

# Keep your eyes open – eye problem assistance

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Sleepy eyes are hardly attractive, the more so as reduced lacrimation and an increased dehydration of the surrounding skin areas often are accompanying symptoms. Which cosmetic products are beneficial in this case?

**B**esides avoiding the triggering conditions of the problem such as constant draught or low humidity, sometimes in combination with low air pressure (in airplanes or in air-conditioned rooms), there is a variety of specific preparations to treat the symptoms. Since the eyes tend to be sensitive though, the range of adequate components for the preparations is limited.

## Tear film

With blinking of the eyelids a fluid film is produced and spread on the ocular surface (tear film). It consists of lipid substances, water and mucins.

Tear film and eyelid movement work like wind-screen wipers: they provide for clear vision and remove foreign bodies. A modified composition of the tear film leads to dry eyes, foreign body sensation, redness and irritations, conjunctivitis and infections.

## Eye preparations

Cosmetic and dermatologic preparations for the use around the eyes or preparations that accidentally can get into the eyes should be isotonic just like the tear film and free of irritants. As is well known, even the own sweat is irritating when it gets into the eyes.

Also contacts with emulsifying creams and gels, tenside-containing shampoos and aggressive substances such as onion vapour during cooking or the chlorinated water in swimming pools are irritating the eyes. The same applies for spreading substances which facilitate the application and spreading of skin creams. Spreading substances, for instance, are the esters of short-chained fatty acids such as isopropyl myristate (IPM).

## Application

Cream-, gel- and anhydrous formulations to increase the skin hydration only are applied on the surrounding skin areas. Whenever they get into the eyes they form annoying but harmless

streaks that blur the vision but then are quickly removed by the lacrimal fluid.

Dry eyes, without exception, are treated with aqueous solutions. Liposomal and nanodisperse solutions are state of the art and contained in a whole variety of products. Sprays are an appropriate alternative as far as they are not added dropwise into the conjunctival sac. They are either sprayed directly into the open eye or onto the closed eyelid. At the first moment, the application via closed eyelid seems unusual but yet is advantageous:

- It simultaneously provides eyelid care and support for the lacrimal fluid (2-in-1-product).
- 2-in-1-products are convenient and time-saving, particularly if they need to be applied several times a day.
- The phosphatidylcholine contained in liposomes not only ensures the penetration of active substances into the eyelid but also laterally into the sensitive eyelid margins and the mucous membrane of the eyes.
- The small amounts of alcohol contained as solubilizer and for microbial stabilisation are insignificant in this context. Neither do they have dehydrating effects.
- Conjunctivitis can also be treated in this way.
- It should be taken care that the eyes are not irritated in case that the spray is accidentally applied into the open eyes.

## Non-irritant preparations

Besides water, also physiological components are adequate ingredients for non-irritant preparations on and around the eye:

- **mineral salts** – such as sodium chloride (table salt) and phosphates (pH buffers)
- **amino acids** – in analogy to the Natural Moisturizing Factor (NMF)
- **vitamins** – particularly Vitamin A and its derivatives (recovery) as well as vitamin E (protection) and D-panthenol (cell proliferation)
- **phosphatidylcholine** – component of

- plasma membranes and the tear film
- **lipid substances of the tear film** as well as lipids with the essential  $\omega$ -3 and  $\omega$ -6 fatty acids which form anti-inflammatory metabolites
- **mucins** of the tear film or physiological alternatives such as hyaluronic acid and other polysaccharides (alginates, xanthan) to improve sliding.

The mentioned components are biodegradable and can be isotonicly processed in aqueous products. Conventional emulsifiers in creams can be avoided by using lamellar structures including nanodispersions based on phosphatidylcholine and ceramides.

In terms of their components, cosmetic and medical products are similar. Besides the already mentioned ingredients, also polymer film-forming substances such as polyvinylpyrrolidon (PVP) and carbomers (polyacrylates) are used.

Skin tightening preparations and compositions to treat lacrimal sacs and eye rings take a special position. In these preparations isoflavonoids (phytohormones), saponins, peptides and extracts, among others, are used, in the case of irritated and red skin also protease inhibitors and anti-inflammatory active agents.

## Prevention

Besides avoiding the trigger factors, the following measures also help prevent dry eyes:

- taking breaks during VDU work
- doing eye exercises to improve the microcirculation
- taking contrast showers to tighten the connective tissue
- having enough sleep
- caring for a balanced diet
- doing regular exercise routines
- reducing nicotine consumption
- checking package leaflets of medical drugs for side effects

A comprehensive analysis of the skin helps finding the appropriate cosmetic preparations for the treatment of the eye area. In this way, not only the dry eye symptom can be treated with lipids and moisturizing substances (amino acids, hyaluronic acid, polysaccharides) but also deficits in essential fatty acids (a frequent condition with atopic skin), keratosis and problems of the connective tissue can be cured.

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