During the past few decades, the incidence of dryness related skin problems has increased. More than 75% of people above the age of 65 suffer from xerosis. The skin, being the largest organ, is exposed to the external environment and comes into contact with the sun, chemicals, soap and harsh temperature conditions from which it acts as a barrier to protect the internal organs in our body. There are various other causes of dry skin, including genetic and acquired diseases, nutritional deficiencies, the use of certain medications and poor lifestyle. One should not ignore the fact that people have a longer lifespan and as one gets older, the function of the skin barrier and sebaceous glands decreases, leading to xerosis.

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CAUSES
Dryness of the skin occurs as a result of reduced water content of the stratum corneum (outermost layer of the skin). Usually, water is lost by evaporation and is replenished from the lower layers of the epidermis and dermis. An imbalance between supply and loss of water leads to xerosis. There are many lipids and derivatives of amino acids in the stratum corneum that regulate the transdermal water loss. These are mainly produced by the lamellar granules in the epidermis as well as the sebaceous glands, which produce sterol esters. These substances help by keeping the natural moisturising factors (NMF) inside the cells that assist in the retention of water and keep the cells hydrated. In brief, as the epidermis loses water, the skin appears flaky and dry. Overly dry skin. Keratosis pilaris has been described as being part of this condition and manifests as sandpaper roughness affecting the upper arms, proximal limbs and in rare cases, the face. This disease is caused by a dysfunction of the fillagrin protein, which forms part of the NMF of the epidermis. Other genetic conditions with xerosis, include x-linked ichthyosis, steroid-sulfatase deficiency and several others. Don’t forget atop eczema, where a dysfunction in fillagrin and decrease in ceramides, leads to dryness, inflammation, erythema and pruritus.

Apart from the diseases, there are several medications that lead to dryness of the skin. The most drastic of them are the isotretinoin, which leads to predictable severe xerosis. Other medications include anti-androgens and lipid lowering medications. Various others that have lesser effects on the skin include diuretics and beta-blockers as well as some chemotherapy agents (EDF-inhibitors).

TREATMENT
In most cases, the cause of xerosis is unknown and we have to use moisturisers to address the dryness. In the past two decades, a better understanding of the NMF, ceramides as well as the function of aquaporin in the epidermis, has led to the development of more effective moisturisers. The NMF is a collection of water-soluble compounds that are only found in the outermost layer of the skin. They make up to 20% of the weight of the stratum corneum and absorb water from the atmosphere and combine it with their own water content, which results in a hydrated outer skin, despite exposure to the elements. The NMF is composed mainly of free amino acids and their derivatives, like PCA, uranic acid (a natural absorber of UV rays) and inorganic salts, sugars, lactic acid and urea. NMF components are derived from the breakdown products of the proteolysis of the fillagrin protein, which starts a proliferation of keratinocytes in the normal epidermis.

These compounds are highly efficient in attracting and binding water inside the corneocytes (the keratinocytes in the outermost layer of the skin), thus working as humectants. This process is very well regulated and even low levels of humidity do not affect its function. In addition, the NMF allows the corneocyte cells to balance the osmotic pressure exerted by the intracellular cement surrounding them. Keeping the solute concentrations balanced is important for preventing excessive water influx as seen in the wrinkled skin of someone who has been in the bath for too long or water efflux, which would cause the corneocytes to shrink. The NMF being water soluble makes them vulnerable to being lost by repeated contact with water, thus making the skin dryer.

Aquaporins (AQP) are proteins that facilitate the transport of water across the cell membranes of keratinocytes. These include the important AQP3, which is involved in the water maintenance of the epidermis and AQPs, which is involved in sweat secretion. The AQP3, being the most abundant of them, also helps in the transport of glycerol, which plays a role in the hydration of human skin. The glycerol is important for the metabolism of lipids in the skin as well as the regulation and proliferation of keratinocytes.

Finally, the AQP3 is also believed to be important in wound healing as a water channel by facilitating cell migration and as a glycerol transporter by enhancing keratinocyte proliferation and differentiation. The expression of AQP3 water channels are strongly affected by age and chronic sun exposure, and a defective osmotic equilibrium could occur in the epidermis, which would account for the skin dryness observed in older people and skin areas most exposed to the sun.

The understanding of the function of the NMF, ceramides and aquaporins has led to the development of novel moisturisers that contain compounds similar to those present in the skin. These work by increasing the water content of the stratum corneum as well as providing an impermeable lipid barrier, which decreases evaporation from the outer layer, as well as encourages accumulation of water from the layers below. This hydration smoothens the skin surface by flattening out the ridges and by reducing the amount of scaling (though separation of individual corneocytes). It also makes the skin surface soft, more extensible, pliable and more compliant. Thus, moisturisers that contain humectants, occlusive oils or both are widely available and one can choose according to their needs.