

Another Good Reason to Eat Leafy Greens, Avocados and Eggs

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✓ Fact Checked

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STORY AT-A-GLANCE

- › Lutein is well-known for its vision-enhancing properties. Research also suggests it has neuroprotective qualities, improving memory and boosting intelligence
- › There's an inverse association between lutein levels in the eyes and age-related macular degeneration (AMD), the primary cause of blindness in the elderly, as well as cataracts
- › Lutein has also been shown to prevent cell death caused by retinal detachment when administered in a timely manner, and can help improve night vision
- › Lutein may help prevent neurodegenerative diseases by preventing DNA damage, the depletion of BDNF and the degradation of a synaptic vesicle protein involved in Alzheimer's and Parkinson's. It's also been shown to help maintain the integrity of your brain's white matter
- › Your body cannot manufacture lutein, so you need to get it from your diet. Lutein is a carotenoid found in egg yolks, avocados, cruciferous vegetables and dark, leafy greens, especially kale and spinach

Lutein — a carotenoid found in egg yolks, avocados, cruciferous vegetables and dark, leafy greens — is well-known for its vision-enhancing properties.¹ Research also suggests it has neuroprotective qualities,² improving memory³ and boosting intelligence.⁴ As reported in the Senior Resource Guide:⁵

“Lutein belongs in the subclass of xanthophylls, which have polar molecular structures that possess unique membrane properties, such as fluidity, communication between brain cells, ion exchange, diffusion of oxygen, membrane stability, and the prevention of oxidation and inflammation.

Like other xanthophylls, lutein accumulates in neural tissue. In fact, lutein accounts for most of the carotenoid accumulation in the human brain, and this high concentration of lutein in the brain may indicate its neuroprotective value.

Lutein accumulates in the brain and embeds in cell membranes. There, lutein protects the neuronal structure and function of brain cells. While lutein is distributed in the gray matter of the brain, researchers have detected its presence in the temporal cortex, the prefrontal cortex, and the hippocampus. Lutein accumulates in the brain over a person’s lifespan and may therefore provide lifelong benefits to brain health.”

Your body cannot manufacture lutein, so you need to get it from your diet. Unfortunately, many do not get enough lutein simply because they don’t eat enough vegetables and/or eggs.

How Lutein Protects Your Vision

As its name implies, lutein is found in high concentrations in your macula lutea,⁶ the small central part of your retina responsible for detailed central vision. It’s also found in your macular pigment (it’s responsible for the yellow hue of the macula⁷) and the lens of your eye.

Epidemiological research has found an inverse association between lutein and zeaxanthin levels in the eyes and age-related macular degeneration (AMD), the primary cause of blindness in the elderly, and cataracts.^{8,9}

As explained in the 2013 paper,¹⁰ “The Role of Lutein in Eye-Related Disease,” lutein and zeaxanthin (another carotenoid present in high concentration in the eyes) help prevent age-related eye degeneration by ameliorating the damage caused by blue light and

oxygen free radicals. Blue light is responsible for a majority of the damage to the eye, and lutein selectively absorbs blue light.

According to this paper, “Dietary concentrations between 6 and 20 mg per day of lutein have been associated with a reduced risk of ocular disorders such as cataracts and age-related macular degeneration.”

A more recent scientific review,¹¹ published in 2019 in PLOS ONE, found people who took 10 mg or 20 mg of lutein per day had greater macular pigment optical density (MPOD), and better visual acuity and contrast sensitivity than those who did not supplement.

Macular pigment, the yellow pigmented area found in the center of your retina, acts as “internal sunglasses,” protecting your macula from harmful blue light. The denser your macular pigment, the lower your risk of developing AMD. Greater MPOD is also associated with better visual performance overall.¹²

According to the authors of the 2019 PLOS ONE review, “The available evidence suggests that dietary lutein may be beneficial to AMD patients and the higher dose could make MPOD increase in a shorter time.” Lutein has also been shown to prevent cell death caused by retinal detachment, when administered in a timely manner,¹³ and can help improve night vision.¹⁴

Lutein’s Role in Brain Health and Cognition

More recent research has also found lutein plays an important role in brain health, and may even help prevent neurodegenerative diseases.¹⁵ As noted in the 2012 paper,¹⁶ “Neuroprotective Effects of Lutein in the Retina,” lutein benefits your brain and cognition by preventing:

- DNA damage
- Depletion of brain-derived neurotrophic factor (BDNF), which is important for brain health

- Degradation of synaptophysin, a synaptic vesicle protein involved in neurodegenerative diseases such as Alzheimer's and Parkinson's disease

Lutein and zeaxanthin have also been shown to help maintain the integrity of your brain's white matter,¹⁷ and this too can lower your risk of age-related decline.

