

# Skin care during cancer therapy

published in *Kosmetik International* 2012 (5), 18-21

When customers undergo cancer treatment also the skin condition is affected. Problems and side effects of cancer therapies can be attenuated with an adequate skin care.

**C**ancer strikes abruptly and forces the patient to change the familiar style of life, either completely or temporarily. This also applies for their skin care routines, particularly during the phase of active therapy. The most important treatment options for cancer are

- surgical interventions
- radiotherapy
- chemotherapy
- immunotherapy

## Surgical interventions

Scars developing after surgical interventions may become an esthetical problem. The treatment of scars - both preventive techniques and skin care measures - has already been covered in detail in *Kosmetik International* 2008 (8), 36-38. A skin care that actively supports the skin recovery, peelings and techniques that stimulate the microcirculation are the most significant cosmetic measures to take after the wound healing process is completed. It should be mentioned though that these measures will require some patience. In the medium run, sun protective measures are a significant topic since the scar tissue still lacks melanin. Contrasts in pigmentation after skin grafts either are attenuated by applying liposomal vitamin C derivatives (sodium ascorbyl phosphate) or matched to the surrounding skin tone using pigment containing foundations and powders.

## Radiotherapy

During radiotherapy, the skin either serves as thoroughfare organ for the radiation applied or it reacts to the scattered radiation from the body interior. A damage of healthy cells cannot be avoided in this context. Consequences are a retarded formation of basal cells and, depending on the radiation dose, reversible or irreversible DNA damages. The body's own matrix metalloproteinases are activated dose-dependently and degrade collagen, the sebum secretion decreases and the barrier function of the skin is disturbed.

Dry and reddened skin, similar to a sun burn, is a visible consequence of radiotherapy. The erythema symptoms may be very intense (radiodermatitis). An intensified proliferation can be observed on the radio-damaged skin and it desquamates. The superficial barrier layers of the stratum corneum are shed. If the basal layer is severely affected, the barrier layer will peel off and leave weeping areas, in rare cases, also a necrotizing of the skin has been stated; oedemas may eventually form. In cases where the enzyme tyrosinase has been stimulated, the skin will darken due to the melanin production. If the hair root cells are damaged, the patient will shed his hair. Also the function of the sweat glands is impaired.

Erythemas appear about two to three weeks after beginning with radiotherapy treatment. Even years later, so-called late reactions may lead to vascular dilatation, teleangiectases, pigment spots and atrophic skin.

Factors influencing the intensity of side effects are the overall radiation dose, the focusing of the radiation source and the intervals between the individual doses.

If the individual radiation doses are spread over time, the tumour cells will be damaged in different growth cycles. In the case that the tumour growth cycles nearly correspond with the skin recovery cycles, the skin will be more affected by the treatments. It goes without saying that the skin should not be additionally stressed by UV radiation (sun) during therapy. If it cannot be avoided, it is essential to apply products with a high sun protection factor.

Similar to the UV radiation of the sun, the radioactive emission causes the formation of oxygen radicals and peroxynitrite radicals in the skin. Yet, they penetrate deeper into the skin and the external effects become visible at a later time. As a consequence, inflammatory reactions of different intensity will develop. The skin reacts particularly sensitive in the décolleté area. The reaction is accompanied by a burning and itching sensation.

The radicals are partly scavenged by amino acids (NMF) but also by hyaluronic acid which is essential for the turgor of the skin. Hyaluronic acid occurs in the extracellular matrix and

degrades in the process which, in combination with the above mentioned collagen degradation, leads to the atrophic condition of the skin. Hence NMF and hyaluronic acid are key elements for the conditioning skin care before and after radiotherapy. Emulsifier free barrier creams with Derma Membrane Structure in combination with linseed oil nanodispersions have proved successful for the basic accompanying skin care. In cases of actinic keratosis, also boswellia nanodispersions can be integrated into the skin care concept. The phosphatidylcholine (PC) contained in the mentioned preparations protects the cells against gamma radiation. PC liposomes have regenerative effects on the gamma and UV radiation-damaged skin. Mixtures of avocado oil and PC, dispersed in water can be applied to cleanse and simultaneously nourish the skin.

It is strongly recommended to avoid – if possible - body cleansing products that contain aggressive tensides such as lauryl sulfate and lauryl ether sulfate. In most cases, lukewarm water is sufficient for the cleansing of the skin. Short chamomile baths have soothing effects. As regards men's wet shaving using shaving soap, it also can be a source for skin irritations. Hence it is recommended to switch to dry shaving. When it comes to soothing the skin, CM glucan-containing hydrogels are an alternative to the aftershave lotions with high alcohol content. Hydrogels with alginates, hyaluronic acid, CM glucan, aloe vera, D-panthenol and amino acids (NMF) will keep the skin well hydrated. Some gels can incorporate vegetable oils whose omega-6 and omega-3 acids have anti-inflammatory effects. In the form of non-aqueous oleogels, the vegetable oils can be applied like a cream.

