

The regulation of aquaglyceroporin AQP3 by lipophilic vitamins in skin keratinocytes

Kenichi Ishibashi.

Meiji Pharmaceutical University, School of Pharmacy, Department of Pathophysiology

The skin is constantly exposed to external physical and chemical toxins to protect the interior and eventually to keep the homeostasis. This barrier mechanism will be enhanced by moisturizing the skin, which is partially conducted by glycerol, an ancient ingredient of cosmetics. The uptake of glycerol into the keratinocyte is mainly conducted by AQP3, a member of aquaglyceroporins also including AQP7, 9, and 10. Recent analyses of AQP3-null mice showed that the absence of AQP3 not only decreases the water content of the skin but also inhibits the development of skin cancer through the glycerol transport. Therefore, glycerol will be beneficial to moisten the skin and promote its regeneration while it will be harmful to stimulate the growth of skin cancers. Since the glycerol transport is regulated by the amount of AQP3 expression in the keratinocyte, the regulation of AQP3 expression should be examined to predict the clinical outcome of the application of cosmetics. Since we examined the effects of glycerol and vitamin A on AQP3 expression in keratinocarcinoma previously, here we tested the effects of vitamin E and D on the expression of AQP3 in a human normal epidermal keratinocyte cell line (PHK16-0b). Both lipophilic vitamins and lower concentration of glycerol significantly stimulated AQP3 expression examined by RT-PCR technique while higher concentration of glycerol inhibited its expression. It will be more efficient to develop a screening system to examine the effect of cosmetic ingredients on AQP3 expression in the keratinocyte in culture to predict their potential benefits and harms to the skin.