Lutein Benefits Both the Old and the Young

In one 2017 study,^{18,19,20} which involved 60 adults between the ages of 25 and 45, those with higher levels of lutein in middle-age had more youthful neural responses than those with lower levels.

Carotenoid status was assessed by measuring MPOD, which is also highly correlated with the lutein status in your brain. Most studies have focused on the effects of diet after cognitive decline has already set in.

Here, they wanted to evaluate whether lutein might have a preventive effect, as the process of cognitive decline has been shown to begin far earlier than typically expected. According to the researchers, you can start seeing cognitive deterioration as early as your 30s.

Indeed, the results suggest your diet, and in this case lutein-rich foods, does help keep your brain young. As noted by co-author Naiman Khan, professor of kinesiology and community health at the University of Illinois:²¹

"Now there's an additional reason to eat nutrient-rich foods such as green leafy vegetables, eggs and avocados. We know these foods are related to other health benefits, but these data indicate that there may be cognitive benefits as well."

Lutein has also been shown to benefit younger people. In one such study,²² healthy 18- to 30-year-olds exhibited better brain function after taking lutein and zeaxanthin supplements for a year. Significant improvements were seen spatial memory, reasoning ability and complex attention.

Cognitive Benefits Associated With Higher Lutein Levels

Several other studies support these findings. For example, in one University of Georgia study,²³ older adults (mean age 72) taking 10 mg of lutein and 2 mg of zeaxanthin daily for one year were able to maintain their brain function, whereas the placebo group's verbal learning ability and word recall deteriorated over the course of the study.

The mechanism thought to be responsible for this protective effect was enhanced blood flow through the brain. A number of other studies looking at lutein's influence on cognition have shown that higher lutein and zeaxanthin levels in the macula are associated with improved:^{24,25,26}

- Verbal learning and fluency
- Word recall
- Executive function such as sorting and prioritizing information and the ability to take action
- “Crystallized intelligence”²⁷ – the ability to use learned knowledge and experience (opposed to the ability to logically reason your way through a new situation or problem, which is known as “fluid intelligence”²⁸)
- Relational memory performance^{29,30} – the ability to remember a person's name when seeing their face, or to retell a story

Other Health Benefits of Lutein

Lutein has also been found to promote health in other ways, beside optimizing vision and cognition. For example, studies have found:

Diets rich in the carotenoids beta-carotene, lutein and lycopene resulted in greater resistance against oxidation of low-density lipoprotein (LDL) cholesterol. Higher plasma concentration of carotenoids was also associated with lower DNA damage.³¹

Lutein and zeaxanthin in combination with vitamin E appears to improve lung

function and respiratory health.³²

Plasma levels of antioxidants such as lutein, zeaxanthin, vitamin E, beta-cryptoxanthin, lycopene, alpha-carotene and beta-carotene are inversely correlated with congestive heart failure severity.³³

Plasma carotenoid levels are also inversely correlated with prostate cancer.³⁴

Lutein and lycopene enhance eye health by reducing your risk for oxidative stress-induced loss of retinal pigment epithelial (RPE) cells, and inhibiting the cell growth in undifferentiated RPE cells.³⁵

Lutein has been shown to induce **autophagy** and may help shield your body against certain stresses.³⁶

Lutein and zeaxanthin have also been shown to increase bone density in young, healthy adults.³⁷ Lutein appears to stimulate bone mineralization and formation by suppressing bone resorption.

Lutein-Rich Foods

Lutein is primarily found in green leafy vegetables, with kale and spinach topping the list of lutein-rich foods. You'll also find it in orange- and yellow-colored fruits and vegetables. The word lutein actually comes from the Latin word "luteus," which means "yellow."