In contrast to Vaseline products, these oleogels have the beneficial effect of amply re-fatting and easily penetrating into the skin. In this context, an analogy can be drawn to the care of the neurodermitic skin which also shows barrier disorders, extreme dehydration problems and a disposition to irritations after mechanical stimuli such as tight clothing.

Irritating or potentially sensitizing additives in cosmetics are an additional source of problems and should be avoided since they easily penetrate through the disordered skin barrier. In cases where the skin barrier is damaged also the risk of infections is increased, a problem which can be confronted with the above-mentioned barrier creams and recovery supporting vitamin supplements (A, C, E, D-panthenol). Powders containing urea will not dehydrate the skin and have anti-itching effects. For decorative preparations, the same criteria apply as for the basic skin care: as little additives as possi-

ble and no substances that impede the natural recovery of the skin. This implies that covering mineral oils and mineral waxes should be avoided.

An essential prerequisite for a fast recovery of the skin after the therapy is the adequate preparation of the skin before therapy starts. Hence, it is recommended to apply barrier creams already several weeks before a planned radiotherapy in order to provide an effective protection for the skin.

## Chemotherapy

Chemotherapy involves a multitude of different effects for the skin as completely different destinations are targeted. If it comes to damage fast growing tumour cells, also the fast growing healthy cells of the skin and the mucous membranes are affected by the systemic treatment. As a consequence, barrier disorders of the skin will develop. Characteristic signs are dehydrated skin and an increased risk for infections which still is augmented by the weakened immune system. Frequently cutaneous mycoses and herpes infections appear which have to be treated with pharmaceutical drugs. Hence hygienic conditions are an essential prerequisite. Similar to the radiotherapy-affected skin, moderate skin cleansing preparations are recommended in order to avoid additional problems for an already damaged skin barrier. Medical hydrogels are advised for the treatment of dry mucous membranes.

A multitude of side effects has been observed in connection with the cytostatics used in cancer therapy:

- Mitotic inhibitors such as vinca alkaloids have toxic effects and cause loss of hair.
- Alkylating cytostatics (as for instance cyclophosphamide) have toxic effects and cause loss of hair and erythema.
- Folic acid antagonists such as methotrexate may cause exanthema, erythema; frequently they also trigger symptoms such as itching and reactions around the injection sites.
- Pyrimidine antagonists (as for instance fluorouracil) are evidenced by photosensitive reactions and hyperpigmentation.

If the signalling channels of the body's own growth factors are blocked by anticancer drugs, modifications of the skin condition, the hairs and nails are inevitable:

- The vascular endothelial growth factor (VEGF) induces the vascularisation process (angiogenesis) during the embryonic stage. Multikinase inhibitors impede the VEGF signalling channel, among others, and impair the tumour angiogenesis. Facial erythema, rashes (exanthema), itching and swellings have been observed.
- Via its receptors, the epidermal growth factor (EGF) stimulates proliferation and cell growth. The EGF impedes the apoptosis (programmed cell death). Hence it also supports the growth and metastatic spread of tumours. Signal transduction inhibitors impede the transduction of the EGF signal to the receptor in the interior of the tumour cell. This reaction also occurs on the skin cells. The skin will dehydrate and chap. Itching, erythema, inflammations and pustules will develop.

The side effects described vary depending on the individual condition and the preparation that has been medicated. The most important skin care measure to take in this context is to support the skin barrier with non-irritant, in other words, emulsifier free products in combination with hydrating agents such as amino acids and hyaluronic acid. In how far the itching sensation can be successfully relieved with urea and the erythema treated with essential fatty acids and vessel stabilizing extracts (echinacea, butcher's broom) has to be tested on an individual basis.

## Immunotherapy

Immunotherapy is classed in either active or passive immunotherapy whereas both will support the immune response to the cancer cells, in other words, slow down the growth or even kill the cancerous cells. Active immunotherapy implies the use of vaccines produced from devitalized tumour cells or antigens in order to cause a natural immune response of the body to the cancer cells. If natural cytokines of the body, interferons also belong to this family, immunoglobulins or T-lymphocytes are applied, it is a matter of passive immunotherapy. Since the growth factors are manipulated by this kind of therapy, it can also affect the skin. Interferons may temporarily cause non-specific exanthema, dry skin or loss of hair. As to the rest, the skin care has to be adapted to the specific symptoms that appear. Apart from that, it is essential to avoid irritations and in individual cases it may be recommended to apply lipid-enriched products.

Concluding, also the hormone therapy should be mentioned (as e.g. in the case of prostate, breast or uterus cancer). Since this specific therapy interferes with the estrogen or testosterone balance, hormone specific skin conditions have to be taken into account. If the sebaceous glands are affected, liposomal skin care lotions based on phosphatidylcholine are suggested; paraffin based products are counterproductive in this case. Abnormal skin reactions may prove to be side effects of the pain medication frequently administered together with the cancer-specific therapy. In this specific case, it is advisable to change the medication.

Dr. Hans Lautenschläger