

Lutein from OptiLut®



INGREDIENTS



Doctor's Best Lutein with OptiLut® features Marigold extract, a potent source of lutein standardized to contain 90% lutein esters. Marigold flowers are the most abundant source of lutein in nature. An oral bioavailability study of lutein that examined two formulations discovered that the lutein ester formulation was nearly 62% more bioavailable than the non-esterified form of lutein.¹ Lutein and zeaxanthin are yellow pigments in a class of carotenoids called

xanthophylls. Since the human body does not synthesize them, we rely on dietary sources for these carotenoids.^{2,3} The average American consumes only 2 mg per day of lutein and zeaxanthin (the best sources are dark leafy-greens like spinach, collards, and kale, in addition to certain yellow-orange fruits & vegetables).⁴ Lutein and zeaxanthin are referred to as "the macular pigments," as they are the only carotenoids found in the lens and macular tissue in the human eye retina. While they are well-known for their impact on visual function and health, they also play an important role in cognitive function and brain health.⁵⁻⁹ OptiLut® is a registered trademark of NutriScience Innovations.

BENEFITS

- Supports visual function*
- Supports cognitive acuity*
- Helps neutralize free radicals*
- Helps reduce eye fatigue with prolonged screen time*
- Non-GMO / Soy Free / Gluten Free

EXTENDED BENEFITS

Supports visual function*

A substantial collection of research has shown that lutein and zeaxanthin are the main natural carotenoids that may support visual function.* Various studies showed that lutein and zeaxanthin supplementations may result in their increased levels in the eye leading to an improved visual function and performance.*¹⁰⁻¹¹ Known as "the eye-protective nutrients," they help protect the macula from oxidative damage by absorbing light irradiation and quenching free radicals originated from photo-damage.*^{10,12-13}

Supports cognitive acuity*

While lutein and zeaxanthin are two nutrients well-known to support eye health, new science has added evidence for their roles in supporting cognitive acuity and performance as well as brain health.*^{6,14} In fact a growing literature has highlighted the importance of healthy nutrition in successful aging and showed that lutein and zeaxanthin are two main nutrients in the xanthophyll carotenoid family that have displayed beneficial cognitive outcomes in young children and adults.*^{9,15-17}

Helps neutralize free radicals*

The macular pigment is highly concentrated in the *macula lutea* of the retina and is known to be responsible for sharp central vision. Research has demonstrated that lutein and zeaxanthin are the main dietary carotenoids that accumulate in the retina, particularly the macula region and since they are found in high concentrated amounts in the macula, they are known as macular pigments.¹⁸ They play a key role in protecting human eye vision of all ages from the oxidative photo-damage caused by high-energy/high-frequency light through their powerful antioxidant activity and by filtering out high-energy/high frequency light.¹⁸⁻²¹

Helps reduce eye fatigue with prolonged screen time*

The shorter wavelengths of visible light, also known as high-energy/high-frequency light, represent the greatest hazard to human ocular health because they contain greater energy that can induce damages to retinal tissues by inducing free radicals.²²⁻²³ Unfortunately, due to our modern life, we are constantly exposed to high-energy/high-frequency light coming from sunlight and artificial light which sources include LED and fluorescent lighting, digital and electronic devices: computers, smartphones, tablets, television screens. Over

Lutein from OptiLut Supplemental Facts

Supplement Facts

Serving Size 2 Veggie Capsules
Servings Per Container 60

	Amount Per Serving	% Daily Value
Lutein (as OptiLut® Lutein Esters extracted from marigold flower (<i>Tagetes erecta</i>))	20 mg	†
Trans-Zeaxanthin (as OptiLut® marigold flower ext., (<i>Tagetes erecta</i>))	4 mg	†

† Daily Value not established.

Other Ingredients: Microcrystalline cellulose, hypromellose (vegetarian capsule), silicon dioxide, magnesium stearate (vegetable source).