As a general rule, anywhere from 15% 47% of the total carotenoid content in dark green leafy vegetables is lutein.³⁸ Following is a list of foods that are particularly rich in lutein.^{39,40,41} Most of these also contain zeaxanthin, albeit in lesser quantities than lutein.

- Egg yolks
- Kale and spinach

- [Avocado](#)
- [Broccoli](#)
- Green, red and yellow peppers

Ideally, you'll want to buy the whole food and consume these foods as close to raw as possible, as the lutein (and other carotenoids such as zeaxanthin) are easily damaged by heat. Accessory micronutrients in the foods that enhance their action also tend to get easily damaged.

While there's no recommended daily intake for lutein or zeaxanthin, studies have found health benefits for lutein at a dose of 10 milligrams (mg) per day and at 2 mg/day for zeaxanthin.

How to Optimize Lutein Absorption

Lutein and other carotenoids are fat-soluble, so to optimize absorption, be sure to add a little bit of healthy fat to your meal. For example, research^{42,43} shows that adding a couple of eggs – which contain both lutein and healthy fats – to your salad can increase the carotenoid absorption from the whole meal as much as ninefold.

Ideally, opt for organically-raised, free-range pastured eggs. Not only do they tend to have a better nutritional profile, by opting for pastured eggs you'll also avoid pesticide exposure and genetically modified organisms. I raise six chickens and typically eat five eggs a day – the yolks raw in my smoothie and the whites cooked with my meat.

The vast majority of commercially available eggs come from concentrated animal feeding operations (CAFOs), where the hens are not permitted to forage on pasture. Instead, they're typically fed a diet of corn and soy, the vast majority of which are genetically engineered. CAFO eggs are also far more prone to cause foodborne illness caused by salmonella contamination.

If you live in an urban area, visiting a local health food store is typically the quickest route to finding high-quality local egg sources. Your local farmers market is another

source for fresh free-range eggs. Cornucopia.org also offers a helpful organic egg scorecard⁴⁴ that rates egg manufacturers based on 22 criteria that are important for organic consumers.

You can often tell the eggs are free-range by the color of the egg yolk. Foraged hens produce eggs with bright orange yolks, indicative of higher amounts of lutein and zeaxanthin. Another way to boost absorption of lutein from your vegetables is to add some raw organic butter or healthy oil such as olive or coconut oil to your salad.

Eat Right to Avoid AMD

To protect your vision over the long haul, aside from making sure you're eating plenty of lutein-rich foods, you'll also want to avoid a high-glycemic diet. As reported by Tufts University in 2017:⁴⁵

"Sheldon Rowan, a scientist in the Laboratory for Nutrition and Vision Research at the Human Nutrition Research Center on Aging at Tufts, said there are plenty of indications that the types of carbohydrates we eat play a role in the development of AMD.

People who eat lots of simple carbohydrates, like those in white bread and sweetened beverages, are more likely to get the disease. This could be because simple carbs break down rapidly during digestion, creating a spike in blood sugar that can lead to widespread inflammation, a condition linked to AMD ... If ... blood glucose stays low over a long period of time, Rowan said, it can lower incidence of AMD.

To understand why, Rowan tested the two diets on laboratory mice. Over the course of a year, he fed one group of mice 'high-glycemic' foods – ones with lots of simple starches. A second group got a 'low-glycemic' diet, rich in complex carbs, but otherwise identical in calories and nutrients. In a third group, Rowan switched the mice's diet from high- to low-glycemic foods halfway through the study.

Sure enough, mice with the low-glycemic diet did not develop AMD, while mice fed the high-glycemic diet almost all came down with the disease ... In the mice that switched diets, though, Rowan saw something completely unexpected. Not only did they avoid AMD, but the existing damage to their retinas was reversed.

'No one had ever seen that before,' Rowan said of the findings, which were reported in Proceedings of the National Academy of Sciences.⁴⁶ 'The most common form of AMD doesn't really have a treatment right now – but this suggests that just changing to a healthier eating pattern could have a huge impact.'"

