

Early abnormalities of Alzheimer's disease: It takes two (proteins) to tango

Montreal, April 20, 2016 – For years, neuroscientists have puzzled over how two abnormal proteins, called amyloid and tau, accumulate in the brain and damage it to cause Alzheimer's disease (AD). Which one is the driving force behind dementia? The answer: both of them, according to a new study by researchers at the Douglas Mental Health University Institute.

In the journal *Molecular Psychiatry*, the team led by Dr. Pedro Rosa-Neto, a clinician scientist at the Douglas and assistant professor of Neurology, Neurosurgery and Psychiatry at McGill University, reports for the first time evidence that the interaction between amyloid and tau proteins drives brain damage in cognitively intact individuals.

"We specifically found that both proteins mutually enhance their individual toxic effects and cause a brain dysfunction considered to be a signature of AD. This finding challenges previous polarized theories that a single protein abnormality was the major driving force of disease progression," explains Dr. Rosa-Neto, whose team is part of the CIUSSS de l'Ouest-de-l'Île-de-Montréal research network.

Toward new therapeutic strategies

This research also points toward new therapeutic strategies to mitigate the progression of AD.

"Until now, therapeutic clinical trials have targeted a single pathological process. Our result paves the way for new therapeutic strategies for prevention or stabilization of AD. For example, combination therapies should be used simultaneously against both amyloid and tau protein accumulation", says Dr. Tharick A. Pascoal, lead author of the study.

Rosa-Neto's team analyzed the performances of 120 cognitively intact individuals over two years (equal gender distribution; average age 75). By measuring amyloid levels using PET scans and tau proteins through cerebrospinal fluid analysis, the researchers were able to identify the patients at risk of brain damage associated with AD.

According to the World Health Organization, Alzheimer's disease is the most common cause of dementia, affecting more than 30 million people worldwide in 2015. In 2011, 747 000 Canadians were living with Alzheimer's disease and other forms of dementia, and the combined direct (medical) and indirect (lost earnings) costs of dementia amounted to \$33 billion (Alzheimer Society of Canada).

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"Amyloid- β and hyperphosphorylated tau synergy drives metabolic decline in preclinical Alzheimer's disease", *Molecular Psychiatry*, published online 29 March 2016.

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About the science team of Dr. Pedro Rosa-Neto

Dr. Pedro Rosa-Neto (MD, PhD) is the current deputy director of the PREVENT-AD program and leads the [translational neuroimaging laboratory](#) (TNL). The TNL conducts groundbreaking research on quantifying neurodegenerative processes using Positron Emission Tomography (PET) and Magnetic Resonance Imaging (MRI) to enable preclinical diagnosis of dementing diseases.

Dr. Serge Gauthier (MD, FRCPC) is a neurologist and a full-time clinician researcher who has been conducting research on dementing disorders at the Douglas Institute since 1990. Dr. Gauthier is the director of the Alzheimer's Disease Research Unit at the McGill Centre for Studies in Aging. In 2015, he was appointed to the Order of Canada for his contributions to advancing our understanding of Alzheimer's disease and dementia, and for fostering the development of research networks in his specialty.

Dr. Tharick Ali Pascoal (MD) is a Brazilian neurologist who is currently conducting PhD studies on the Integrated Program in Neuroscience (IPN) at McGill University. Dr. Pascoal is a recipient of a Stop-AD scholarship. For his thesis, he focuses on in vivo quantification of protein to protein interactions as determinants of dementia using imaging and fluid biomarkers.

About the CIUSSS de l'Ouest-de-l'Île-de-Montréal

The Centre intégré universitaire de santé et de services sociaux (CIUSSS) de l'Ouest-de-l'Île-de-Montréal is made up of the CSSS de l'Ouest-de-l'Île, the CSSS de Dorval-Lachine-LaSalle, St. Mary's Hospital, St. Anne's Hospital, Douglas Mental Health University Institute, West Montreal Readaptation Centre, Grace Dart Extended Care Centre, and Batshaw Youth and Family Centres.

The Douglas Mental Health University Institute is a world-class institute affiliated with McGill University and the World Health Organization. It treats people suffering from mental illness and offers them both hope and healing. Its teams of specialists and researchers are constantly increasing scientific knowledge, integrating this knowledge into patient care, and sharing it with the community in order to educate the public and eliminate prejudices surrounding mental health.

Source

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