

Effect of dietary lutein and zeaxanthin on plasma carotenoids and their transport in lipoproteins in age-related macular degeneration^{1–4}

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ABSTRACT

Background: Low dietary intakes and low plasma concentrations of lutein and zeaxanthin are associated with an increased risk of age related macular degeneration (AMD). No studies have challenged AMD patients with a diet high in lutein and zeaxanthin.

Objective: The objective was to examine the effect of diets low or high in lutein and zeaxanthin on plasma carotenoids and their transport in AMD patients.

Design: Seven AMD patients and 5 control subjects were fed a low-lutein, low-zeaxanthin diet (≈ 1.1 mg/d) for 2 wk, which was followed by a high-lutein, high-zeaxanthin diet (≈ 11 mg/d) for 4 wk. Ten subjects continued the diet for 8 wk. Plasma and lipoprotein carotenoids were measured by HPLC.

Results: The high-lutein, high-zeaxanthin diet resulted in 2- to 3-fold increases in plasma concentrations of lutein and zeaxanthin and other carotenoids, except lycopene, in the AMD patients and the control subjects. With this diet, 52% of the lutein and 44% of the zeaxanthin were transported by HDL; $\approx 22\%$ of lutein and zeaxanthin was transported by LDL. Only 20–25% of α -carotene, β -carotene, and lycopene was transported by HDL; 50–57% was transported by LDL.

Conclusions: The AMD patients and control subjects responded similarly to a diet high in lutein and zeaxanthin; plasma carotenoid concentrations increased greatly in both groups, and the transport of carotenoids by lipoproteins was not significantly different between the groups. This finding suggests that abnormalities in the metabolism of lutein and zeaxanthin in AMD may reside in the uptake of lutein and zeaxanthin from the plasma and transport into the retina.