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dl-α-トコフェリルリン酸ナトリウムの紫外線皮膚障害防御作用

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Protective Effect of Sodium *dl*-α-tocopheryl Phosphate for UV-induced Skin Damage

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Abstract

It is well established that ultraviolet (UV) irradiation causes skin photodamage, including erythema and immunosuppression. Skin photodamage is mainly caused by reactive oxygen species (ROS) such as hydroxyl radical, nitric oxide and peroxynitrite. Although *dl*-α-tocopherol (VE) has been used to prevent skin photodamage by antioxidative activity, VE is insoluble in water and unstable against oxidation. In this present study, therefore, we examined the effect of sodium *dl*-α-tocopheryl phosphate (VEP), a newly synthesized water-soluble and stable VE derivative, on UV-induced photodamage.

VEP was enzymatically cleaved to generate VE and inhibited UV-induced lipid peroxide production in human dermal fibroblasts. VEP also prevented UV-induced erythema and immunosuppression. ROS production in normal human epidermal keratinocytes was then assessed using ROS-specific fluorescent and its fluorescence image of cells was visualized using confocal laser scanning microscopy. The increased fluorescence intensity of ROS after UV irradiation was inhibited by VEP. To clarify the molecular mechanism of VEP in preventing photodamage, we performed a comprehensive analysis with oligonucleotide microarrays in human keratinocytes following UVB exposure and revealed that the expression of several genes was changed. Furthermore we demonstrated that VEP suppressed the down regulation of genes related to the inhibition of nuclear factor-κB pathway and epidermal barrier functions.

These results therefore suggest that VEP may protect skin from several conditions following UV exposure and is a useful water soluble VE derivative for cosmetic products.

Key words: sodium *dl*-α-tocopheryl phosphate (VEP), skin photodamage, antioxidative activity, reactive oxygen species (ROS), microarrays.