Corneotherapeutic skin care for the rosacea skin

Published in Ästhetische Dermatologie (mdm Verlag) 2010 (3), 16-20

Rosacea predominantly affects fair-skinned people and develops in adult age. Characteristic symptoms are erythema, changes of the superficial blood vessels and connective tissue as well as enlarged sebum follicles. Frequently there are also oedema and pustules to observe. In addition, there is a whole variety of special forms of rosacea.

Rosacea is partly hereditary and can be provoked by external influences like sun exposure (UV-radiation), temperature stimuli (cold, warm), nutrition, stress and contact with irritating substances. Blood vessel changes in form of telangiectasis are also called couperosis.

The recovery of the skin as well as anti-inflammatory, anti-erythemic and anti-microbial effects have priority in the pharmaceutical treatment. Consequently, retinoids (isotretinoin oral), antibiotics (minocycline and doxycycline oral, metronidazole topical) and azelaic acid (up to 15% in topical creams) are applied. Glucocorticoids are counterproductive.

Preventive measures

As a therapy-adjuvant and preventive measure, it is significant to avoid the rosacea-triggering irritations. The skin should be protected against UV and intense IR radiation (sun), heat (as e.g. sauna), extreme cold and dehydrating wind. Hot spices, hot and alcoholic drinks cause immediate vasodilatation. Emotional, mental stress causes flushes and sweating. Dried sweat may provoke irritations (burning, itching) in the case of connective tissue disorders. Smoking primarily is harmful for the skin appearance.

The following principles are essential for the formulations of the daily skin care preparations:

- Perfumes and essential oils usually contain sensitizing components. They should be avoided in pure form but also as components of skin care products.
- Alcohol concentrations of more than 10 percent in cosmetic products may provoke irritations on the rosacea skin.
- Emulsifiers, particularly polyethylene glycols (PEG), have barrier-disordering effects and may form irritating peroxides.
- Lipid substances should be used sparingly. Particularly mineral oils should be avoided in creams. High concentrations of lipid substances provide ideal anaerobic conditions for propionibacterium acnes and staphylococcus epidermis.
- Redundant additives as e.g. azo dyes stress the skin.
- Use lukewarm water for skin cleansing instead of hot water.
- After cleansing pad the skin dry instead of rubbing with the towel.
- Avoid peeling of skin areas with rosacea.
- Dry instead of wet shaving.

Corneotherapy

Corneotherapeutic measures aim at stabilizing the disordered skin barrier in the long run. The intact skin barrier can largely stop exogenic rosacea triggers as e.g. working materials, chemicals and germs. As a matter of fact, as the skin barrier is stabilized, also the probability decreases that inflammatory processes in the deeper skin layers start again and again. They now can gradually regress. This treatment is called "outside-in" strategy.

The conventional pharmaceutical treatment usually proceeds in reverse sense, which means that the inflammatory processes are inhibited first. This does not involve a recovery of the stratum corneum (horny layer), however. Although there is an immediate effect to observe, frequent relapses can occur after the drug has been stopped as the exogenous triggers still can penetrate through the skin.

The stabilization of the horny layer concentrates on mild cleansing, non-irritant skin care and skin protection. The water used for cleansing should be lukewarm and free of hardening components like calcium and magnesium ions in order to prevent a salt precipitation of the fatty acids of the skin barrier, a fact which further destabilizes the skin barrier. Cleansing

products should be free of preservatives (sensitizing potential) and re-fattening substances in form of silicones or surface active compounds. Appropriate preparations are gels with pH values up to maximal 7 without lauryl sulfate or lauryl ether sulfate (irritating potential). Sugar tensides, for instance, are recommended as detergent substances. Alternatively, tenside or emulsifier free cleansing milk can be used.

The skin care cream bases (base creams) should be free of perfumes, preservatives, emulsifiers, mineral oils or silicones. Fatty acids, ceramides and phytosterols in combination with saturated phosphatidylcholine and triglycerides allow skin-identical physical structures and excellent tolerance properties (DMS base creams).

Similar considerations apply for the composition of foundations (make-up). Naturally, their lipid contents in general need to be higher in order to stabilize the pigments. Appropriate pigments are iron oxides, titanium dioxide, silicic acid and mica. Greenish tones may neutralize erythema. Prominent blood vessels may eventually be treated with the self-tanning agent dihydroxy acetone (DHA) in order to attenuate the difference in skin tone.

