

Immediate effects of UV radiation on the skin: modification by an antioxidant complex containing carotenoids

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Abstract

Background/aims: The ultraviolet (UV) portion of sunlight is involved in the induction and development of skin cancers against which a limited photoprotection may be provided by reduced time of exposure, clothing, and sunscreen applications. The concept of an effective, safe, systemic photoprotection will circumvent many of the shortcomings. The UV-induced oxidative stress is a cause of DNA damage and a few publications have shown, in humans, minimal benefits, if any, of the oral intake of antioxidant complex, contrasting with the large literature showing beneficial effects in vitro or in animal models.

Methods: We investigated, in 25 healthy individuals, the capacity of an antioxidant complex (AOC) - vitamins (lycopene, beta-carotene, alpha-tocopherol), selenium - to reduce UV-induced damages. The AOC was administered orally, daily during 7 weeks. Before and after irradiations, before and after the intake of the product, six parameters were studied: skin color by chromametry, minimal erythemal dose and, on skin biopsies, sunburn cells (SBCs), p53 detected by immunohistochemistry, pigmentation index, and levels of lipoperoxides (thiobarbituric acid reaction).

Results: After the oral intake of AOC, we observed an elevation of the actinic erythema threshold (+20%, $P=0.01$) and a general reduction of the UV-induced erythemas, a reduction of the UV-induced p53 expression ($P<0.05$) and of SBCs ($P<0.01$), and a parallel reduction of the lipoperoxide levels ($P<0.01$). The pigmentation was increased ($P<0.01$).

Conclusion: After the oral intake of an antioxidant complex, many parameters of the epidermal defense against UV-induced damages are significantly improved. The oral intake of AOC could provide a safe, daylong and efficient complement to photoprotective measures provided by topical and physical agents and may contribute to reduce the DNA damages leading to skin aging and skin cancers.