Suggested Adult Use: Take 2 capsules daily with or without food, or as recommended by a nutritionally informed physician.

Non-GMO / Gluten Free / Soy Free / Vegan

Store in a cool dry place.

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time, high-energy/high-frequency light exposure can lead to short-term eye strain effects (due to the great amount of time spent in front of computers, smartphone screens) with fatigue and dry eye, irritated eyes and difficulty focusing, but also to long-term high-energy/high-frequency light damaged retinal cells.²⁴⁻²⁷ Studies have demonstrated that lutein and zeaxanthin are the main macular pigments that can support health vision against the potentially damaging high-energy/high-frequency light exposure.^{*28-30}

CLINICAL STUDIES

Lutein antioxidant supplementation trial (LAST) was conducted to determine whether nutritional supplementation with lutein or lutein together with antioxidants, vitamins, and minerals improves visual function. The study was a prospective, 12-month, randomized, double-masked, placebo-controlled trial conducted with 90 participants. The researchers concluded that visual function is improved with lutein alone or lutein together with other nutrients promoting macular health and supporting the eyes during aging.^{*31}

The CLEAR study investigated the effect of supplementation with lutein capsules (10 mg/day) on macular pigment optical density and visual acuity. Based on the results, the researchers suggest that increasing MP, either by food or dietary supplementation of lutein, can be expected to provide the basis for a viable management strategy for early onset of eye problems in the elder population.^{*32}

Findings from the COMPASS study suggest that MP augmentation is beneficial for visual performance under glare conditions. Healthy young subjects who received lutein + zeaxanthin reported better visual performance for daily visual tasks (including night driving against oncoming headlights) and those with the highest MP reported better capacity to deal with sudden changes in illumination.³³

A randomized, double-blind, placebo-controlled, 1-year study was conducted to examine the effect of lutein supplementation on visual function in 120 healthy drivers with long-term light exposure. The active group consumed 20 mg of lutein daily. Participants were assessed at baseline, 1, 3, 6, and 12-month. Assessment included visual acuity, serum lutein concentrations, macular pigment optical density (MPOD), and visual performance. The researchers concluded that supplementation with 20 mg of lutein daily resulted in improvements in terms of contrast sensitivity and glare disability. Lutein nutritional supplementation may be useful to maximize visual performance.^{*34}

To test if lutein and zeaxanthin influence the processing of visual lead to increased visual processing speeds, healthy young subjects were randomly assigned to one of three treatment groups: zeaxanthin taken daily, zeaxanthin + lutein + mixed n-3 fatty acids taken daily, and placebo. Supplementation with zeaxanthin and the mixed formulation produced significant increases in visual motor reaction time compared to placebo. In general, increasing macular pigment density through supplementation resulted in significant improvements in visual processing speed.^{*35}

Studies have suggested that the macular pigment may play a role in reducing the effects of "blue haze" when viewing distant objects through the atmosphere because of preferential scattering of short wavelength light.³⁶ Researchers found that lutein supplementation alone or in combination with

zeaxanthin improved contrast acuity. These results suggest that xanthophyll supplementation may improve visual performance during activities such as driving at night.^{*37}



In another study, to determine whether supplementation with lutein and zeaxanthin improves macular pigment and promote macular health, participants aged 50 to 79, were randomly assigned to receive 10 mg/day lutein, 20 mg/day lutein, 10 mg/day lutein plus 10 mg/day zeaxanthin, or placebo for 48 weeks. The researchers concluded that early functional abnormalities of the central retina in early AMD patients could be improved by lutein and zeaxanthin supplementation. These improvements may be potentially attributed to MPOD elevations.^{*38}

