

New study suggests rethink of dementia causes

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University of Adelaide researchers have developed a new theory for the causes of dementia and other neurodegenerative diseases, involving an out-of-control immune system.

Published in the journal *Frontiers in Neuroscience*, the researchers have assembled strong evidence that the neurological decline common to these diseases is caused by 'auto-inflammation', where the body's own [immune system](#) develops a persistent inflammatory response and causes [brain cells](#) to die.

"Dementia, including the most common form Alzheimer's Disease, and related neurodegenerative conditions are dramatically rising in frequency as people live longer and our population ages," says study lead Professor Robert Richards, from the University of Adelaide's School of Biological Sciences. "Australia is predicting that by 2050 there will be almost double the number of people with dementia, and the United States similarly says there will be twice as many.

"Currently we have no effective treatments to assist the millions of affected people, and these diseases are an enormous burden on families and the [public health care](#) system."

Previously, researchers have focused on the role of protein deposits called amyloid plaques that lodge in the brain of Alzheimer's affected people. But it is now clear that this is an inadequate explanation for Alzheimer's Disease.

There are many distinct forms of neurodegeneration including Alzheimer's, Parkinson's and Huntington's Diseases. These conditions are distinguished by the different types of [brain nerve cells](#) that are first affected and by the symptoms that first appear. However, as all of these diseases progress, they become more similar.

Professor Richards believes that instead of many different mechanisms, each [disease](#) has the same underlying mechanism, and common pathway of nerve cell loss.

"Our interest in the body's own (innate) immune system as the culprit began when we discovered that immune system agents become activated in a laboratory model of Huntington's Disease," he says. "Remarkably, researchers from other laboratories were at the same time reporting similar features in other [neurodegenerative diseases](#). When we pulled the evidence together, it made a very strong case that uncontrolled innate immunity is indeed the common cause."

The innate immune system is the first line of defense in cells, and normally distinguishes molecules that belong to the body from foreign, disease-causing, molecules. It is an alarm and response system with a self-destruct mechanism to contain and eliminate invaders or abnormal cells, like cancer.

Malfunctions can occur because of various triggers including genetic mutations, infection, toxins or physical injury, all of which have been linked with different forms of neurodegeneration. Initially the innate immune system protects the tissue against these triggers, but prolonged activation becomes self-perpetuating, causing [brain cell death](#) to occur.

"We hope this new way of understanding neurodegeneration will lead to new treatments," Professor Richards says. "We now need to further investigate the immune signaling molecules, to identify new drug targets that will delay the onset and/or halt the progression of these devastating diseases."

More information: The Enemy within: Innate Surveillance-Mediated Cell Death, the Common Mechanism of Neurodegenerative Disease. *Front. Neurosci.*, 10 May 2016 [dx.doi.org/10.3389/fnins.2016.00193](https://doi.org/10.3389/fnins.2016.00193)

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