

Topical α -Tocopherol Acetate in the Bulk Phase

Eight Years of Experience in Skin Treatment

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ABSTRACT: Clinical practice in dermatology indicates that α -tocopherol acetate is beneficial in xerosis, hyperkeratosis, asteatotic eczema, atopic dermatitis, superficial burns, cutaneous ulcers, onychoschizia and, in general, skin diseases in which an inflammatory process is activated. The positive effect results from the combination of biological activity, the absence of adverse reactions, and the physical effect of the α -tocopherol acetate oil. The viscosity of this oil in bulk phase accounts for a remarkable moisturizing effect and minimization of transepidermal water loss. This effect combines well with the antioxidant capacity of α -tocopherol released from the ester, and the recently emerging effect on reprogramming of gene expression.

KEYWORDS: α -tocopherol acetate (bulk phase); skin diseases; topical vitamin E; skin

INTRODUCTION

The first reports, indexed in Medline, about the use of vitamin E in dermatology appeared in the early 1950s, approximately 30 years after the discovery of this nutrient, the deficiency syndrome of which produced alterations of reproductive function. A topical or systemic treatment with vitamin E has been reported as beneficial in wound healing, X-ray injuries of the skin, senile skin, and a heterogeneous series of different dermatoses.

Later on, the elucidation of the redox properties of tocopherol^{1,2} and the related "antioxidant theory" drove a large series of studies to unravel the relationships between free radical scavenging and skin protection.³

A large part of *in vitro* or *ex vivo* studies has been aimed at demonstrating that the protective effect of vitamin E on the skin is accounted for by its antioxidant properties.⁴⁻⁶ Skin is, indeed, exposed to environmental oxidants (including oxygen itself) and inflammation is a major biological source of oxidants, and thus a protective ef-

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Ann. N.Y. Acad. Sci. 1031: 443–447 (2004). © 2004 New York Academy of Sciences.
doi: 10.1196/annals.1331.069

fect of vitamin E on skin aging, sunburn, and inflammatory diseases was first expected and then observed and rationalized on the basis of the efficient quenching of free radicals.⁷

Nevertheless, in 1993 in a exhaustive review of clinical data, K. Pehr and R. Forsey⁸ reached the conclusion that "... there is still scant proof of vitamin E's effectiveness in treating certain dermatologic conditions..." and that "... research in well-designed controlled trials is needed to clarify vitamin E's role..."

To our knowledge fully controlled and evidence-based studies are still extremely scant. Nonetheless, the cosmeceutical use of vitamin E at different concentrations in different vehicles has become progressively more and more popular.

On the other hand, basic knowledge about the physiological function of vitamin E is today much more precise and new functions are emerging, not always nor necessarily related to the antioxidant effect.⁹

With the aim of suggesting possible insights, hopefully helping in bridging the gap between clinical experience and basic science, and looking forward for an evidence-based clinical validation for an use of vitamin E in dermatology, we would like to present examples of the practical clinical experience acquired by the company that first introduced, in Italy, the use of α -tocopherol acetate in bulk phase for the complementary treatment of different forms of skin disease.

TOPICAL VITAMIN E IN DERMATOLOGY

The idea of using the oily α -tocopherol acetate for topical skin treatment rests on the following evidence: (a) the redox chemistry of the vitamin, compatible with an antioxidant effect *in vivo*¹⁰; (b) the hydrolysis of the ester in the skin¹¹ and thus the pro-drug nature of the acetate; (c) the prospect of a physiological extracellular function of vitamin E, which is indeed secreted and reabsorbed in the skin¹²; and (d) the virtual absence of adverse reactions.¹³

A further peculiar feature of the use of α -tocopherol acetate oil as a bulk phase is the absence of a vehicle in which the active species is dissolved. This results in a gain of chemical and microbiological stability and in the prevention of adverse reactions due to excipients. Furthermore, this viscous oil (TABLE 1) accounts for another, possibly relevant, effect. The use of treating the skin with oils¹⁴ is, indeed, as old as our civilization, when our ancestors learned how to protect the skin by overspreading it with oils, most frequently the edible, and thus apparently safe, olive oil.

TABLE 1. Viscosity of different compounds used in cosmetic preparations

Compound	milliPascal per second
α -tocopherol acetate	5000
Glycerol	1270
Vaseline oil	180
Olive oil	70
Octyl-palmitate	50
Propylenic glycol	46
Jjoba oil	45