A 2-year randomized, double-blinded, and placebo-controlled trial was conducted to determine the effects of lutein/zeaxanthin on serum concentration, MPOD (macular pigment optical density), and visual performances in patients with early signs of eye problems. One hundred-twelve patients (over 50 year old) were randomly given either lutein alone (10 mg), lutein alone (20 mg), a combination of lutein (20 mg) + zeaxanthin (10 mg), or placebo, daily for 2 years. Serum concentration of lutein/zeaxanthin, MPOD, visual functions including best-spectacle corrected visual acuity (BCVA), contrast sensitivity (CS), and vision-related quality of life (VFQ25) were also quantified. Based on the results, this trial demonstrated that 2 years of lutein/zeaxanthin supplementation increased serum lutein/zeaxanthin concentrations, MPOD, and visual performances in patients with early eye problems, without leading to any detectable adverse effect. The researchers concluded that early functional abnormalities of the central retina in early AMD patients could be improved by lutein and zeaxanthin supplementation. These improvements may be potentially attributed to MPOD elevations.^{*39}

A study assessed whether higher macular pigment optical density (MPOD) and lutein (L) and zeaxanthin (Z) supplementation are related to improvements in glare disability, photostress recovery, and chromatic contrast. A randomized, double-blind, placebo-controlled study was then conducted to evaluate the visual effects of one year of supplementing with the combination lutein/zeaxanthin: L+Z (lutein 10 mg/day + zeaxanthin 2 mg/day). One hundred fifteen young, healthy subjects were recruited and randomized into the study (58 subjects received placebo and 57 subjects received L+Z). Several dependent measures were collected at baseline and then once every 3 months: serum L+Z, MPOD, and photostress recovery were measured and assessed accordingly during the length of the study. The study concluded that daily supplementation with L+Z resulted in significantly increased serum levels and MPOD and improvements in chromatic contrast and recovery from photostress. These results are consistent with past studies showing that increasing MPOD leads to improved visual performance.^{*40}

One of the latest studies conducted by Machida *et al.* in 2020 highlighted the effectiveness of lutein supplementation on visual function. A randomized double-blind placebo-controlled parallel-group clinical trial was conducted among

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59 healthy adults aged 20-69 years. The study diet included a placebo (placebo group) or a diet supplemented with 12 mg of lutein (lutein group). Each study diet was continuously administered for 16 weeks. The study aimed to determine the effects of lutein administration on MPOD, contrast sensitivity, and glare sensitivity, and changes in serum lutein levels. Compared with the placebo group, the lutein group showed significantly improved MPOD, contrast sensitivity, and glare sensitivity at week 16 and significantly increased serum lutein levels at weeks 8 and 16. The authors concluded that continuous administration of lutein for 16 weeks, considering its bioaccessibility, increased MPOD, making the outlines of visible objects clearer and was effective in inhibiting decreases in visual function caused by glare from light.*41

A study investigated the association between plasma lutein and zeaxanthin and domain-specific cognitive performance in over 4,000 adults aged 50 years or older from The Irish Longitudinal Study on Ageing. Mixed-effects models were fitted with adjustment for demographic and socioeconomic factors, health conditions, and health behaviors. They found an independent positive association between plasma concentrations of both lutein and zeaxanthin and performance on three of the four domains assessed—global, memory, and executive function. Based on the study, blood levels of lutein and zeaxanthin are closely associated with better cognitive, memory, and executive (prioritizing and decision-making) function. Higher blood levels of zeaxanthin specifically are associated with better processing speed.*17

A randomized controlled trial investigated the relation of lutein (L) and zeaxanthin (Z) to brain function using functional magnetic resonance imaging (MRI). A total of forty-four older adults were randomly assigned to receive either placebo or L+Z supplementation (12 mg/daily) for one year. Neurocognitive performance was assessed at baseline and post-intervention. Results showed lutein and zeaxanthin appeared to buffer cognitive decline on the verbal learning task. The authors concluded that lutein and zeaxanthin supplementation may have beneficial neurocognitive function by enhancing cerebral perfusion.*42

