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## Omega-3 and vitamin D may help clear Alzheimer's plaques



By Nathan Gray+  
12-Feb-2013

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**Researchers have pinpointed the mechanism behind vitamin D3 and omega-3's ability to enhance the immune system's ability to clear the brain of amyloid plaques that are associated with Alzheimer's Disease.**

The pilot study, published in the *Journal of Alzheimer's Disease*, identifies key genes and signalling networks regulated by vitamin D3 and the omega-3 fatty acid DHA (docosahexaenoic acid) that may help control inflammation and improve plaque clearance.

Led by Dr Milan Fiala from the David Geffen School of Medicine at UCLA in the United States, the research team explained that his team's previous lab work has helped clarify key mechanisms involved in helping vitamin D3 clear amyloid-beta, however their new data extends these previous findings with vitamin D3 and highlights the role of omega-3 DHA.

"Our new study sheds further light on a possible role for nutritional substances such as vitamin D3 and omega-3 in boosting immunity to help fight Alzheimer's," said Fiala, who also works as a consultant for Norwegian omega-3 drink firm Smartfish.

### Alzheimer's progress

The build-up of plaque from beta-amyloid deposits is associated with an increase in brain cell damage and death from oxidative stress. This is related to a loss of cognitive function and an increased risk of



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Alzheimer's, the most common form of dementia and currently affects over 13 million people worldwide.

The direct and indirect cost of Alzheimer care is over \$100 billion (€81bn) in the US, while direct costs in the UK are estimated at £15bn (€22bn).

Previous work by Fiala and his team, based on the function of immune cells called macrophages that had been isolated from Alzheimer's Disease (AD) patients' has suggested that there are two groups of patients and macrophages.

Fiala and his colleagues also found that the immune cells in people that suffer from Alzheimer's Disease express inflammatory genes differentially to healthy controls.

Two distinct transcription patterns were found to further define the two groups: Group 1 had an increased transcription of inflammatory genes, while Group 2 had decreased transcription.

"Further study may help us identify if these two distinct transcription patterns of inflammatory genes could possibly distinguish either two stages or two types of Alzheimer's disease," said Mathew Mizwicki, who also worked on the study.

### Study details

In the new study the research team drew blood samples from both AD patients and healthy controls, then isolated critical immune cells called macrophages from the blood.

Macrophages are responsible for gobbling up amyloid-beta and other waste products in the brain and body.

The team incubated the immune cells overnight with amyloid-beta and added either an active form of vitamin D3 (1alpha,25-dihydroxyvitamin D3) or an active form of the omega-3 fatty acid DHA (resolvin D1) to some of the cells to gauge the effect they had on inflammation and amyloid-beta absorption.

Both the 1alpha, 25-dihydroxyvitamin D3 and resolvin D1 were found to improve the ability of the macrophages in AD patients' to break-down amyloid-beta, and they inhibited the cell death that is induced by amyloid-beta, said the researchers.

While researchers found that 1alpha,25-dihydroxyvitamin D3 and resolvin D1 greatly improved the clearance of amyloid-beta by macrophages in patients in both groups, they discovered subtleties in the effects the two substances had on the expression of inflammatory genes.

- In Group 1, the increased-inflammation group, macrophages showed a decrease of inflammatory activation;
- in Group 2, the group with decreased inflammation, macrophages showed an increase of the inflammatory genes IL1 and TLRs when either 1alpha,25-Dihydroxyvitamin D3 or resolvin D1 were added.

"We may find that we need to carefully balance the supplementation with vitamin D3 and omega-3 fatty acids, depending on each patient in order to help promote efficient clearing of amyloid-beta," Fiala said.

"This is a first step in understanding what form and in which patients these nutrition substances might work best."

The next step is a larger study to help confirm the findings, as well as a clinical trial with omega-3 DHA, the researchers said.

Fiala said that an active (non-oxidised) form of omega-3 DHA – which is the precursor of the resolvin D1 used in this study – may work better than more commercially available forms of DHA, which generally are not as well protected against oxidation.

Bridget Brennan, CEO of Female Factor and best selling author

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*"1 $\alpha$ ,25-Dihydroxyvitamin D3 and Resolvin D1 Retune the Balance between Amyloid- $\beta$  Phagocytosis and Inflammation in Alzheimer's Disease Patients "*

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