

known as aquaporins are present in all living cells to control osmotic balance. Aquaporins were discovered in the kidneys many years ago, as aquaporin 1 is the abnormality that leads to diabetes insipidus. Aquaporin 3, however, is found in the skin. Aquaporins are formed from 6 trans-membrane α helices in a right-handed bundle. This channel allows the transport of substances, including urea and glycerol, in addition to water. It is interesting that a mouse model, deficient in aquaporin 3, demonstrates decreased stratum corneum hydration and impaired barrier function very similar to those seen in human atopic dermatitis.

Glycerin, a humectant that attracts water, is also transported in aquaporin 3 channels. It has been recognized for many years that glycerin possesses a skin reservoir effect. That means that a morning glycerin application can still be measured 2 or 3 days later, provided that it has been applied every day for two weeks or longer. It was previously thought that glycerin somehow intercalated itself between intracellular lipids and modulated skin water content, but it appears that glycerin may be transported through aquaporin 3 channels. A substance known as phospholipase, which results in the production of phosphatidylglycerol (phosphatidylglycerol is a lipid that signals enzymes of cell differentiation. Meaning that glycerin when placed on the skin surface, functions not only as a humectant, but also as a modifier of cell differentiation. The fact that older cells are not as well differentiated by younger cells means that glycerin may have a more profound effect on aging skin than previously thought.

The ability of substances to increase the water content of the skin can be measured scientifically through a

technique known as corneometry. Corneometry is performed with something known as a pin probe. The probe contains pins that transmit electricity to the skin and sense electrical conduction. However, in order to be conducted, electricity needs a conductor. What is the conductor in the skin? Water. So more water in the skin will conduct more electricity, the corneometry reading will be higher, and the skin is better hydrated. If, on the other hand, the skin is dehydrated with less water, less electricity will be conducted, and the corneometry reading will be lower indicating less well moisturized skin. It is through this indirect measurement of the electrical conductivity of water that skin hydration is assessed.

Since water transport into cells and cell differentiation are linked, it is quite possible that moisturizing ingredients, such as the commonly used humectant glycerin, may improve skin functioning and reduce the appearance of lines of dehydration in addition to enhancing moisturization.

Summary
All cosmetic products for skin are chemical. Not only is it possible that purchasing one product instead of 2 may save money, but combination products may offer attributes useful in some dermatologic conditions. This article has examined the use of moisturizing body washes in patients with atopic dermatitis, conditioning shampoos in patients with androgenic alopecia, and antiaging moisturizers in persons with photoaging. Newer formulations, better ingredients, and more insight into skin functioning are contributing to this advanced technology. ■

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