

Liver defect likely cause of DHA deficiency in Alzheimer's patients

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UC Irvine researchers have discovered that markedly depleted amounts of an omega-3 fatty acid in brain tissue samples from Alzheimer's patients may be due to the liver's inability to produce the complex fat, also contained in fish-oil supplements.

Low levels of docosahexaenoic acid, or DHA, have been associated with the chronic neurodegenerative disease affecting millions of Americans, but no cause had been identified.

In postmortem liver tissue from Alzheimer's patients, the UCI team found a defect in the organ's ability to make DHA from shorter molecules present in leafy plants and other foods. Previous studies have shown that most brain DHA is manufactured in the liver.

Non-Alzheimer's livers did not have this defect, said Daniele Piomelli, the Louise Turner Arnold Chair in the Neurosciences and director of the Center for [Drug Discovery](#) at UCI, who led the research with Giuseppe Astarita, project scientist in pharmacology.

"We all know Alzheimer's is a brain disease, but our findings - which were totally unexpected - show that a problem with liver fat metabolism can make people more vulnerable," Piomelli said. "They also suggest a reason why clinical trials in which Alzheimer's patients are given [omega-3 fatty acids](#) to improve cognitive skills have had mixed results."

The study appears Sept. 8 in the open-access, peer-reviewed journal [PLoS ONE](#).

DHA occurs naturally in cold-water fatty fish and seaweed. It is essential for the proper functioning of adult human brains and for the development of our nervous system and vision during the first six months of life. Omega-3 fatty acids are also part of a healthy diet that helps lower risk of heart disease.

"Additionally, we found that the greater the amount of Alzheimer's-related cognitive problems experienced in life by the patients, the lower were their liver DHA levels," Astarita said. "So we do see a connection."

Piomelli added that the results point to new diagnostic and dietary approaches to Alzheimer's: Specific blood lipid profile tests might identify at-risk persons, and dietary supplements with a chemically enhanced form of DHA may benefit early-stage patients.

"Our research isn't advocating that liver metabolism is a key to Alzheimer's," he noted. "The factors causing the disease are many and complex, but we feel this is another piece in the Alzheimer's puzzle."

Provided by University of California - Irvine

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