

Lutein and zeaxanthin dietary supplements raise macular pigment density and serum concentrations of these carotenoids in humans.

J Nutr. 2003 Apr;133(4):992-8

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Age-related macular degeneration (AMD) is thought to be the result of a lifetime of oxidative insult that results in photoreceptor death within the macula. Increased risk of AMD may result from low levels of lutein and zeaxanthin (macular pigment) in the diet, serum or retina, and excessive exposure to blue light. Through its light-screening capacity and antioxidant activity, macular pigment may reduce photooxidation in the central retina. Lutein supplements, at 30 mg/d, were shown previously to increase serum lutein and macular pigment density in two subjects. In this study, we compared the effects of a range of lutein doses (2.4- 30 mg/d), as well as a high zeaxanthin dose (30 mg/d), on the serum and macular pigment in a series of experiments. Serum carotenoids were quantified by HPLC. Macular pigment densities were determined psychophysically.

Conclusions: Serum lutein concentrations in each subject reached a plateau that was correlated with the dose ($r = 0.82$, $P < 0.001$). Plateau concentrations ranged from 2.8×10^{-7} to 2.7×10^{-6} mol/L. Zeaxanthin was less well absorbed than an equal lutein dose, resulting in plateaus of approximately 5×10^{-7} mol/L. The rate of increase in macular pigment optical density was correlated with the plateau concentration of carotenoids in the serum ($r = 0.58$, $P < 0.001$), but not with the presupplementation optical density ($r = 0.13$, $P = 0.21$). The mean rate of increase was $(3.42 \pm 0.80) \times 10^5$ mAU/d per unit concentration (mol/L) of carotenoids in the serum. It remains to be demonstrated whether lutein or zeaxanthin dietary supplements reduce the incidence of AMD.

PMID: 12672909 [PubMed - indexed for MEDLINE]