

# Skin care for the neurodermitic skin - supporting the skin barrier

Published in Kosmetische Praxis 2005 (1), 9-11

Dehydrated skin and a high transepidermal water loss (TEWL) are characteristic symptoms of the neurodermitic skin. Especially during the winter season an adequate skin care accompanying the treatment and above all its specific formulation is an important issue.

**N**eurodermatitis or atopic dermatitis as it is also called is a widespread skin barrier disorder which, on the one hand, belongs to the hereditary diseases and on the other hand obviously is also influenced by specific cultural features. A steady increase in frequency is observed. Estimates show that 10 to 20 percent of the children and between 3 and 5 percent of the adult population are affected. Besides heredity, it is assumed that an insufficiently developed immune system in childhood is responsible for the later acquired hypersensitivity towards atopic diseases like neurodermatitis, hay fever and allergic asthma. The fact, that the frequency in big cities is higher than in rural areas still backs this assumption. Without addressing the issue of complex immunological processes in detail, a variety of genetic factors and environmental triggers of the disease can be presupposed. Among the last named above all mental stress, climatic conditions, microbial infections as well as irritating and sensitizing substances play a major role.

## Damaged skin barrier

Characteristic properties of neurodermatitis are dehydrated skin and a high transepidermal water loss (TEWL). The last named also explains the increased susceptibility of the skin for the penetration of external substances. The stratum corneum shows a deficiency of ceramide I which contains linoleic acid and which is one of the major barrier substances of the skin. Regarding the different essential fatty acids where also linoleic acid belongs to, a frequent enzyme defect can also be observed: the body is not able to transform linoleic into gamma-linolenic acid. Based on this fact, the supportive prevention with appropriately formulated skin care products has been developed. In this connection it should be mentioned that topically applied essential fatty acids are not in the same way transformed as the ones administered orally. The last named are meta-

bolized to arachidonic acid and its reaction products in the liver.

## Increasing sensitivity

There is a multitude of dermatological therapies ranging from UV treatment to balneological measures, prescriptions of immune modulators, immune suppressing products, antibiotics and anti-inflammatory substances to symptomatic treatment with glucocorticoids. It is very important to avoid a further aggravation of the atrophic condition of the skin - side effect of a continued therapy with these substances; as it still increases the sensitivity towards external influences. Additional complications like sensitization and infections will then be the consequence.

## Stress & Co.

Potential triggers for neurodermatitis may be hidden in food, textiles, pharmaceutical products, occupational substances and pollen. Adapting nutrition and day to day habits as well as changes in climate may offer some relief however are sometimes hard to realize in our daily routine.

Neurodermatitis may develop a variety of different symptoms. The barrier disorder may sometimes be limited to certain skin areas with the bends of the joints as the most affected parts or evolve symptoms all over the body. Infants frequently develop milk crust on the hairy parts of the head. Apart from that eczema-like weeping spots in the face, on trunk, hands and feet may spread out. The itching causes repeated scratching and subsequently a high susceptibility for infections. Stress situations even increase the itching which is the reason why also strategies for stress management are important.

As a rule there are intermittent attacks of neurodermatitis. The period in between the attacks may be used for a supporting prevention. This helps delaying the renewed

deterioration of the skin condition. Due to the low humidity in rooms the winter season is specifically critical. During this period the damaged skin barrier still furthers the dehydration of skin and, in connection with it the tormenting itching. Therefore, particularly in this season the skin care and above all the ingredients of the skin care products are very important.

### **General skin care principles**

As the neurodermitic skin is very sensitive to substantial influences it is recommended to observe some basic principles when selecting the skin care products. As a rule, the preparations contain a multitude of substances in order to improve their stability as well as their customer acceptance which, however are a strain for the skin. Preservatives for example belong to these substances. As they are potentially sensitizing and easily penetrate the barrier damaged skin they are a major problem for the persons affected. The same applies for perfumes. Another substance class to avoid are emulsifiers i.e. additives which enable lipid substances to combine with an aqueous phase to build up a cream. It has turned out that particularly synthetic emulsifiers which remain unchanged in the skin contribute to an increased wash out of natural skin barrier substances with every skin cleansing process. As the skin of neurodermatitis patients produces comparatively small amounts of barrier substances, these specific emulsifiers additionally aggravate the condition of the skin. Recommended here are cosmetic concepts which definitely avoid emulsifiers and which develop a cream structure based on natural membrane substances similar to the barrier layers of the skin (Derma Membrane Structure). This specific system has the advantage to fill deficits in the skin barrier layer with comparatively similar substances without impeding the natural regeneration process of the skin. A reduced natural regenerating process may be observed for example after the application of creams with components that build up an impermeable film on the skin surface. This specifically applies for high concentrations of paraffin oil and/or vaseline. The effect can be compared with a band-aid on the skin. Vegetable oils, lipids and waxes by contrast sufficiently refatten the skin and are able to integrate into the structure of the horny layer. Moderate amounts may also be applied purely on the hypersensitive skin even if the watery phase of creams is no longer tolerated. In these extreme cases also water free oleogels are appropriate – they are basically

