

# Is This One of the Best Nutrients for Your Eyes and Brain?

Analysis by [Dr. Joseph Mercola](#)

✓ Fact Checked

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## STORY AT-A-GLANCE

- › Of all the known carotenoids, only lutein and zeaxanthin cross the blood-retina barrier to form macular pigment
- › Lutein is also found in the brain, hinting at its importance for cognitive function
- › Lutein, found in green leafy vegetables, egg yolks and more, helps form the retinal macular pigment, which is responsible for optimizing your visual performance and serves as a biomarker for the risk of macular diseases
- › Lutein is protective against age-related macular degeneration, cataracts, glaucoma and other eye diseases
- › Among young and older adults, lutein and zeaxanthin supplementation improves cognitive function

While there are about 850 known carotenoids, most are not found in the human body<sup>1</sup> and only lutein, zeaxanthin and astaxanthin cross the blood-retina barrier to form macular pigment.<sup>2</sup> Your retina is an extension of your brain,<sup>3</sup> where lutein also accumulates throughout the human lifespan, hinting at its importance for both vision and cognitive function.

In fact, if you have dementia, you're likely deficient in lutein, which crosses the blood-brain barrier and has a protective, anti-inflammatory effect.<sup>4</sup> While lutein is available in supplement form, it's also found in a wide variety of foods, including dark leafy greens, avocados and egg yolks.

# Lutein for Vision Health

Lutein concentrates in your macula,<sup>5</sup> which is the part of your retina responsible for central vision. Along with zeaxanthin and mesa-zeaxanthin (a metabolite of lutein), these three carotenoids form the retinal macular pigment, which not only is responsible for optimizing your visual performance but also serves as a biomarker for the risk of macular diseases.<sup>6</sup>

Lutein is also found in the lens, where it helps protect against cataracts and other age-related eye diseases.<sup>7</sup> Among carotenoids, lutein is the most efficient at filtering out blue light — the type that comes from cellphones, computers, tablets and LED lights.

Blue light induces oxidative stress in your eyes, which increases the risk of cataracts and macular diseases. Lutein, however, acts as a shield against it. According to a team of researchers from Harvard Medical School and The University of Hong Kong, writing in the journal *Nutrients*:<sup>8</sup>

*"As the peak wavelength of lutein's absorption is around 460 nm which lies within the range of blue light, lutein can effectively reduce light-induced damage by absorbing 40% to 90% of incident blue light depending on its concentration."*

*"The outer plexiform layer of the fovea, where the majority of axons of rod and cone photoreceptor cells are located, is the retinal layer having the highest density of macular carotenoids including lutein. Hence the photoreceptors are protected against photo-oxidative damages from blue light."*

Lutein also suppresses inflammation and the expression of vascular endothelial growth factor (VEGF),<sup>9</sup> which stimulates the formation of blood vessels and is upregulated in many tumors.<sup>10</sup>

"As inflammation and abnormal angiogenesis in retinal vasculature are major pathogenic mechanisms of many ocular diseases, lutein's functions in suppressing inflammatory response and VEGF expression make it effective in reducing the severity

of these diseases," the team noted.<sup>11</sup> Further, lutein may improve visual acuity while helping to reduce cell loss after injury.<sup>12</sup>

It is important to understand that VEGF can be very helpful or detrimental depending on the circumstances. When building muscle, VEGF expression is vital to nourishing Type 2 muscle fiber stem cells. However, if there is a disease process going on, then excessive VEGF levels can be pathologic. In healthy people, though, VEGF expression is generally considered healthy.

## **Lutein for AMD, Cataracts and Other Eye Diseases**

In my view the most important strategy to prevent age-related macular degeneration (AMD) is through the radically lowering of the omega-6 fat linoleic acid. AMD was virtually unknown prior to the refining of seed oils in the late 1800s. Now it is a leading cause of blindness.

Lutein also may help prevent AMD,<sup>13</sup> which is the leading cause of vision loss and blindness for Americans aged 65 and older.<sup>14</sup> By 2050, it's estimated that 288 million people worldwide will be affected, up from 196 million in 2020.<sup>15</sup>

Not only are higher blood levels of lutein and other carotenoids associated with a lower risk of AMD, but one study found people with the highest lutein and zeaxanthin intake had a 65% lower incidence of neovascular AMD compared to those who consumed the least.<sup>16</sup>

Lutein also shows promise for diabetic retinopathy, which affects one-third of diabetes patients.<sup>17</sup> Along with improving retinal thickness and function, lutein may lower the risk of development or progression of diabetic retinopathy.<sup>18</sup> Cataracts, which are estimated to affect over 90% of adults aged 70 and over, are also less common in people with higher lutein intakes.

