

## **Toxic chain reaction triggers Alzheimer's disease**

Alzheimer's disease. It is tied with cancer as the most feared human disease. The devastating consequences to both sufferers and their families, has caused billions of dollars to pour into research efforts across the globe. Thus far, this investment has paid off, driving basic research towards a very good understanding the nature of the disease. We know a lot about what happens to the brain when someone is stricken with the disease. How the disease progressively damages the brain, and why certain parts of the brain are more vulnerable than others. This information has helped us to understand how damage to the brain in Alzheimer's disease gives rise to the classic symptoms affecting memory and executive function, and driving the inevitable cognitive decline. Nevertheless, some really important questions still remain. Why do some people get it and others not? Why can't we prevent it?

In order to answer these questions, we need to know not just what happens during the course of the disease, but how and why it happens in the first place. Understanding how it begins gives us the best possible chance of stopping it in its tracks – before it runs roughshod over our brains and minds. New Neuroscience research has uncovered a potential trigger for the brain destruction that occurs in Alzheimer's disease.

For about a decade, scientists have known that a small toxic protein forms in the early stages of Alzheimer's disease. In the later stages of the disease, the toxin is widespread in the brain, and large aggregations, or clusters, of toxin are found. These are what kill brain cells. What we don't know is how large amounts of toxin are made or how they get spread around. If we did, we could stop them, and stop Alzheimer's disease from progressing.

This new report discovered that the small toxic protein is initially manufactured at a slow rate, but that once it reaches a critical level the manufacturing method changes to increase production. This chain reaction produces masses more toxin. Because the toxin is small, it can move around the brain easily; much like fuzzy thistle seeds blow around in the wind. And once dispersed, each can start its own chain reaction, gathering big clusters of toxic proteins and killing brain cells.

If we could disable that second manufacturing method and stop increased production of the toxin, we may be able to stop Alzheimer's disease before it stops us.

According to Alzheimer's NZ, dementia already affects around 50,000 people in New Zealand and that number is set to triple by 2050 as the population ages. Understanding what triggers Alzheimer's disease onset provides a new avenue for prevention of the disease before it changes us for the worse.

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**REFERENCE:** Cohen SA et al. (2013) "Proliferation of amyloid- $\beta$ 42 aggregates occurs through a secondary nucleation mechanism" Proc Natl Acad Sci USA. [www.pnas.org/cgi/doi/10.1073/pnas.1218402110](http://www.pnas.org/cgi/doi/10.1073/pnas.1218402110)