The fat content of sun protection cream bases is higher, similar to foundations, as they have to incorporate the UV filters. Mineral UV filters like titanium dioxide and zinc oxide are preferred in this context. It has to be mentioned, though, that high sun protection factors cannot be realized without chemical filters. Furthermore, it should be added that aqueous, triglyceride-containing creams with zinc oxide are unstable on the long term as they gradually develop into the undesired zinc soap. It has to be considered that the use of sun screen creams will not protect against IR radiation. Hence, shade is the best protection for the rosacea skin.

Cosmetic active agents

After the barrier function of the stratum corneum has been recovered, the focus turns to the preventive skin care. In this context, the "extended corneotherapy" is an interesting point. It means the selective opening of the horny layer with the help of liposomal and nanodisperse active agent concentrates. The active agents may then easily penetrate through the barrier layer. Subsequently, the barrier is re-closed with DMS base creams.

Base creams and active agents are often combined in modular form. This helps to accumulate the active agents in the horny layer from where they are gradually released as needed. A key component of liposomes and nanodispersions is native (unsaturated) phosphatidylcholine (PC) which contributes to the penetrating properties of the barrier layers. PC contains chemically bound linoleic acid and choline, both essential substances. Linoleic acid serves as a substrate for the formation of ceramide I, a significant protective substance of the skin barrier. The following active agents are at disposal:

- **Liposomes:** The fatty acid composition of PC contains up to 80 % linoleic acid which is metabolized in the skin into 13-hydroxyoctadecadienoic acid (13-HODE) with excellent anti-inflammatory properties (omega-6 acid). Liposomes are very effective against cornification disorders. Azelaic acid is recommended as a consistency agent; it also is a potent agent against propionibacterium acnes and staphylococcus epidermis. Azelaic acid concentrations of up to 1% are licensed for skin care products.
- **Linseed oil:** Linseed oil contains more than 50 % α-linolenic acid (ALA; omega-3 acid) which is enzymatically transformed in the skin into the anti-inflammatory 13-hydroxy-9,11,15-octadecatrienoic acid (13-HOTrE). The availability is improved with aqueous and quickly penetrating nanodispersions with excellent sensorial properties.
- **Evening primrose oil:** Evening primrose oil is rich in γ-linolenic acid (GLA; omega-6 acid) which serves as the basis for the anti-inflammatory 13-hydroxy-6,9,11-octadecatrienoic acid (13-HOTrEg) that forms in the skin. Also in this context, the nanodisperse application is advantageous.

Annotation: While the natural 15-lipoxygenase of the skin oxidizes linoleic acid, α-linolenic acid and γ-linolenic acid into anti-inflammatory acids, the same omega-3 or omega-6 acids taken orally are metabolized into eicosapentaenoic acid resp. arachidonic acid and their respective reaction products which are less efficient.

- **Boswellia resin:** The acetyl-11-keto-β-boswellia acid of the boswellia resin inhibits the enzyme 5-Lipoxygenase which triggers inflammatory processes in the body. Only after processing boswellia sacra resin into nanodispersions it can be

made available for the corneotherapeutic skin care. It is also very effective against actinic keratoses and inhibits the expression of the collagen-degrading metalloproteinases during UV radiation.

- **Vitamin A:** Retinol supports both skin recovery and the neoformation of collagen. Retinol is usually used in form of retinyl palmitate which is enzymatically hydrolyzed into palmitic acid and free vitamin A. In highly effective nanodisperse systems, the agent should be used in low dosages only as the released vitamin A is mainly metabolized into vitamin A acid. Other dosages could cause the typical irritative effects of vitamin A acid.
- **Butcher's broom** extract stabilizes blood vessels and connective tissue. It tightens the skin and alleviates erythema. The extract contains saponines or their aglycones ruscin, ruscogenin and neo-ruscogenin together with the alkaloid spartein. The combination with a liposome concentrate improves the penetrability of butcher's broom extract.
- **Echinacea extract** has antiseptic and anti-inflammatory effects and inhibits the hyaluronidase. The extract is mainly used against telangiectasis (couperosis). The occasionally reported tightening effect is due to unsaturated acid amides and flavones.
- **D-panthenol** is the pre-stage of vitamin B_5. It attenuates itching, increases the skin hydration and intensifies the recovery supporting cell proliferation.
- **Aloe vera extract** calms the skin and forms a light superficial film which stabilizes the skin hydration. Alternatively, aqueous-dispersed CM-glucan can be used.
- **Rose hip seed oil** is an option for gentle massages. The esterified fatty acids of the oil consist between 25-50 percent of linoleic acid and 25-30 percent of α-linolenic acid (see above for information on metabolism).
- **Salicylic acid** has antimicrobial effects, however, should be used sparingly, if the focus is not on the keratolytic effect of the substance.
- **NMF:** The Natural Moisturizing Factor (NMF) mainly consists of amino acids. It has not only moistening effects but also is the natural radical scavenger of the skin.

