

## Beneficial Long-Term Effects of Combined Oral/Topical Antioxidant Treatment with the Carotenoids Lutein and Zeaxanthin on Human Skin: A Double-Blind, Placebo-Controlled Study

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### Key Words

Carotenoid · Lutein · Zeaxanthin · Antioxidant · Premature aging

### Abstract

**Background:** The skin is exposed to numerous environmental assaults that can lead to premature aging. Of these agents, perhaps none is more ubiquitous than the ultraviolet (UV) wavelengths of sunlight. The primary immediate defense against environmental skin damage is the antioxidant capacity of the skin. However, this defense system can be compromised by moderate exposure to UV light. Therefore, bolstering the antioxidant defense system of the skin is a potentially important strategy for reducing environmentally induced skin damage. **Aim of the Study:** This clinical trial was designed to study the efficacy of lutein and zeaxanthin, two potentially important antioxidants found naturally in the skin, upon five skin physiology parameters (surface lipids, hydration, photoprotective activity, skin elasticity and skin lipid peroxidation – malondialdehyde) of human subjects. These xanthophyll carotenoids were administered either orally, topically, or in combination (both oral and topical routes). **Results:** The results obtained indicate that the com-

bined oral and topical administration of lutein and zeaxanthin provides the highest degree of antioxidant protection. However, oral and topical administration of these antioxidants individually also provides significant activity in the skin. In addition, oral administration of lutein may provide better protection than that afforded by topical application of this antioxidant when measured by changes in lipid peroxidation and photoprotective activity in the skin following UV light irradiation.

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### Introduction

Environmentally induced premature aging of the skin as well as the general aging of the population is of increasing importance. Irrespective of gender, the amount of ultraviolet (UV) exposure obtained is spread almost uniformly over a lifetime [1, 2]. However, skin cancer is only one of the effects that environmental exposure, including UV light exposure, can have on skin homeostasis [3–7]. Sunburn is the most common type of damage on the minds of consumers when they think about environmental exposures. Sun-induced skin damage, which ulti-