LUTEIN

Name of supplement: Lutein

Scientific name(s): Beta, Epsilon-Carotene-3, 31-diol[1]
Other [common] names: Xanthophyll, Zeaxanthin[1]

Description of active ingredients: Lutein, like beta-carotene and vitamin A, is a carotenoid vitamin; zeaxanthin is its stereoisomer.[1]

MOA: Lutein and its stereoisomer zeaxanthin, major carotenoids, are endogenously found in the macula and retina of the human eye, as a color pigment. The pigment potentially acts as a blue light filter to protect the deeper tissues of the eye from damage from sunlight.[1] Lutein is thought to act as an antioxidant, [1] immunostimulant and photoprotectant.[2]

Current indications and efficacy:

- Reducing the risk of age-related macular degeneration[1, 3] (dietary source possibly effective, while benefits are still unknown from supplemental sources) [1]
  - The Blue Mountain Eyes Study was conducted in Australia between 1992 and 1999, and had 3654 Caucasian participants, aged 49 years of age or older. This cohort study looked at dietary antioxidant consumption, including lutein and zeaxanthin intake averaging 829 μg/day, via self-reported Food Frequency Questionnaire, and the possible correlation of early age-related maculopathy (ARM). Although the study was powered to find a 50% risk reduction for early ARM, it could not find evidence of protection associated with usual dietary intake of antioxidants.[4]
  - An Italian study by Falsini et al. was published in January 2003, and studied 30 patients aged 55-84 years old to evaluate whether short-term antioxidant supplementation (6-12 months) may influence retinal function in ARM. These patients were given either a daily oral combination of lutein 15 mg, Vitamin E 20 mg and nicotinamide 18 mg or placebo and then underwent focal electroretinograms (FERGs) to study changes in retinal function. FERGs are altered in early ARM eyes. Falsini concluded that this antioxidant supplement combination was associated with statistically significant macular changes in patients with early ARM. However, further randomized, placebo-controlled trials are warranted to confirm these findings.[5]
  - The most current journal articles written about lutein and its ability to reduce incidence or prevent macular degeneration or cataracts are inconclusive and state that further randomized controlled trials need to be conducted. Many studies have observed a correlation between serum lutein levels and eye health improvement, but substantial amounts of evidence do not exist yet to recommend this product to certain populations.[4,5]
- Reducing the risk of developing cataracts[1, 3] (dietary source possibly effective, while benefits are still unknown from supplemental sources) [1]
  - Patients with cataracts have higher concentrations of hydrogen peroxide and lipid peroxidation products in the lens and aqueous humor. Antioxidant intake may protect against the oxidative modification of the lens and decrease the incidence of developing cataracts. Although other carotenoids have been studied for this purpose to some extent, lutein and zeaxanthin may be of particular importance because they are the only carotenoids found in the human lens.[6]
  - The Nurses' Health Study followed more than 50,000 nurses between 45 and 71 years of age for 12 years, and added more than 27,000 more subjects to the study population as they reached 45 years of age. The purpose of this prospective cohort analysis was to determine of a correlation exists between specific dietary carotenoid intake and risk of cataracts severe enough to require extraction. The cohort authors concluded that

subjects with the highest intake of lutein and zeaxanthin had a 22% risk reduction (RR 0.78) of cataract extraction than subjects with the lowest intake of these specific carotenoids. However, they say further assessment and other trials are needed to better define this correlation.[7]

- In an English study of 372 men and women, aged 66 to 75 years, investigators compared serum concentrations of various antioxidants with ophthalmologist findings and concluded that a carotenoid-rich diet may offer some protection against cataract development. However, due to the observational study methods and limitations of the study, randomized, controlled trials are needed to confirm the results.[6]

- Reducing risk of developing colon cancer[1, 3] (dietary source possibly effective, while benefits are still unknown from supplemental sources) [1]
  - Carotenoids may be effective in cancer because of "their effect on regulation of cell growth, modulation of gene expression, and possibly, immune response." [8] They have been shown to have an inverse relationship with cancer in several studies, but the relationship with colon cancer is unknown.[8]
  - A Kaiser population case study including 2410 subjects was published in 2000. Investigators identified patients recently diagnosed with colon cancer and then investigators asked them to recall their dietary intake for the two years prior to diagnosis. A significant association was found between dietary lutein intake and colon cancer diagnosed in patients younger than 67 years of age, as well as an "inverse linear trend with increasing lutein intake." [8] The authors concluded that dietary lutein may reduce the risk of colon cancer.[8] However, more studies need to be performed before recommending lutein to this population as well.

Contraindications/allergies: None known.[1]

Dosage forms, recommended doses, duration:

- **Dosage forms**
  - Dietary sources
    - broccoli (3 mg lutein/cup)[1]
    - cooked spinach (26 mg lutein/cup)[1]
    - cooked kale (44 mg lutein/cup)[1]
    - also found in corn, orange pepper, kiwi fruit, grapes, orange juice, zucchini, squash
  - Supplemental sources:
    - Lutein only:
      - GNC Lutein capsules (20 mg lutein, 1 mg zeaxanthin)
      - Nature's Bounty Lutein softgels (20 mg lutein)
    - In combination with other vitamins and minerals
      - Ocuvite® with Lutein capsules (6 mg lutein)
      - Icaps® tablets (4 mg lutein)
      - OcuGuard® Plus with Lutein capsules (10 mg lutein)
      - Many more available[9]
- **Recommended doses**
  - 6 mg[1] – 10 mg[2] dietary lutein per day to prevent age-related macular degeneration
  - Supplements should be taken with high-fat meals to increase absorption
  - No recommended dose found for supplemental lutein, but benefits are still unknown in this dosage form
- **Duration**
  - Dietary lutein should be consumed daily to see potential effects, [5] shown after approximately one month for macular degeneration, [10] but long term effects (after 1 year[5] and after 5 years[4]) have not been proven in clinical trials.

Drug-drug and/or drug-disease interactions: none known

Other safety issues:

- **Pregnancy or lactation:** Lutein is safe for most people, but pregnant or lactating women should limit their intake to the amounts found in foods.[1]
- **Herb-supplement interactions:** beta-carotene may reduce bioavailability of lutein[1]
- **Food interactions:** olestra lowers serum concentrations of lutein in healthy people, so may work similarly with lutein supplements.[1]

References:

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8. Slattery ML, Benson J, Curtin K, Ma KN, Schaeffer D, Potter JD. Carotenoids and colon cancer. Am J Clin Nutr 2000 Feb; 71(2):575-82.
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