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9 | Impact of AQP3 inducer treatment on cultured human keratinocytes, ex vivo human skin and volunteers.

Garcia N, Gondran C, Menon G, Mur L, Oberto G, Guerif Y, Dal Farra C, Domloge N.; Int J Cosmet Sci. 2011 Oct;33(5):432-42. doi: 10.1111/j.1468-2494.2011.00651.x.

ABSTRACT

One of the main functions of the skin is to protect the organism against environmental threats, such as thermal stress. Aquaporin-3 (AQP3) facilitates water and glycerol transport across cell membranes and therefore regulates osmotic balance in different situations of stress. This mechanism seems to be particularly important for the resistance of different organisms to cold stress. Consequently, we were interested in investigating the effect of cold and osmotic stress on AQP3 expression in normal human keratinocytes. We developed a new active ingredient to stimulate aquaporins in skin and demonstrated the partial restoration of AQP3 expression in keratinocytes transfected with AQP3 siRNA. Moreover, we examined the effect of cold stress on cell morphology and the impact of a pre-treatment with the active ingredient. Our results indicated that induction of AQP3 helped maintain a correct organization of the actin cytoskeleton, preserving cell morphology and preventing cells from rounding. Immunofluorescent staining revealed cytoplasmic localization of AQP3 and its translocation to the cell membrane following osmotic stress. Histological ex vivo studies of skin under different conditions, such as cold environment and tape-stripping, indicated that increase in AQP3 expression appears to be involved in skin protection and showed that the pattern of AQP3 expression was more enhanced in the active ingredient-treated samples. In vivo confocal microscopy by Vivascope showed a generally healthier appearance of the skin in the treated areas. These results attest to the potential value of the active ingredient in optimizing environmental stress resistance and protecting the skin from stratum corneum damage.