

Omega-3 fatty acids enhance cognitive flexibility in at-risk older adults

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M.D./Ph.D. student Marta Zamroziewicz, left, Carle Hospital-Beckman Institute postdoctoral fellow Rachael Rubin and their colleagues looked at the role of nutrition in brain function in elderly adults who were at risk of developing late-onset Alzheimer's disease. Credit: L. Brian Stauffer

A study of older adults at risk of late-onset Alzheimer's disease found

that those who consumed more omega-3 fatty acids did better than their peers on tests of cognitive flexibility—the ability to efficiently switch between tasks—and had a bigger anterior cingulate cortex, a brain region known to contribute to cognitive flexibility.

The analysis suggests, but does not prove, that consuming DHA and EPA, two omega-3 [fatty acids](#) found in fish, enhanced [cognitive flexibility](#) in these adults in part by beefing up the anterior cingulate cortex, the researchers report in the journal *Frontiers in Aging Neuroscience*.

"Recent research suggests that there is a critical link between nutritional deficiencies and the incidence of both [cognitive impairment](#) and degenerative neurological disorders, such as Alzheimer's disease," said University of Illinois neuroscience, psychology, and speech and hearing science professor Aron Barbey, who led the study with M.D./Ph.D. student Marta Zamroziewicz. "Our findings add to the evidence that optimal nutrition helps preserve cognitive function, slow the progression of aging and reduce the incidence of debilitating diseases in healthy aging populations."

The researchers focused on aspects of brain function that are sometimes overlooked in research on aging, Zamroziewicz said. "A lot of work in cognitive aging focuses on memory, but in fact cognitive flexibility and other executive functions have been shown to better predict daily functioning than memory does," she said.

"Executive function" describes processes like planning, reasoning, paying attention, problem solving, impulse control and task switching.

"These functions tend to decline earlier than other cognitive functions in aging," Zamroziewicz said.

The new research built on previous studies that found associations between [omega-3 fatty acid](#) consumption, cognitive flexibility and the size of the anterior cingulate cortex.

"There's been some work to show that omega-3 fatty acids benefit cognitive flexibility, and there's also been work showing that cognitive flexibility is linked to this specific brain region, the anterior cingulate. But there's been very little work actually connecting these pieces," Zamroziewicz said.

The new study focused on 40 cognitively healthy older adults between the ages of 65 and 75 who are carriers of a gene variant (APOE e4) that is known to contribute to the risk of developing late-onset Alzheimer's disease.

The researchers tested participants' cognitive flexibility, measured levels of the fatty acids EPA (eicosapentaenoic acid) and DHA (docosahexaenoic acid) in their blood, and imaged their brains using MRI. Statistical analyses teased out the relationships between these factors.

"We wanted to confirm that higher omega-3 fatty acids related to better cognitive flexibility, and we did in fact see that," Zamroziewicz said.

"We also wanted to confirm that higher omega-3 fatty acids related to higher volume in the anterior cingulate cortex, and we saw that. Finally, we were able to show that higher volume in the [anterior cingulate cortex](#) was an intermediary in the relationship between omega-3 fatty acids and cognitive flexibility."

More information: Anterior cingulate cortex mediates the relationship between O3PUFAs and executive functions in APOE e4 carriers, journal.frontiersin.org/article/.../2015.00087/abstract

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