In one study, those who consumed the most lutein had a 50% lower likelihood of cataracts than those who consumed the least.<sup>19</sup> Glaucoma, another leading cause of blindness worldwide, is also linked to lutein consumption. A systematic review revealed

that lutein enhanced neuroprotection of retinal ganglion cells, helping to preserve synaptic activity.<sup>20</sup>

Further, not only was greater consumption of carotenoids in the diet associated with a lower glaucoma risk, but higher carotenoid levels in macular pigment helped improve visual performance in eyes affected by the disease.<sup>21</sup> Even myopia, or nearsightedness, which causes faraway objects to appear blurry while close-up objects look clear, may have a lutein connection.

In a study looking into the effects of vitamin D and ultraviolet B exposure on myopia, it was found, unexpectedly, that subjects with the highest lutein concentrations had 40% reduced odds of myopia.<sup>22</sup>

## **Lutein Optimizes Brain Health, Too**

While lutein is well-known for its role in eye health, its role in brain health is being increasingly explored. The connection makes sense, since as your vision worsens with age, so too may your cognitive abilities.

Research shows visual impairment at a distance is associated with declining cognitive function over time, while "maintaining good vision may be an important interventional strategy for mitigating age-related cognitive declines."<sup>23</sup>

Meanwhile, studies support the beneficial effects of lutein on brain health. In a trial of young, healthy adults, supplementation with lutein and zeaxanthin improved levels of these carotenoids in the central nervous system along with boosting cognitive function.<sup>24</sup>

Among older adults with a mean age of 73.7 years, lutein and zeaxanthin supplementation also improved cognitive function, including boosts in complex attention and cognitive flexibility domains, compared to those taking a placebo.<sup>25</sup>

Men taking part in the study also had improvements in composite memory. These benefits were seen with a daily lutein and zeaxanthin dose equivalent to that found in

one-half cup of cooked kale or 1 cup of cooked spinach.<sup>26</sup>

A literature search involving eight clinical trials further revealed that lutein and zeaxanthin in the blood or macula are associated with cognitive performance, and "there is an inverse relationship between a higher amount of macular pigment in the blood and lower risk of mild cognitive impairments or Alzheimer's disease."<sup>27</sup>

In another example, among 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.<sup>28</sup> The researchers suggested eating more lutein-rich foods could therefore benefit your brain in middle age:<sup>29</sup>

*"While some age-related cognitive decline is to be expected in healthy aging, our data suggest that these effects may be less pronounced among adults with greater retinal carotenoid status, a marker of dietary patterns characterized by greater intake of green and leafy vegetables. Furthermore, these practices may provide neuro-cognitive benefit before the onset of older age, in early to middle adulthood."*

## **Lutein Is Also Good for Cardiometabolic Health**

Lutein's ability to protect against oxidative stress may also boost cardiometabolic health, according to a systematic review and meta-analysis. Both higher dietary intake and higher blood concentrations of the carotenoid were associated with better cardiometabolic health, including a lower risk of metabolic syndrome, coronary heart disease and stroke.<sup>30</sup>

Lutein may support optimal cardiometabolic health by inducing beneficial vascular changes and offering antioxidant and immunomodulatory effects. Lutein's anti-inflammatory effects also appear to be systemic, not restricted to the eyes, including an association with lower c-reactive protein (CRP),<sup>31</sup> a measure of heart disease risk.

## **Top 10 Sources of Lutein**

Your body cannot make lutein, so you must get it from your diet. Following are 10 foods that are particularly rich sources of lutein.

Dark leafy greens	Carrots
Broccoli	Egg yolks
Red and yellow peppers	Sweet corn
Avocados	Raspberries
Cherries	Paprika

Lutein and other carotenoids are fat-soluble, so to optimize absorption be sure to consume it along with a source of healthy fat, such as coconut oil or grass-fed butter. Because organic, pastured egg yolks contain fat, they're among the healthiest sources of lutein. 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.

Further, consuming eggs along with vegetables that contain lutein may increase its absorption. In fact, eating whole eggs along with a raw mixed-vegetable salad increased absorption of lutein and zeaxanthin by four- to five-fold.<sup>32,33</sup>

While there's no recommended daily intake for lutein, one study found, "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."<sup>34</sup> Another paper, published in 2019 in PLOS ONE, found benefits to vision in those who took 10 mg or 20 mg of lutein per day, explaining:<sup>35</sup>

*"Our stratified analyses suggest the importance of providing lutein at sufficiently high doses and durations: daily doses of at least 20mg showed efficacy within 6 months, compared to 1 year for daily doses of 10mg. However,*

*at least one study showed that 10 mg lutein had the same effect as 20 mg per day, which contradicts our results.*

*This raises the possibility that the efficacy of lutein supplementation depends on multiple factors. In any event, lutein or zeaxanthin appears to be safe in rats at up to 400mg/kg per day, and lutein appears to be safe in humans at up to 20mg per day."*

While the optimal dose of lutein in supplement form is still being determined, increasing your intake of lutein-rich foods is a simple and effective way to boost your levels of this important nutrient.

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