A double-blind, randomized, placebo-controlled trial examined if one year of supplementation with lutein (L) and zeaxanthin (Z) could impact structural brain outcomes in older adults. Community-dwelling older adults (20 males and 27 females) aged 65–87 years were randomized into supplement (10 mg L + 2 mg Z daily) and placebo groups. The authors found that higher lutein and zeaxanthin blood levels—and higher density of these carotenoids in the retina—are associated with improved integrity of the brain's white matter tracts that are considered as long "cables" that provide network connections between brain regions that are known to deteriorate with age.*14

A randomized, double-masked, placebo-controlled trial was designed to investigate whether or not supplementation with lutein and zeaxanthin could improve cognitive function in young (age 18–30), healthy adults. Fifty-one young, healthy subjects were randomized into active supplement (n = 37) and placebo groups (n = 14). MPOD was measured psychophysically using customized heterochromatic flicker photometry and cognitive function was measured using the CNS Vital Signs testing platform. Results showed supplementation increased MPOD significantly over the course of the year contrary to the placebo group. More, daily supplementation with L + Z and increases in MPOD resulted in significant improvements in spatial memory

($p < 0.04$), reasoning ability ($p < 0.05$) and complex attention ($p < 0.04$). They authors concluded that supplementation with L + Z may improve brain xanthophyll levels and cognitive function in young, healthy adults.*43

Barnett *et al.* conducted the first study to demonstrate that retinal lutein and zeaxanthin, measured as MPOD (Macular pigment optical density), is positively related to academic achievement in children, even after accounting for the robust effects of IQ and other demographic factors. Their findings extend the positive associations observed between the density of lutein and zeaxanthin in the macula of the retina and cognitive abilities in school-age children.*44

The antioxidant effect of lutein was successfully demonstrated in a small pilot study involving 20 healthy term newborns. They received lutein or placebo at 12 and 36-hour after birth. From the results, the researchers concluded that lutein supplementation greatly helped in increasing the biological antioxidant potential (BAP) of the plasma in treated newborns.*45

Two studies found that lutein and zeaxanthin supplementation helps protect the eye's lens against sustaining damage from light energy through their powerful antioxidant activity. These studies suggest that higher intakes of lutein and zeaxanthin contribute to maintaining the lens structural integrity.*46-47

The B.L.U.E. study was a 6-month randomized, double-blind, placebo-controlled supplementation trial with 48 healthy young adults who were exposed to a screen time exposure of at least 6 hours daily. Subjects were randomly assigned to either placebo or MC (Macular Carotenoid Supplementation with Lutemax®2020 formulation) supplement. Subjects were evaluated at baseline, 3-months and 6-months for MPOD (Macular Pigment Optical Density). Markers of visual performance (including contrast sensitivity, photostress recovery and disability glare), sleep quality, and physical indicators of excessive screen use were measured. The results showed that supplementing with Lutemax®2020 significantly improved macular pigment optical density, visual performance and indicators of excessive screen use, including eye strain and fatigue and headache frequency. Sleep quality also improved significantly.*30

Supplementing the diet with lutein and zeaxanthin can improve visual performance and help counter challenges such as photo-stress and glare.*48-49 Healthy subjects, aged 17-41 years, received 10 mg of lutein and 2 mg of zeaxanthin daily, for 6 months. Visual performance under conditions of high glare and photo-stress improved and was significantly correlated with increased macular pigment density.*48

Modern society constantly places demands for long hours of visual task performance. These demands lead to visual fatigue and discomfort in the eyes. A randomized, double-blind, placebo-controlled cross-over study with a 2 week-washout period applied psychophysiological methods to examine whether supplementation with a combination of lutein, zeaxanthin and blackcurrant extract could help reduce

symptoms of visual fatigue. Overall, the results suggested that a combination of lutein and zeaxanthin can help recovering from visual fatigue.*⁵⁰

After toxicology studies were conducted, purified crystalline lutein has been established to be “generally recognized as safe” (GRAS), allowing the use of lutein in several food and beverage applications.⁵⁰ Furthermore, lutein and zeaxanthin supplements have been safely used in animal and clinical trials.^{31,51-52}

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