Medical Xpress

Omega-3 intake heightens working memory in healthy young adults

October 25 2012

(Medical Xpress)—While Omega-3 essential fatty acids—found in foods like wild fish and grass-fed livestock—are necessary for human body functioning, their effects on the working memory of healthy young adults have not been studied until now.

In the first study of its kind, researchers at the University of Pittsburgh have determined that healthy young adults ages 18-25 can improve their working memory even further by increasing their Omega-3 fatty acid intake. Their findings have been published online in *PLOS One*.

"Before seeing this data, I would have said it was impossible to move young healthy individuals above their cognitive best," said Bita Moghaddam, project investigator and professor of neuroscience. "We found that members of this population can enhance their working memory performance even further, despite their already being at the top of their cognitive game."

Led by Rajesh Narendarn, project principal investigator and associate professor of radiology, the Pitt research team sought healthy young men and women from all ethnicities to boost their Omega-3 intake with supplements for six months. They were monitored monthly through phone calls and outpatient procedures.

Before they began taking the supplements, all participants underwent positron emission tomography (PET) imaging, and their blood samples were analyzed. They were then asked to perform a working memory test

in which they were shown a series of letters and numbers. The young adults had to keep track of what appeared one, two, and three times prior, known as a simple "n-back test."

"What was particularly interesting about the presupplementation n-back test was that it correlated positively with plasma Omega-3," said Moghaddam. "This means that the Omega-3s they were getting from their diet already positively correlated with their working memory."

After six months of taking Lovaza—an Omega-3 supplement approved by the Federal Drug Administration—the participants were asked to complete this series of outpatient procedures again. It was during this last stage, during the working memory test and blood sampling, that the improved working memory of this population was revealed.

"So many of the previous studies have been done with the elderly or people with medical conditions, leaving this unique population of young adults unaddressed," said Matthew Muldoon, project coinvestigator and associate professor of medicine at Pitt. "But what about our highest-functioning periods? Can we help the brain achieve its full potential by adapting our healthy behaviors in our young adult life? We found that we absolutely can."

Although the effects of Omega-3s on young people were a focus, the Pitt team was also hoping to determine the brain mechanism associated with Omega-3 regulation. Previous rodent studies suggested that removing Omega-3 from the diet might reduce dopamine storage (the neurotransmitter associated with mood as well as working memory) and decrease density in the striatal vesicular monoamine transporter type 2 (commonly referred to as VMAT2, a protein associated with decision making). Therefore, the Pitt researchers posited that increasing VMAT2 protein was the mechanism of action that boosted cognitive performance. Unfortunately, PET imaging revealed this was not the

case.

"It is really interesting that diets enriched with Omega-3 fatty acid can enhance cognition in highly functional young individuals," said Narendarn. "Nevertheless, it was a bit disappointing that our imaging studies were unable to clarify the mechanisms by which it enhances working memory."

Ongoing animal modeling studies in the Moghaddam lab indicate that brain mechanisms that are affected by Omega-3s may be differently influenced in adolescents and young adults than they are in older adults. With this in mind, the Pitt team will continue to evaluate the effect of Omega-3 fatty acids in this younger population to find the mechanism that improves cognition.

Provided by University of Pittsburgh

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https://medicalxpress.com/news/2012-10-omega-intake-heightens-memory-healthy.html