

〈原 著〉

Characteristics of β -Galactosyl-L-serine-diamides in Reinforcing the SC Lamellar Structure

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Abstract

Hara et al. found that the topical application of β -galactosylceramide significantly increases the amounts of ceramides in the stratum corneum (SC), a major family of intercellular lipids of the SC, and corrects atopic dry skin conditions in human. Recently we synthesized *O*- β -D-galactosyl-*N*-stearoyl-L-serine-hexylamide (Gal-Ser-diamide), an L-serine derivative that mimics β -galactosylceramide. In this study, we examined its direct effects on the intercellular lipid organization which plays a crucial role in maintaining the barrier properties of the skin, using an *in vitro* model of the SC lamellae. We observed a dose-dependent decrease in the trans-membrane water loss when Gal-Ser-diamide was added to the lipid components of the model SC lamellae. Unlike the control sample, the membranes treated with lipids containing Gal-Ser-diamide were completely covered with a continuous lipid film, including a lamellar structure confirmed by SEM and TEM analyses. X-ray diffraction studies also revealed an ordering and close packing of the model SC lamellae in response to the concentration of Gal-Ser-diamide. These findings suggest that Gal-Ser-diamide improves the epidermal barrier function not only by enhancing the ceramide synthesis, but also by reinforcing the SC lamellar structure.

Key words: intercellular lipid, lipid organization, X-ray diffraction, β -galactosylceramide, ceramide.