

〈教育セミナー〉

表皮機能の新展開

表皮におけるアクアポリンの発現と機能

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The Expression and Function of Aquaporins in the Epidermis

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Abstract

The aquaporins (AQPs) are a family of water channel proteins with at least 13 known members (AQP0–AQP12) in human tissues. Of the 13 members of AQP, AQP3, AQP7, AQP9 and AQP10 were known to facilitate permeation of small solutes such as glycerol and urea as well as water. The distributions of AQP family in the tissues are quite different one another and the expression of each AQP is thought to be strictly regulated in a cell type specific manner. In human epidermis, AQP3 was expressed from basal to granular layers, while AQP9 was only detected in granular layer. Incubation of cultured human keratinocytes in sorbitol-added hypertonic medium increased AQP3, but not AQP9, expression at both mRNA and protein levels, indicating that osmotic stress up-regulates AQP3 expression in keratinocytes. In addition, expression studies for AQP3 revealed that retinoic acid is a regulatory factor for AQP3 expression in keratinocytes. With regard to the function of AQP3 in skin, impairments in the hydration, elasticity and barrier recovery of skin in AQP3 knockout mice indicated that AQP3 plays important roles in skin physiology. The activities in the field of AQP research would provide new insights for the novel cosmetics.

Key words: aquaporin, AQP3, epidermis, osmotic stress, retinoic acid.