oils which were thickened with the help of consistency agents with the result that they are more comfortable to apply than pure oils. They actually are the optimal protection for the skin. Regarding physiology, the oils used for oleogels just like for creams should not present a foreign body.

### **Corneotherapy**

Corneotherapy which has been coined by Professor Albert Kligman, is based on the same theory. A major objective here is to individually balance the moisture and lipid content of the horny layer. Subsequently, this will also be beneficial for the deeper skin layers affected which then are able to regenerate. Topical drugs and their side effects can thus be reduced or even be avoided. In the field of cosmetics the principle of corneotherapy is an excellent tool for the supporting prevention between attacks. There are specific measuring methods like corneometry for the moisture content of the skin, sebumetry for the superficial lipid content and tewametry for the TEWL. To increase the skin hydration NMF substances like amino acids, urea and glycerin have proved successful. In combination with liposomes they easily spread within the horny layer. Evening primrose oil dissolved in nanoparticles may also be helpful in case of an enzyme defect which causes a deficiency in gamma-linolenic acid as described above. In addition, due to their phosphatidylcholine content nanoparticles and liposomes continuously release linoleic acid which is integrated into the endogenous ceramide I and thus helps to stabilize the barrier layers. Urea soothes the itching. It is recommended to use the different active agents in combination with a cream which contains membranes.

### **Adequate skin cleansing**

Neurodermitic skin shows a deficiency in natural skin barrier substances and beyond it, with every cleansing process the few ones still available drain away. Therefore it is essential to avoid excessive cleansing particularly when detergent cleansing products like shower cream, shampoo etc. are used. The later named should be reduced to a minimum or even avoided. Neurodermatitis patients should pay attention that the cleansing products contain very mild surfactants only. The frequently propagated refatting properties of these products are not suitable for the dehydrated and neurodermitic skin especially if they are based on surface active substances. In this respect it is recommended to become

familiar with the INCI. An appropriate alternative here e.g. is cleansing milk which basically corresponds to a cream with membrane substances and increased oil content. This type of cleansing milk avoids the washout of natural barrier substances.

Even if using pure water only, it is necessary to take a closer look at the components as water and water just are not alike. Hard water is most inappropriate for the barrier damaged skin as its calcium ions easily penetrate into the skin where they combine with the natural palmitic acid and form insoluble "lime soaps". As palmitic acid is an essential component of skin barrier, the deterioration of barrier layers still continues with the formation of soaps. In areas with hard water it is therefore recommended to use a descaling device; the pH-value of the descaled water should not exceed 7-8. In case the water available only has carbonate hardness it may be adequate to just boil small quantities as the calcium ions then separate as insoluble boiler scale.

Emulsifier free oil baths may be a help for a non-irritating skin cleansing. Added phosphatidylcholine actively transports the oils to the surface of the skin to form deposits there. In this case the degreasing effect of baths containing emulsifiers will be avoided.

### **Perspiration & climate**

One of the reasons for frequent cleansing may be the irritation caused by natural perspiration concentrating on the skin surface. In this specific case light breathing clothes are important. Tightly fitting clothes are the reason for mechanical irritations and a humid microclimate. Bacteria and fungi can successfully reproduce in these favourable conditions, penetrate into the damaged skin barrier and cause infections. By contrast, a room climate with low temperatures and high moisture content reduces the dehydration of the skin.

It is obvious that all these measures mentioned above will not be able to remedy every single cause for a neurodermitic skin. However, after the dermatological treatment, in their entirety they are an important element among the potential measures available.

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