alzheimer's entirely would be very welcome, but to date Phase 2 and 3 clinical trials of possible treatments have largely failed. In fact, the rate of failure of trials has been so high that it has been proposed that the focus change to targeting any lifestyle factors that can be modified to delay or avoid the disease.

The Problem

One such lifestyle risk factor is *midlife chronic stress*, which is known to be a significant risk factor for Alzheimer's disease.

While animal models are already used to study neuropsychiatric disorders (those diseases that typically impact cognitive function, emotion and mood), the translation to humans of the discoveries made has been difficult. This is because of the limited common methodologies applicable between species. However, Western has developed novel translational tools and approaches that enable sensitive and robust measurement of cognition, brain structure and function that are directly comparable across species and can be used to discover new therapeutic targets.

The Project

We will be integrating this cognitive assessment with imaging of brain structure and function to understand the mechanisms by which a risk factor, in this case modifiable life stress, influences AD-related decline. The resultant data will be integrated and disseminated using a new open-access neuroinformatics platform developed at Western (MouseBytes.ca), which will become a unique resource for open science investigations and set the standard for sharing of behavioural data across the world.

We expect to find that AD-related structural and functional brain changes are worsened by this kind of stress, and that these changes also align with impairments to memory and attention. This integration of different kinds of data is intended to help us identify possible novel targets for future therapeutic approaches.

Funding Program

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Western Faculty, Group or Institution

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McGill Faculty, Group or Institution

Department of Psychiatry, Faculty of Medicine

Keywords

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The Collaboration

The work leverages the recently approved new behavioural touchscreen facility at McGill's Douglas Mental Health University Institute, as well as expertise at Western University's Mouse Neurobehavioural Facility and Translational Cognitive Neuroscience Lab, touching on behaviour, brain structure, function and gene expression. It is bringing together broad, complementary expertise at the two institutions to extend our understanding of this brain disorder, supporting a comprehensive, inter-disciplinary approach to the research that would not be possible in any single lab.

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