

Lutein with Lutemax[®] 2020



INGREDIENTS

Lutein with Lutemax[®] 2020 supplies lutein (L, for short), zeaxanthin (Z), and meso-zeaxanthin (MZ), three carotenoid nutrients clinically-proven to benefit vision and eye health.¹⁻⁸ This carotenoid triad is highly concentrated in the retina, other eye tissues and in the brain.⁹ Preliminary studies also suggest L, Z and MZ can enhance brain functions.^{9,11,22,23} Lutein with Lutemax[®] 2020 is sustainably-produced from marigold flowers, naturally rich in L, Z and MZ.

Both L and Z are vitamin-like nutrients for humans and primates such as monkeys.¹⁰ For monkeys, removing L and Z from the diet results in impaired visual function.¹² The standard American diet provides very low intakes—only about 1-3 mg per day of L plus Z, mostly from vegetables and fruits.¹³ Research suggests higher intakes could support optimal eye and brain health.^{4,5}

L, Z, and MZ are classified as xanthophyll carotenoids because they contain oxygen, built into hydroxyl groups.¹³ This gives them properties distinct from beta-carotene and other carotenoids, making L, Z and MZ specially-suited to occupy unique positions within cell membranes.^{13,14} The latest Age-Related Eye Disease Study (AREDS-2) found that replacing beta carotene with L and Z provides superior risk reduction for macular degeneration, the most common cause of visual loss after age 60.¹⁵

Lutein and zeaxanthin are at least 500 times more concentrated in the retina than the blood, due to proteins that bind tightly with L and Z, transport them from the blood to retinal tissue, and then deliver them into light-sensing retina cells.¹⁶ Lutein predominates in the iris, lens and retina. Zeaxanthin tends to accompany lutein and is most concentrated in the retina. Meso-zeaxanthin can be generated from lutein in the macula, and is highly concentrated in the central retina that receives the most light (and is therefore most vulnerable to UV and blue light damage).¹⁷

The accumulation of L+Z+MZ in the macula gives it an intense, yellowish-orange color, a “macular pigment” (MP) measurable using optical methods such as MP density.¹⁷ L+Z+MZ levels in the retina closely match MP density, so MP density is widely used to infer vision function.

BENEFITS

- Protects eyes from damaging UV and blue light*
- Enhances visual function*
- Promotes macular health*
- Supports eyes during aging*
- Supports the brain and brain visual processing*

EXTENDED BENEFITS

Promotes eyes from damaging UV and blue light*

Many people protect their eyes from ultraviolet (UV) light to help preserve vision and maintain eye comfort.

L+Z+MZ helps protect our eyes from UV light.^{18,19} A more recently-recognized issue that can damage our eyes over time is blue light from ever-increasing use of smartphones, computers, tablets and even LED lights.^{20,21} The L+Z+MZ triad acts as a yellow filter, screening out shortwave blue light, helping protect eyes and ensuring clear vision.¹⁹⁻²¹

All cells are organized around membranes, thin continuous molecular sheets forming cells' outer border, along with functionally-specialized compartments within the cell interior.¹⁴ In the eye, retina are cells concentrated with L, Z and MZ. They provide effective protection against light damage and are biochemically-important for optimal vision.^{13,14}

Enhances Visual Function*

Supplementing the diet with L+Z+MZ can improve visual performance and help counter visual challenges.^{13,6} Macular pigment density has been linked to eye capacity in coping with glare, photostress recovery (time to

Supplement Facts

Serving Size 1 Softgel
Servings Per Container 60 & 180

	Amount per serving	% Daily Value
Lutein (from Lutemax [®] 2020 marigold flower extract)	20 mg	†
Zeaxanthin (from Lutemax [®] 2020 marigold flower extract) (containing minimum 1 mg meso-zeaxanthin)	4 mg	†

† Daily Value not established.

Other Ingredients: Sunflower oil, softgel capsule (gelatin, glycerin, purified water).

Suggested Adult Use: Take 1 softgel daily, with or without food, or as recommended by a nutritionally-informed physician.

Non-GMO / Gluten Free / Soy Free

Store in a cool dry place.

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recover sight following intense light exposure), and other visual challenges.⁸

In a clinical trial of 39 healthy subjects, aged 17-41 years with no history of vision problems, each received 10 mg of L and 2 mg of Z per day, for 6 months.¹ Visual performance under conditions of high glare and photostress (high-intensity light exposure) improved, and was significantly correlated with MP density increase, that is, with L+Z+MZ buildup in the retina. Visual performance showed significant improvement by 4 months into the trial. A separate clinical trial with 115 young, healthy participants showed similar results: daily supplementation with L+Z resulted in significantly increased serum levels, MP and improved chromatic contrast and recovery from photostress. The researchers concluded that their results are consistent with past studies showing that increasing MP improves visual performance.²

In another trial,³ 121 healthy subjects aged 18-41 years were divided into a group that received 10 mg of L and 1 mg of Z per day (active group), and a placebo group. Over the 12-month dosing period, MP increased significantly. From questionnaire self-scoring, the L+Z group scored significantly better than placebo for night driving against oncoming headlights.

These researchers further analyzed their data, comparing the one-third of active group subjects achieving the highest MP density at 12 months against the one-third with the lowest MP density.³ The high-MP subgroup had 30% more improved contrast sensitivity under high glare, compared to the low-MP subgroup. The high-MP subgroup also reported significantly better capacity to deal with sudden changes in illumination (light/dark adaptation) than the low-MP subgroup.