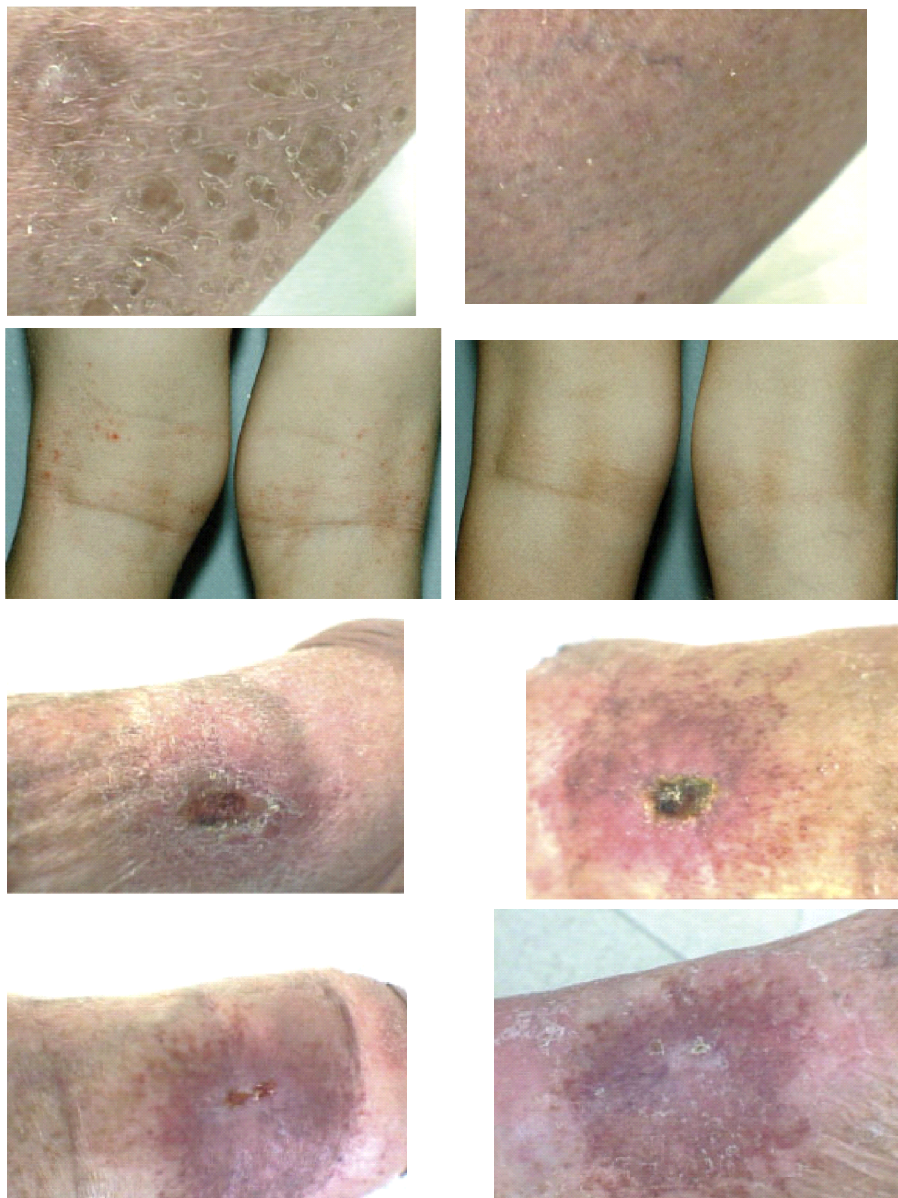


FIGURE 1. Effect of α -tocopherol acetate treatment in different skin diseases. *Top row:* asteatotic eczema. (*left*) dry and cracked skin; (*right*) disappearance of scales and dryness after 10 days of twice-a-day treatment. *Second row:* atopic dermatitis. (*left*) erythema, lichenification, and excoriation of knee flexures; (*right*) disappearance of symptoms after 7 days of treatment 2 \times daily. *Third row:* cutaneous ulcer. (*left*) venous long-standing ulcer in leg of old woman; (*right*) erythematous halo and blackish crust after 2 weeks of treatment 1 \times daily. *Fourth row:* cutaneous ulcer. (*left*) healing; reforming epithelium spreads over



FIGURE 1. — *continued.*

granulation tissue after 4 weeks of treatment 1× daily; (*right*) complete healing with brown halo after 6 weeks of treatment 1× daily. *Fifth row*: onychoschizia. (*left*) transverse splitting into layers near free edge; (*right*) good response to topical therapy after 3 months of treatment 2× daily.

The beneficial effect is now seen in relation to the preservation of the barrier function of the skin. In agreement with this notion, a minimization of the abnormal transepidermal water loss by topical vitamin E has been observed in atopic dermatitis.¹⁵

The oily α -tocopherol acetate can be seen, therefore, as a medical device capable of moisturizing the skin and preventing transepidermal water loss.

Examples of the efficiency of the treatment in some common skin disorders are shown in FIGURE 1.

CONCLUSIONS

Clinical practice supports the notion that treatment of the skin with vitamin E oil is beneficial in the vast majority of cases of xerosis, hyperkeratosis, asteatotic eczema, atopic dermatitis, superficial burns, cutaneous ulcers, and onychoschizia. However, only minimal beneficial effect, if any, has been observed in psoriasis, lichen ruber planus, seborrhoeic dermatitis, vitiligo, dyshidrotic eczema, and infectious diseases in general.

A remarkable effect of topical vitamin E oil is an amelioration of pruritus or pain associated with different diseases, independent of the efficiency on the peculiar features of the specific disease.

The common elements, shared by diseases where a clinical effect has been observed, could be tentatively recognized as an abnormal or inappropriate response to an injury associated with an inefficient repair system and to a more or less severe loss of the barrier function of the skin.

It is proposed that the observed clinical effect likely results from the combination of the redox chemistry of α -tocopherol, its biological activity as regulator of cellular response, and eventually the physical effect of the oil.

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