

PALM-BASED ANTI-INFLAMMATORY CREAM

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Human skin is relatively a complex structure with adapted barrier to the environment. Administration of chemical agents to the skin surface has long been practiced, whether for healing or purely decorative or cosmetic purposes. The skin is a semi permeable membrane and these open new possibilities for local treatment of the skin. An interesting strategy to provide photoprotection to the skin would be to support or enhance the endogenous antioxidant systems such as tocopherol or tocotrienols. Tocotrienols are fat-soluble vitamins related to the family of tocopherols (Figure 1). Structurally, tocopherols and tocotrienols share some resemblance consisting of a common chromanol head and a side chain at the C-2 position. However, tocopherols and tocotrienols are distinguished by their side chains and are further separated into individual compounds assigned by the Greek letter prefixes (α , β , δ and γ) depending on the number and position of methyl substitution on the chromanol ring.

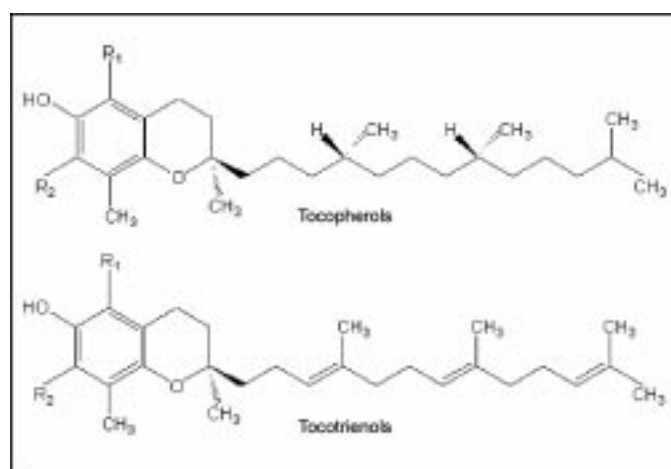


Figure 1. Vitamin E structures: α , R_1 and $R_2 = CH_3$; β , $R_1 = CH_3$, $R_2 = H$; γ , $R_1 = H$, $R_2 = CH_3$; δ , R_1 and $R_2 = H$.

Both tocopherol and tocotrienol are well recognized for their antioxidant effect (Kamal-Eldin and Appleqvist, 1996). Contrary to popular believe, tocotrienol was observed *in vitro* to possess a remarkably higher antioxidant activity against lipid peroxidation than tocopherol (Serbinova *et al.*, 1991) in biological membranes. It was reported that a single suberythemogenic dose of solar simulated ultraviolet radiation (UV; 0.75 minimal erythema dose, MED), depleted human stratum corneum α -tocopherol by almost 50% and murine stratum corneum α -tocopherol by 85% (Thiele *et al.*, 1998). Thus, topical application of vitamin E (tocopherols and tocotrienols) in high doses may offer an alternative way in providing the stratum corneum with antioxidants.

PHOTOPROTECTIVE EFFECTS

Supplementation of non-enzymatic antioxidants such as glutathione, tocopherol, ascorbate and β -carotene was also found to be very effective in photoprotection (Muizzuddin *et al.*, 1999; Steenvoorden and Henegouwen, 1997; Dreher *et al.*, 1998). The results of our study indicate a preventive effect of topical application of tocotrienol-rich fraction (TRF) on UVB-induced inflammation in human skin (Figure 2). In comparison with Muizzuddin *et al.* (1999) who had calculated the percentage of protection factor (% PF) based on MED readings, our % PF was calculated at 156% compared to their %PF at 163%. It is interesting to note that their formula was a mixture of antioxidants consisting of vitamin E linoleate, butylated hydroxytoluene (BHT), nordihydroguaradinic acid and magnesium ascorbyl phosphate compared to our TRF emulsion.



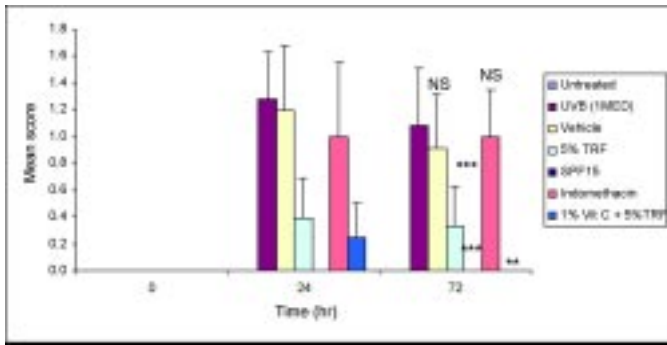


Figure 2. The effect of UVB irradiation (1 MED) on skin pre-treated with TRF emulsion, vehicle, SPF 15 cream, indomethacin and mixtures of vitamin C/TRF in comparison with UVB irradiated site and control (no treatment or irradiation). Results are expressed as mean score \pm S.D. T-test between test materials and positive control (UVB).

INHIBITION OF PHOTODAMAGE

The effect of post-treated TRF on UVB-induced skin erythema was also studied. Results indicated that TRF emulsion have the potential to reduce the photodamage on skin if it is immediately applied after UVB radiation. The percentages of inhibition of mean chromametry readings were between 28% - 31%. This result indicated that TRF emulsion at 5% had effectively reduced the skin erythema. It was also noted that combination of antioxidants, TRF and vitamin C resulted in higher suppression of UVB-induced skin erythema compared to TRF emulsion alone. Other investigators also found synergistic photoprotective properties of vitamins E and C (Bonina *et al.*, 1998; Dreher *et al.*, 1998). The work reported here indicates that TRF, which acts as free radical scavenger, is photoprotective against UVB-induced skin erythema. In addition, TRF may not only be photoprotective but also exhibit the ability to recover back the photodamage if applied properly.

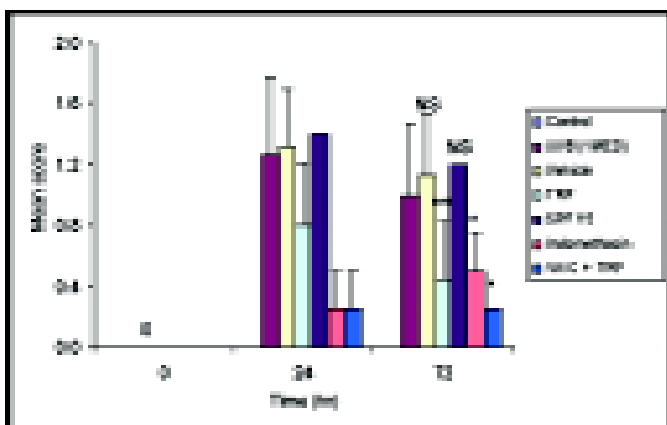


Figure 3. The effect of skin pre-irradiated with UVB and applied with TRF emulsion, vehicle, SPF 15 cream, indomethacin and mixtures of vitamin C/TRF in comparison with UVB irradiated site and control (no treatment or irradiation). Results are expressed as mean score \pm S.D.

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