

〈一般論文〉

新規アスコルビン酸誘導体 3-O-グリセリルアスコルビン酸の抗酸化作用

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The Antioxidant Effect of Novel Ascorbic Acid Derivative 3-O-Glyceryl Ascorbate

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Abstract

Ascorbic acid (AsA) has multifunctional effects on skin beauty regarding the prevention and improvement of pigmentation and wrinkles. However, AsA not only has poor stability both in aqueous solutions and in cosmetic formulations, but it also influences the stabilities of formulations. To express the efficacy of AsA in/on the skin, it is important to develop a novel AsA derivative which overcomes those disadvantages. We synthesized 3-O-glyceryl ascorbate (3GA) by introducing a glycerol group into the C-3 position of AsA. 3GA has high stability in formulations. We then investigated the chemical and biological effects of 3GA. 3GA has a scavenging ability against various reactive oxygen species (ROS) assessed by the ESR spin-trapping method. HaCaT keratinocytes pretreated with 3GA have suppressed intracellular ROS levels both under physiological conditions and following exposure to H₂O₂ or UVB. In addition, HaCaT cells pretreated with 3GA were protected from cell damage induced by H₂O₂, UVB and ONOO⁻. In reconstructed human epidermal equivalents, topical application of 3GA markedly reduced the generation of intracellular ROS after UVB irradiation. Taken together, 3GA is an effective AsA derivative that is stratum corneum permeable, does not interfere with the stability of cosmetic formulations, and is able to reduce intracellular ROS levels caused by oxidative stress.

Key words: 3-O-glyceryl ascorbate, antioxidant, high stability of cosmetic formulation, reactive oxygen species, anti-skin aging.