

Study links nutrition to brain health and intelligence in older adults

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Psychology professor Aron Barbey, left, graduate student Marta Zamroziewicz, postdoctoral researcher Chris Zwilling and their colleagues conducted a new study linking blood levels of a key nutrient to brain structure and intelligence in older adults. Credit: L. Brian Stauffer

A study of older adults links consumption of a pigment found in leafy

greens to the preservation of "crystallized intelligence," the ability to use the skills and knowledge one has acquired over a lifetime.

The study is reported in the journal *Frontiers in Aging Neuroscience*.

Lutein (LOO-teen) is one of several plant pigments that humans acquire through the diet, primarily by eating [leafy green vegetables](#), cruciferous vegetables such as broccoli, or egg yolks, said University of Illinois graduate student [Marta Zamroziewicz](#), who led the study with Illinois psychology professor [Aron Barbey](#). Lutein accumulates in the [brain](#), embedding in cell membranes, where it likely plays "a neuroprotective role," she said.

"Previous studies have found that a person's lutein status is linked to cognitive performance across the lifespan," Zamroziewicz said.

"Research also shows that lutein accumulates in the gray matter of [brain regions](#) known to underlie the preservation of cognitive function in healthy brain aging."

The study enrolled 122 healthy participants aged 65 to 75 who solved problems and answered questions on a standard test of crystallized intelligence. Researchers also collected blood samples to determine blood serum levels of lutein and imaged participants' brains using MRI to measure the volume of different brain structures.

The team focused on parts of the temporal cortex, a brain region that other studies suggest plays a role in the preservation of crystallized intelligence.

The researchers found that participants with higher blood serum levels of lutein tended to do better on tests of crystallized intelligence. Serum lutein levels reflect only recent dietary intakes, Zamroziewicz said, but are associated with brain concentrations of lutein in [older adults](#), which

reflect long-term dietary intake.

Those with higher serum lutein levels also tended to have thicker gray matter in the parahippocampal cortex, a brain region that, like crystallized intelligence, is preserved in healthy aging, the researchers report.

"Our analyses revealed that [gray-matter](#) volume of the parahippocampal cortex on the right side of the brain accounts for the relationship between lutein and crystallized intelligence," Barbey said. "This offers the first clue as to which brain regions specifically play a role in the preservation of crystallized intelligence, and how factors such as diet may contribute to that relationship."

"Our findings do not demonstrate causality," Zamroziewicz said. "We did find that lutein is linked to crystallized intelligence through the parahippocampal cortex."

"We can only hypothesize at this point how lutein in the diet affects brain structure," Barbey said. "It may be that it plays an anti-inflammatory role or aids in cell-to-cell signaling. But our finding adds to the evidence suggesting that particular nutrients slow age-related declines in cognition by influencing specific features of brain aging."

More information: Marta K. Zamroziewicz et al, Parahippocampal Cortex Mediates the Relationship between Lutein and Crystallized Intelligence in Healthy, Older Adults, *Frontiers in Aging Neuroscience* (2016). [DOI: 10.3389/fnagi.2016.00297](https://doi.org/10.3389/fnagi.2016.00297)

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