With regard to the selection of active agents, the main focus is on calming effects, a stabilization of the superficial blood vessels, anti-inflammatory and antimicrobial prevention as well as recovery-supporting effects which all can be integrated into one treatment procedure:

- **Cleansing:** with a cleansing gel or cleansing milk
- **Toning:** with an aqueous lotion containing D-panthenol and an astringent cucumber extract or a liposomal dispersion containing azelaic acid.
- **Massage:** (very gentle) with the same components as for the following facial mask. If a supplementary oil is needed: rose hip seed oil.
- **Facial mask:** with linseed oil, vitamin A, butcher's broom, echinacea extract and base cream. The surplus mask preparation is gently removed with a compress.
- **Eye care:** consisting of butcher's broom, liposomes, NMF, hyaluronic acid as well as base cream or base gel (as e.g. water, xanthan gum, sodium carbomer).
- **Finishing care:** boswellia, liposomes containing azelaic acid and D-panthenol in a base cream.

Depending on the skin diagnosis and the degree of severity of rosacea and its concomitant effects, the treatment procedure can be individually varied. Concluding, it should be mentioned that most of the active agents listed above also are used against acne vulgaris (oily skin) and adult acne (dry skin). **Acne vulgaris:** cleansing gel, enzyme peeling, salicylic acid, liposomes, azelaic acid, boswellia, vitamin A, DMS base cream (optional). **Adult acne:** cleansing gel or cleansing milk (DMS base), enzyme peeling, salicylic acid, linseed oil, boswellia, vitamin A, phytohormones (as e.g. liposomal red clover extract), liposomes, NMF, hyaluronic acid, aloe vera, DMS base cream.

Burning skin

The past years have seen a considerable increase of rosacea cases and disorders of the connective tissue. Repeated fruit acid and chemical peelings seem to contribute a great deal to these problems. Individuals concerned report on short burning sensations after applying O/W emulsions, among others. These burning sensations depend on the concentration of water soluble substances in the products whereas the chemical composition is insignificant in this context. Characteristic for this effect is a feeling like "rubbing salt into open sores". Obviously, water soluble substances penetrate deeply into the skin and cause irritations. If the excessive use of skin care products leads to concentrations of water soluble substances, particularly in winter with

low skin hydration and overheated rooms, it is suggested to:

- **Reduce skin care creams**
- **Increase the lipid content**
- **Apply azelaic acid containing liposomes and NMF**
- **Use astringent active agents**

Frequent skin cleansings intensify the problems especially if the hardening components of the drinking water deeply penetrate into the pre-damaged skin and thus largely destabilize the skin barrier. A worthy investment in this situation is a domestic water softening unit. The largely irritated skin is not only sensitive to hard water but also to infections caused by microorganisms which occur in the same way. In extreme cases, the facial skin may even spring up. Itching and feelings of tension followed by inflammations on cheeks, nose but also eyelids and on perioral areas between upper lip and nose or on the chin are typical symptoms. During the acute stage of the inflammation, even water and emulsifier free oleogels should no longer be used for the skin care as the fat-enriched products provide ideal conditions for anaerobic bacteria, particularly propionibacterium acnes and staphylococcus epidermidis. It is inevitable then to apply antibiotics. Metronidazole is advantageous as it also stabilizes the superficial blood vessels. Parallel to the pharmaceutical therapy, it is necessary to provide for a well-functioning skin barrier ("adjuvant corneotherapy") as quickly as possible in order to prevent relapses.

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