

Regeneration of the skin barrier

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The objective of regenerating the skin is just as old as cosmetic itself. The decorative cosmetic shows how we would like to look after the regeneration. The caring cosmetic with the active agents at its disposal tries to support the regeneration to revitalize, soothe and protect the neglected, elderly and damaged skin.

Regeneration rather is a medical term and summarizes in one word a variety of very complicated cell-biological processes which control the cell formation and recovery. Hence, regeneration contradicts the current cosmetic decree. It is not allowed to attribute soothing effects to cosmetic products though without doubt, many preparations containing e.g. panthenol, urea, essential fatty acids or phosphatidylcholine have proven successful.

Delaying the skin aging

For this reason frequently paraphrasing statements like "anti-aging", "anti-wrinkle" and "revitalizing" effects can be found today. The appropriate products are supposed to delay or even stop the aging of the skin or at least to soothe its consequences. Yet, the insinuation of skin regeneration always is somehow present and the consumer also understands it like that. Also "rebuilding" and "repair" products generate this illusion. Speaking of regeneration itself, the statements are a little more reserved like e.g. "the product supports the regeneration" or "supports regeneration". This explains that not the product but the body brings on the regeneration and that the product accelerates the process, at least it will not slow down or stop it.

Typical active agents like vitamin A acid, fruit acids (AHA acids), vitamin E etc. are usually linked to skin regeneration. They are supposed to stimulate the natural repair or to protect against harmful mechanisms like e.g. against free radicals. The order within the top active agents changes permanently, however, on a long-term comparison some substances are regularly present – apart from few exceptions. Highly concentrated vitamin E and coenzyme Q10 are some examples at present.

Now, experience shows that not necessarily the deeper (living) skin layer have to be stimulated and supported with active agents but that rather the uppermost (dead) skin layer also called horny layer, the Latin word is

stratum corneum offers interesting areas for new concepts. On first sight this might be seen as a step backward into the past as the horny layer is the traditional activity field of the cosmetic and offers little spectacular ways. The dermatological research has brought about a lot of new results and finally has put an end to this prejudice.

The specialists agree on the fact that numerous signal functions which influence important controls in the living epidermis are started in the stratum corneum. Hence, it is obvious that the care of the horny layer indirectly has an important influence on the regenerating processes of deeper skin layers which on their turn again interact on the condition of the stratum corneum.

Care of the barrier layers

It is not necessary to be biochemist or cell biologist to observe these effects in practice. To add a negative example: Cosmetic products which cause a very low trans-epidermal water loss (TEWL) slow down the regenerative skin activities which can for example be recognized in a reduced synthesis of nucleic acids (DNA). With other words: clients treated with skin care products which form a more or less impermeable film on the skin - this especially applies for products high in mineral oils and silicones (at maximum: vaseline, INCI: petrolatum) – will always fall back on the products since a feeling of extremely dry skin will show up as soon as the client is without products. To return to a normal and natural metabolism activity it takes an adaptation period of several weeks to several months. The process can be compared with the slackening of the muscles in case of lacking physical exercise and the start of a tedious physical training to regain the original fitness. Cosmeticians who change their client's skin care over to a different product type have to be very patient – the clients also, of course. It is a fact today that chemical as well as physical factors of cosmetic have a major

influence on the integrity, regeneration and preservation of the horny layer and as a result, though on a secondary level, also the processes in the living epidermis are controlled. The idea that the preservation of the natural functions of the barrier layers is a major issue, gains more and more acceptance.

Structured like a brickwork

The stratum corneum is structured like brickwork. The dead horny cells are the "bricks" in this picture. The "mortar" which keeps the horny cells together consists of highly effective barrier layers with a bilayer membrane structure similar to the cell membranes. They are also called lipid bilayers or just bilayers. In cases where the membrane structure is disturbed the skin dehydrates and due to its increased roughness or developed cracks it is even more susceptible for the penetration of harmful substances. The objective of recent concepts is to keep the membrane structures between the horny cells in a rather natural and intact condition. This type of skin care has components which are very well tolerated by the natural membrane structure and which are able to restore it and without impeding the natural regeneration of the skin. In this connection two factors are very important:

- The chemical composition of the components is skin-identical or skin-related.
- The physical structure of the skin care is also skin-identical or at least similar to the skin in form of bilayer elements as e.g. in DMS-base creams.