The L+Z+MZ triad also helps protect the eye lens against damage from light energy. Two meta-analyses (data analyses from multiple clinical trials) suggest higher intakes of L and Z contribute to maintaining lens structural integrity.^{4,5}

Two leading vision researchers described L+Z+MZ as “analogous to internal sunglasses” that help counter glare discomfort and disability, shorten photostress recovery times, enhance color contrast, and increase visual range (how far one can see in the distance).⁶ They discussed how these nutrients might help baseball players.

Looking into the bright sun outdoors, or bright overhead lights in an indoor stadium, can cause glare or photostress. Suspended particles in the air can create “blue haze” that impairs distance vision. These researchers reviewed the considerable evidence that blue-wavelength light, most responsible for these effects, is screened out by L+Z+MZ.⁶

Promotes Macular Health*

The macula is the center of the retina and is most directly exposed to light focused on it by the lens. Its MP content helps minimize blue haze and glare, which can degrade the image, while maximizing contrast sensitivity and light/dark adaptation. For the macula and the rest of the retina, the L+Z+MZ triad is a unique asset.²³ L+Z+MZ also contribute to such fundamental cell processes as gene regulation, cell growth and maturation, and cell-to-cell signaling.²⁴

Macula cells have extensive cell membranes, rich in polyunsaturated fatty acids, rendering these cells highly vulnerable to free radical attack.⁹ Further, their intense metabolic activity requires high oxygen levels, amplifying the free radical threat. L+Z+MZ helps protect the macula and the entire vision system against this threat.²³

The L+Z+MZ triad works synergistically—their combined protective actions surpass those of any one alone.²⁵ Their molecules can span the membrane's entire width, allowing them to both intercept free radicals within the membrane and to help neutralize free radicals in the water-phase “cytoplasm” at the membrane edge.²⁶

Supports Eyes During Aging*

Macular pigment density declines with age, beginning around age 60.²⁷ Negative lifestyle factors such as cigarette smoking can exacerbate this decline. In a study of 484 subjects aged 18 to 70 years, smoking was significantly linked to loss of MP density. Subjects who had never smoked had significantly greater MP than current smokers.²⁸



Retinal MP density has been linked to eye lens health in later life. A study of 376 individuals aged 18-75 years found MP density significantly correlated with lens tissue density.²⁹ For subjects over 50, the higher their macular density, the lower their lens density. Low lens density is healthy because it allows light to pass freely through the lens without damaging the lens tissue itself. The researchers concluded that L and Z intake supports healthy eye lenses with age. Similarly, another clinical trial with 112 early age-related macular degeneration patients concluded that L supplementation increased MP density and visual sensitivity.²⁹

MZ may be more important for vision than previously assumed. Though supplementation with just L+Z can improve contrast sensitivity and light-dark adaptation,^{2,3} evidence strongly suggests MZ is required for vision.⁸ Though rare or absent from most diets, MZ makes up fully one-third of the total macular pigment and its abundance at the center of the macula is a clue to its importance.¹³ MZ may specifically improve contrast sensitivity and enhance overall vision.¹⁶

Supports the Brain and Brain Visual Processing*

Evidence is growing that L and Z are also important for the brain. First, in-depth studies with monkeys established that L and Z brain levels can be accurately predicted from their macular pigment levels, and this prediction was extended to humans.^{10,16} From human brain studies, it is clear that L and Z are concentrated in the brain's visual cortex, which does initial processing of visual stimuli, in the motor cortex, which can generate movement in response to visual stimulation; and in the frontal cortex, which helps generate conscious response to visual stimulation.⁹ L and Z in the human brain may contribute to eye-brain coordination and “visuomotor” functions (visual and motor cortex coordination). In a study with healthy subjects aged 24-76 years, higher retinal MP density (and by extension, higher brain levels of L and Z) were significantly linked with faster visual-motor response time.⁹ Higher MP was also significantly linked to longer “balance time” (length of time a subject could stand on one leg), a measure of motor function.

Another clinical trial of 69 young, healthy adults supplemented with L and Z concluded that L and Z can increase processing speed even in young, healthy subjects.²² Using baseball as an example,⁶ a batter with faster visual processing speed can “take more snapshots” of the pitch as it approaches home plate. With less than one-tenth of a second to decide on a 95-mph fastball, the added processing speed from higher L+Z+MZ intake could be helpful to a hitter. This is relevant for anyone wanting to optimize their vision, mind-body coordination or other skills.

Another study measured cognitive function in older adults and correlated them with MP densities.²⁴ For 24 subjects with some cognitive impairment, higher MP density was significantly related to better performance on the MMSE (Mini-Mental Status Examination), on the RBANS (Repeatable Battery for Assessment of Neuropsychological Status), and on specific tests of attention, language ability, and spatial-constructional ability. For 29 subjects without measurable cognitive impairment, higher MP was significantly linked to spatial-constructional ability.

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There is preliminary evidence that supplementation with L+Z can improve cognition. In a double blind, placebo-controlled trial with healthy women aged 60–80 years,¹¹ 11 women were randomly allocated to receive L (12 mg per day) plus Z (about 0.5 mg per day), and 10 women received a placebo, for 4 months. The L+Z group scored higher than placebo group on verbal fluency – ability to retrieve words from long-term memory in a short period of time. This positive result with small groups makes a case for larger, more in-depth trials with L and Z for brain health.

Lutein, zeaxanthin and meso-zeaxanthin are vitamin-like nutrients important for vision, eye-brain coordination, and quality of life. Emotional, chemical, physical, and other stresses of modern living can deplete nutrients from the body and consequently increase daily nutritional requirements.³⁰ With ever-increasing exposure to blue light from smartphones, computers, tablets and LED lights, Doctor's Best Lutein with Lutemax is a prudent supplement, especially considering most Americans do not get optimal intakes of these carotenoids.

SCIENTIFIC REFERENCES



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