

Advantages of products without water and cosmetic additives

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Water is an essential substance to maintain skin hydration and elasticity. However, there are also water-free products on the market. Why is that? When are they used and what are the benefits?

It seems that water is indispensable. And yet – water does not only have positive effects but also a few disadvantages: Water cannot be mixed with oils and fats. Water can hydrolytically decompose other substances and is an elixir of life for microorganisms. So, if cosmetic preparations contain water, there are additional problems to be solved – and, as a matter of fact, they are solved with cosmetic additives. Cosmetic additives however contribute scarcely anything to the care of the skin. Rather on the contrary: considering the frequency of intolerances to cosmetic preparations, cosmetic additives rank in the top position of the statistics.

Cosmetic additives allow a problem-free storage of preparations at different storage conditions. Cosmetic additives also can prolong the shelf life and extend the period of use (time indicated in the open jar symbol printed on the label). Within the labelled dates the preparations are microbiologically, physically and chemically stable and can be used without running any risk.

Required companions in aqueous preparations

- **Preservatives** – they eliminate the microorganisms living in water
- **Emulsifiers** – they allow the mixing of water with oils and lipid substances. Resulting are stable emulsions with water (W/O emulsions) or oils (O/W emulsions) dispersed in the cream in the form of tiny droplets.
- **Consistency agents** – they reduce the fluidity of water.
- **Buffer substances** – they stabilize the pH value which otherwise would increase or decrease through the reaction of water with other preparation components.
- **Antioxidants** – they inhibit the reaction of atmospheric oxygen and atmospheric radicals with the ingredients dissolved in water.

Since the water quickly evaporates after the

application of aqueous cosmetic preparations, the cosmetic additives concentrate in the skin, particularly if the products are applied more than once per day. This may involve that the individual irritation threshold is exceeded which is more likely to occur with pre-damaged skin as for instance in the case of rosacea, perioral dermatitis and neurodermatitis. The process still is accelerated by the washout effect of various emulsifiers that are not degraded in the epidermis. Stored in the skin, they emulsify the skin care substances but also the natural lipid components of the skin barrier when they come in contact with water (skin cleansing) with the result, that they jointly are washed out. The preservatives listed in the annex of the Cosmetic Directive can basically be avoided however this alternative usually involves higher production costs. Emulsifiers are not needed in lamellar creams since their cream structure is based on physiological cell membrane substances – usually vegetable phosphatidylcholine (PC). Depending on the PC concentration, the creams can partly be formulated without consistency agents. Even water is not always needed: the most consequent alternative to reduce the counterproductive cosmetic additives is formulating the preparations without water. This is not a new invention though. In the baby care and in the case of barrier disorders, pure oils always have proved successful for skin care purposes but also for the cleansing of the skin. Avocado oil for instance has an appropriate fatty acid composition. It contains saturated and essential fatty acids, phytosterols that are similar to the cholesterol of the skin barrier as well as the vitamins E and D.

It is a matter of properties

From a present-day perspective, non-physiological paraffin oils and the more solid petrolatum alias milking grease (also called bag balm) are less appropriate as they do not penetrate into the skin, in other words, they remain on the skin surface and cause skin swellings due to their strong occlusive properties. General disadvantages of oils are the impractical han-

ding, the haptic properties and the unavoidable stains they leave on textiles. A long time ago already, people have started to set their wits to work to optimize the mentioned properties – particularly in the context of the cream development for dermatological purposes. Thus, the paraffin oil based lipo- respectively oleogels were developed. They still are mixed with pharmaceutical substances and processed into magistral formulations. The occlusive properties are utilized here to obtain a homogenous release of pharmaceutical substances. Similar to paraffin oils, these formulations are not suitable for skin care purposes as they remain too long on the skin surface which is not a pleasant feeling though. The processing of plant instead of paraffin oils in the gels improves the penetrability however haptic properties still are perceived as being too greasy. For this reason, the linseed oil and zinc oxide compounds no longer are used.

Use of natural carriers

The addition of phosphatidylcholine (PC, see above) can significantly improve the haptic of oleogels. PC not only accelerates the penetration of active agents in aqueous liposomal preparations but also in non-aqueous oleogels based on herbal components. As with nano-dispersions, the oil components of oleogels penetrate faster into the skin in the presence of PC. Also the enzymatic cleavage of vegetable oils into free, partly skin-protecting and partly anti-inflammatory essential fatty acids is accelerated. In other words: the preparations behave like rich O/W emulsions although they do not contain water and critical cosmetic additives. PC even allows the incorporation of polar and water-soluble substances such as urea or azelaic acid. There are still disadvantages though:

- The oleogel production is more complex and, in technical respect, substantially differs from the processing of emulsions.
- Only small amounts of oleogels need to be administered. This is why the change from the generously applied emulsions to oleogels needs getting used to.
- Oleogels initially do not moisten the skin with water. Instead the skin hydration increases from inside due to the oil-induced reduction of the trans-epidermal water loss (TEWL) and occurs at a slower pace than with an O/W emulsion (see fig.). Here, the initial high increase and rapid reduction of skin hydration is attributed to the

free and fast evaporating water. With continued application the skin hydration values will approximate though.