Skin-like structures

Regarding the prevention of skin problems, positive results could be achieved with products whose physical structure is skin-identical or skin-like. To quote an example: neurodermitics show an extremely disordered skin barrier. They suffer when the disordered skin barrier is no longer able to regenerate. They keep applying cosmetic and dermatologic products and in spite of their efforts there is no long-term success. In case of inflammations their dermatologist prescribes corticosteroids which cause a short-term improvement, but in the long run, they contribute to an increased skin sensitivity and deterioration of the general skin condition. Experience has shown that a high percentage of neurodermitics can be helped simply by supplying skin care creams which are free of emulsifiers. Emulsifiers have positive and negative properties. Positive is

their capacity to combine skin caring fats and oils with a watery base in a stable condition. The disadvantage is that they usually keep their positive property also in the skin – with the exception of only a few types of emulsifiers - and thus disturb the natural skin barrier. Inevitably, fat substances and barrier components will later be transported out of the skin e.g. after a longer contact with water. The damaged skin barrier of neurodermitics is specifically susceptible here.

Yet, if neurodermitics use skin care creams free of emulsifiers with the appropriate active agents like linoleic acid (essential fatty acid) and urea, the skin barrier will reactivate its own regeneration after a certain time and the problems will ease.

Supportive linoleic acid

Particularly ceramides contribute to the preservation and regeneration of the skin barrier. They are provided and transported into the skin barrier layers by the organism itself.

One of the most important ceramides is the linoleic acid containing ceramide I. A decreasing availability of ceramide I correlate with an increase of pathological skin modifications. Therefore, vehicles like liposomes and nanoparticles whose shells normally contain high concentrations of linoleic acid become increasingly important as active agent additives. Meanwhile, it has turned out that the experiences of neurodermitics described above also are applicable for the lower but still relatively high percentage of psoriatic patients.

Psoriatics also have an extremely disturbed skin barrier, but in contrast to neurodermitics the symptoms are a hyperproduction of horny layer components mostly in combination with an inflammation. A part of the psoriatic patients also benefits from liposome products since they are able to rebalance the disordered skin balance (homoeostasis). The condition of the skin barrier will normalize.

Stabilizing the salt content

Salts are a very important regulative to stabilize and support the mineral salt content which is characteristic for a healthy skin. Salts are not only influencing the moistness content of the horny layer but also the normal cell proliferation and cell differentiation and the synthesis of epidermal and barrier-active fat substances linked to it. They are an important component of cosmetic products supporting the skin regeneration. The spectrum of salts

and their specific effects is too broad to be described here in detail.

In this connection also the natural moisturizing factor (NMF) has to be mentioned. If necessary, it should be supported with skin-identical substances like urea.

Gentle skin cleansing

A major component of an appropriate skin barrier care is skin cleansing. Cleansing the skin with watery substances involves an increased washing out of epidermal protective substances. Partly because of the above mentioned activation of the emulsifiers in the skin and partly due to the effects of the tensides included in the cleansing products. Even if we are used to the pleasant foam and the lipogenous effect of cleansing products today, it should be mentioned that unconventional non-foaming products with very mild tensides (e.g. sugar tensides) and products free of refatting agents take better care of the skin and also are better tolerated by sensitive skin.

In summary, it can be stated that the natural regeneration of the "dead" horny layer barrier is a central point. A cosmetic which uncompromisingly concentrates on the skin barrier can rightfully be called dermatological cosmetic. It is the best choice regarding skin care, skin protection and especially the prevention of skin disorders and it offers a holistic concept.

Effective "anti-aging" products

The best strategy to preserve an appropriate skin condition corresponding to the age solely is to preserve the natural skin barrier with the help of suitable products. Thus, protection and prevention are optimally guaranteed. Besides, a low dosage often is more successful than the intensive treatments which are favored today.

Dermatological cosmetic however, is not for free. Products free of emulsifiers with the exception of shaking mixtures or the good old cold creams require complicated production technology. Since their components are not staying on the skin surface but are integrated into the barrier layers of the horny layer where they set up depots, these creams have to be free of preservatives and perfumes.

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