

# Vitamin E - Effects on the Skin



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## Studies Relating to the Benefits of Topically Applied Vitamin E

### Evidence for the photoprotective effects of vitamin E.

Department of Biology, University of Essex, Colchester, UK.

#### Abstract

The antioxidant vitamin E (alpha-tocopherol) may protect both animal and plant cell membranes from light-induced damage. The various biochemical and biophysical modes of protection are considered. An examination is made of the evidence that vitamin E plays an important prophylactic role against a number of serious light-induced diseases and conditions of the eye (cataractogenesis and retinal photodeterioration) and skin (erythrocyte photohemolysis, photoerythema, photoaging and photocarcinogenesis) that are mediated by photooxidative damage to cell membranes.

PMID: 8415922 [PubMed - indexed for MEDLINE]

Curr Probl Dermatol. 2001;29:157-64.

### Delivery of vitamin E to the skin by a novel liquid skin cleanser: comparison of topical versus oral supplementation.

Colgate-Palmolive Company, 909 River Road, Piscataway, NJ 08855, USA.

#### Abstract

Topical supplementation represents an attractive approach to mitigate environmentally induced deficiencies of skin vitamin E (alpha-tocopherol). We report here the impact of natural sunlight on stratum corneum (SC) vitamin E and also compare the effectiveness of dietary supplementation to topical application as a way to increase vitamin E in the superficial layers of the SC. The effects of natural sunlight, 30 minutes of midday sunlight, were measured on two separate occasions. Vitamin E in the surface layers of the SC was measured by HPLC after ethanol extraction. Under these relevant conditions, vitamin E in the superficial SC was reduced in a dose-dependent manner by 50-65%. In a followup study, panelists entered into a randomized, double-blind, vehicle-controlled study. In this study, one group washed their skin once daily for one minute with a commercially available body wash containing 0.15% vitamin E and 0.10% vitamin E acetate, while the second group used a body wash without vitamin E but also supplemented their diet with 400 IU alpha-tocopherol (18 x RDI). Not surprisingly, only dietary supplementation increased serum vitamin E (approximately twofold). Although both treatment modalities increased SC vitamin E, topical delivery was significantly more effective (53-fold vs baseline) than dietary delivery (eightfold vs baseline). Moreover, only topical delivery increased SC vitamin E acetate (19-fold vs baseline). The results reported here indicate that vitamin E in the superficial layers of the SC is depleted readily by even a brief exposure to sunlight and that use of a vitamin E body wash can substantially increase the vitamin E in this superficial layer more effectively than dietary supplementation.

PMID: 15131729 [PubMed - indexed for MEDLINE]

Nutr Cancer. 2000;38(1):87-97.

### Protective effects of topical antioxidants in humans.

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#### Abstract

Human studies have convincingly demonstrated pronounced photoprotective effects of 'natural' and synthetic antioxidants when applied topically before UVR exposure. Particularly with respect to UVB-induced skin damage such as erythema formation, the photoprotective effects of antioxidants are significant when applied in distinct mixtures in appropriate vehicles. Topical application of such combinations may result in a sustained antioxidant capacity of the skin, possibly due to antioxidant synergisms. And, since UVA-induced skin alterations are believed to be largely determined by oxidative processes [26], topical administration of antioxidants might be particularly promising [27, 28]. In fact, topical application of antioxidants or antioxidant mixtures resulted in a remarkable increase in the minimal dose to induce immediate pigment darkening after UVA exposure [18, 23] and diminished the severity of UVA-induced photodermatoses [22] in humans. In conclusion, regular application of skin care products containing antioxidants may be of the utmost benefit in efficiently preparing our skin against exogenous oxidative stressors occurring during daily life. Furthermore, sunscreens may also benefit from combination with antioxidants resulting in increased safety and efficacy of such photoprotective products [11, 29].

J Cosmet Sci. 2004 Mar-Apr;55(2):177-87.

### Effects of topical and oral vitamin E on pigmentation and skin cancer induced by ultraviolet irradiation in Skh:2 hairless mice.

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#### Abstract

This study investigates whether supplementation with topical RRR-alpha-tocopherol (Eol), topical RRR-alpha-tocopheryl succinate, and oral RRR-alpha-tocopheryl acetate can reduce the incidence of acute and chronic damage to the skin (i.e., sunburn and pigmentation and skin cancer, respectively) induced by ultraviolet (UV) irradiation to mice. Groups of twenty Skh:2 female hairless pigmented mice were treated with 1) lotion vehicle, 2) 5% Eol lotion, 3) 5% topical RRR-alpha-tocopheryl succinate lotion, or 4) lotion vehicle and oral RRR-alpha-tocopheryl acetate. Within each group, 15 mice were exposed to 0.24 J/cm<sup>2</sup> of UV-B radiation three times per week. The animals' weights and food intakes were monitored, and the vitamin E concentrations of skin, liver, and adipose tissue were measured to determine whether the topical Eol resulted in significant tissue levels. Skin pigmentation was scored, and the total number of clinically detectable skin tumors per animal was counted weekly. Results showed that the skin concentrations of Eol, as well as levels in the adipose tissue, were increased after topical application. Mice treated with each form of vitamin E showed no signs of toxicity and had significantly less acute and chronic skin damage induced by UV irradiation, as indicated by reduced inflammation and pigmentation and by later onset and lesser incidence of skin cancer.

Drug Metab Rev. 2000 Aug-Nov;32(3-4):413-20.

### Photoprotective actions of topically applied vitamin E.

Department of Pharmacology and Toxicology, College of Pharmacy, University of Arizona, Tucson 85721, USA.

#### Abstract

Topical application of vitamin E has been shown to decrease the incidence of ultraviolet (UV)-induced skin cancer in mice. Vitamin E provides protection against UV-induced skin photodamage through a combination of antioxidant and UV absorptive properties. Topical application of alpha-tocopherol on mouse skin inhibits the formation of cyclobutane pyrimidine photoproducts. However, topically applied alpha-tocopherol is rapidly depleted by UVB radiation in a dose-dependent manner. The photooxidative fate of the alpha-tocopherol depends on the local environment of the vitamin E. alpha-Tocopherol quinone and alpha-tocopherol quinone epoxides are principal photoproducts of vitamin E that has penetrated into the epidermal layer of the skin, whereas tocopherol dimers and trimers are formed from alpha-tocopherol in a bulk phase at the skin surface. Dimer and trimer products may participate in prevention of UV-induced photodamage.

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