Further exploration revealed that high-glycemic diets led to higher levels of advanced glycation end products (AGEs), which Rowan points out are “toxic end products of sugars” that “can damage the proteins and lipids that a cell needs to function.”

In the retina, the damaged proteins accumulate forming drusen, yellow deposits that damage your retinal cells.⁴⁷ Elevated insulin levels also affect the development of your eyeball, making it abnormally long, thereby causing near-sightedness.⁴⁸

Following my [nutrition plan](#) will help normalize your insulin level by reducing, or eliminating, excess sugar and processed grains from your diet.

Sources and References

- ^{1, 45, 47} [Tufts Now October 4, 2017](#)
- ² [Current Pharmaceutical Design January 2012; 18\(1\): 51-56](#)
- ^{3, 30} [Nutrition Insight August 5, 2019](#)
- ^{4, 5} [Senior Resource Guide, Study Links Lutein and Brain Health, Intelligence in Older Adults](#)
- ⁶ [American Optometric Association, Lutein and Zeaxanthin](#)
- ⁷ [Nutrients May 2013; 5\(5\): 1823-1839, Introduction](#)
- ^{8, 10} [Nutrients May 2013; 5\(5\): 1823-1839](#)
- ⁹ [Healio June 15, 2000](#)
- ¹¹ [PLOS ONE December 30, 2019 DOI: 10.1371/journal.pone.0227048](#)
- ¹² [Enhancedvision.com, Macular Pigment Density Testing](#)
- ¹³ [Nutrients May 2013; 5\(5\): 1823-1839, Lutein in Retinal Detachment, Experimental Studies](#)
- ¹⁴ [Nutrition July-August 2013; 29\(7-8\): 958-964](#)
- ¹⁵ [Life Extension Magazine August 2019](#)

- ¹⁶ Curr. Pharm. Des. January 2012; 18(1): 51-56
- ¹⁷ Arch Clin Neuropsychol. 2018 Nov 1;33(7):861-874
- ¹⁸ Frontiers in Aging Neuroscience June 9, 2017
- ¹⁹ Illinois News Bureau July 24, 2017
- ²⁰ Neuroscience News July 25, 2017
- ²¹ Science Daily July 25, 2017
- ²² Nutrients. 2017 Nov; 9(11): 1246
- ²³ J Int Neuropsychol Soc. 2018 Jan;24(1):77-90
- ²⁴ Age Ageing. 2014 Mar;43(2):271-5
- ²⁵ J Gerontol A Biol Sci Med Sci. 2017 Oct 1;72(10):1431-1436
- ²⁶ Invest Ophthalmol Vis Sci. 2018 Apr 1;59(5):1828-1835
- ²⁷ Front. Aging Neurosci., December 6, 2016 DOI: 10.3389/fnagi.2016.00297
- ²⁸ Study.com, Two Types of Intelligence
- ²⁹ Nutrients April 2019; 11(4):768
- ³¹ Nutr Metab Cardiovasc Dis. 2001 Aug;11(4 Suppl):78-81
- ³² American Journal of Epidemiology 2002 Mar 1;155(5):463-71
- ³³ Free Radic Biol Med. 2002 Jan 15;32(2):148-5
- ³⁴ Cancer Epidemiol Biomarkers Prev. 2001 Jul;10(7):749-56
- ³⁵ Antioxidants 2017 Dec 4;6(4). pii: E100
- ³⁶ Am J Chin Med. 2017;45(6):1273-1291
- ³⁷ Foods. 2017 Sep; 6(9): 78
- ³⁸ British Journal of Ophthalmology Aug 1998; 82(8): 907–910
- ³⁹ Self Nutrition Data Lutein + Zeaxanthin
- ⁴⁰ Nutrients 2013 Apr; 5(4): 1169–1185
- ⁴¹ USDA, Healthy Colors of Your Diet
- ⁴² Science Daily March 9, 2015
- ⁴³ Time Magazine March 30, 2015
- ⁴⁴ Cornucopia.org Organic Egg Scorecard
- ⁴⁶ Proceedings of the National Academy of Sciences May 30, 2017 114 (22) E4472-E4481
- ⁴⁸ Acta Ophthalmol Scand April 2002;80(2):125-35