- With specific indications such as rosacea and perioral dermatitis, oils and lipids, as for instance in rich emulsions, are counterproductive since the living conditions for anaerobic germs significantly improve with increasing lipid content.

The absence of preservatives and other cosmetic additives makes today's oleogel technology to an attractive skin care alternative for sensitive skin and barrier-disordered problem skins – but also for atopic skin. The products are suitable for the adjuvant corneotherapy, or in other words, for the skin care accompanying a medical therapy. This applies for instance for

- neurodermatitis and related barrier disorders,
- abrasive dermatitis (cumulative sub-toxic contact eczema),
- cheilitis (inflammation of lips),
- perianal barrier disorders and decubitus or
- care of the lower leg of diabetics

Also good for the little ones

Besides skin protection and cold protection products in the personal and occupational field, children and baby preparations are relevant fields of application of oleogels. Further specific effects can be obtained by adding natural substances that otherwise are difficultly soluble or instable in O/W or W/O emulsions or do not penetrate easily. Examples for specific effects are:

- Inhibition of inflammations with essential ω -6 and ω -3 fatty acids: borage (or starflower)-, evening primrose-, linseed- and kiwi oil.
- Anti-inflammatory effects by inhibiting microbial proteases through boswellia acids occurring in frankincense resin.
- Azelaic acid inhibits the 5-alpha-reductase and hence the growth of anaerobic germs. Azelaic acid occurs naturally in wheat and rye.
- Antimicrobial and antiparasitic effects can be observed with betulinic acid which occurs in birch and plane tree bark.

The combination of azelaic-, boswellia- and betulinic acid even allows an administration of oleogels in the case of rosacea and perioral dermatitis. Thus, the counterproductive effects

of lipids are neutralized which otherwise would support an explosive growth of anaerobic microorganisms of the microbiome of the skin. It is also beneficial for rosacea patients who cannot tolerate the hypertonic aqueous phases of emulsions.

Conclusion: Non-aqueous preparations are an adequate complement in the skin care of problem skins when emulsions are not tolerated.

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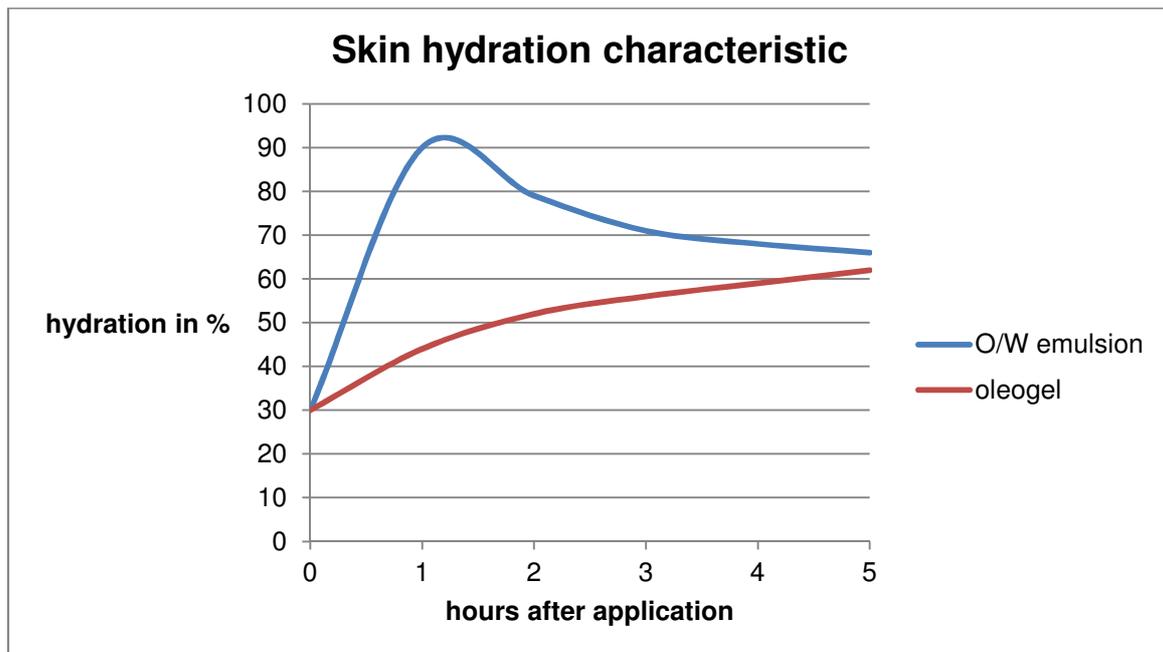


Figure: The initial high increase and rapid reduction of skin hydration in O/W emulsions is attributed to the free and fast evaporating water. Oleogels cause a slower increase of skin hydration because the transepidermal water loss (TEWL) is reduced through the high fat- respectively oil content and also because the hydration slowly increases from inside. The graph shows the progression for dry skin.