

No crinkle-look – an arsenal of anti-wrinkle agents at choice

published in Kosmetik International 2012 (11), 22-25

There may be regrets though that those characteristic faces furrowed with wrinkles and deep lines are less common today. However, media and commercials talk us into a concept of beauty that lays emphasis on smooth skin. What can you do to preserve the skin smooth and supple?

Today, retouched photographs serve as paragons of beauty and influence your customers. The complexion is expected to be flawless and wrinkles and creases need to disappear. On that account a broad range of different substances is at your disposal in your beauty institute. Though, the terms used in this connection are just as vague and ambiguous as the transitions between the various types of facial appearance:

- skin smoothing
- skin tightening
- wrinkle reduction
- improved skin elasticity
- improved skin recovery

This enumeration foreshadows the complexity of the issue "wrinkles" that just cannot be reduced to a few trendy active agents. In addition, a difference has to be made between wrinkle reduction and wrinkle prevention.

The following overview intends to describe specific active agents as well as their mode of action as far as they are known today. Yet, the article is not focusing on the quantitative efficacy of the agents on specific types of wrinkles. The real challenge in the field of cosmetic treatments actually consists in selecting an adequate combination of agents after the individual skin condition has been diagnosed. In this context, also the matrix of the formulation - be it cream, gel or lotion - plays a significant role particularly in view of the fact that also obviously old-fashioned substances such as lipids substantially contribute to the intended skin tightening effect.

- **Acylamino acids** (lipacides) such as di-palmitoyl hydroxyproline, N-palmitoylglutaminic acid and natural compounds as for instance palmitoyl wheat protein hydrolysate, are characterized by their excellent smoothing effects. They adhere to the protein structures of the skin via their

hydrogen bridge bonds. With enzymatic hydrolysis long-chained barrier-active fatty acids such as for instance palmitic acid, as well as the NMF supporting amino acids will be formed.

- **Algae extracts** are rich in polymeric alginic acids and generate a thin hygroscopic layer on the skin surface that only marginally influences the TEWL (transepidermal water loss). The mucilages of aloe, xanthan gum, CM-glucan and cellulose derivatives have a similar effect. Due to the fact that the bonding capacity of the latter-mentioned to the keratin structures of the skin is insufficient, they are only used in combination with lipid substances. They smooth the skin and lightly fill up the wrinkles.
- **Antioxidants** such as the vitamins C and E protect against free radicals which, in the case of an impaired NMF and UV stress increasingly destroy protein structures and cause premature skin aging.
- **Barrier creams** with membrane structure reduce the TEWL to a physiologically reasonable level and increase the skin hydration which consequently leads to a smoothing of the skin.
- **Coenzyme Q₁₀**: Combined with phosphatidylcholine (PC), it occurs naturally in the mitochondria of the somatic cells. It can have similar effects as anti-oxidative vitamins. However, these effects only are released after the coenzyme Q₁₀ has been metabolized in the skin from the inactive quinone into its hydroquinone structure. Hence, penetration supporting substances are advantageous in this context.
- **DMAE** (2-Dimethylaminoethanol) is an amine with skin-tightening and wrinkle-reducing effects. It is used as ammonium salt, i.e. its neutralized form. DMAE develops, among others, as a metabolite, when the choline group of phosphatidylcholine (PC) is degraded. Hence, the pe-

- netration-supporting PC as a “pre-stage” is beneficial.
- **Fruit acids (AHA-acids)** purposefully trigger skin irritations and thus activate cell formation and skin tightening processes. It should be mentioned however that there are more and more reports on a potential causality between a long-term use of AHA acids and connective tissue disorders as for instance rosacea.
 - **Hyaluronic acid** combines to the keratin of the skin via hydrogen bridges. The water in the formulation evaporates causing a light tension so that smaller wrinkles disappear. Additionally, a light plumping effect on the bottom of the wrinkles can be observed. Experience shows that the effects can be intensified by combining liposomal PC although hyaluronic acid cannot be liposomally encapsulated due to its high molecular weight.
 - **Kigelia extracts** of the African kigelia or sausage tree contain, among others, flavonoids, steroidal saponins and phytosterols and have a noticeable tightening effect on the connective tissue. The extract is used in eye creams and preparations for the décolleté. The tightening effects can be most intensive in such a way that individuals with sensitive skin may even perceive them as uncomfortable.
 - **Caffeine and green tea**, the latter-mentioned additionally contains anti-oxidative polyphenols, stimulate microcirculation and lipolysis and are used in the treatment of the atrophic skin and cellulite. Massages, ultrasound or radiofrequency treatments intensify the effects in presence of penetration-supporting substances such as PC.
 - **Cosmetic peelings** with exfoliating particles stimulate the skin recovery.
 - **Lipids (fatty substances)** reduce skin roughness and TEWL. That is why night creams are particularly rich in fatty substances (frequently paraffin oils): The skin swells and a plumping effect is observed which then even is intensified by lipid-enriched make-ups or camouflage products. Intense skin cleansing routines in order to remove these superficial non-absorbable paraffin oils plainly results in the same skin condition as before the treatment, or even worse though. In this regard, it is inevitable that the skin also loses part of its natural barrier lipids.
 - **Lipoic acid** has anti-oxidative effects. It supports the smoothing of the skin and stimulates the collagen metabolism.
 - **Masks, modeling masks and fleece masks** can achieve fast skin smoothing and wrinkle-reducing effects for several hours even without specific active agents due to their temporary occlusive effects. Long-term effects can be achieved by adding active agents that easily pass through the skin barrier under these conditions.
 - **Butcher’s broom extracts** tighten the connective tissue, similar to the kigelia extracts. The superficial capillary blood vessels are stabilized.
 - **Moisturizers** are an important element for an unlined facial skin. The NMF consists of amino acids; it retains the skin hydration and smoothes the skin but also is a very effective natural radical scavenger.
 - **Niacinamide (Vitamin B₃)** can stimulate the recovery of the skin and smooth out fine wrinkles. Yeast extracts contain B-vitamins and, depending on their concentration, may have similar effects.
 - **OPC (oligomeric proanthocyanidins)** occur highly concentrated in aqueous grape seed extract which should not be confounded with grape seed oil and its characteristic features. OPCs have an excellent anti-oxidative potential.
 - **Optical wrinkle reduction** is achieved by using specific pigments in make-ups and powders that generate scattered light.
 - **Peptides** with stimulating effect on the collagen synthesis, the so-called matricins, such as palmitoyl-pentapeptide, smooth the skin but need to be applied on a long-term basis. Other peptides such as acetyl-hexapeptide temporarily influence the neuromuscular synapses of the mimic wrinkles. They induce a relaxation of the muscles and consequently have a smoothing effect on the skin.
 - **Phosphatidylcholine (PC)** occurs in the membranes of all types of cells. PC has cell-protective features due to its choline content. The substance originates from soya lecithin and is the most important base substance for liposomes, whose membranes correspond to the natural cells and whose cavity can incorporate watery active agents. Due to its content of linoleic acid, PC has skin-recovering (smoothing) and anti-inflammatory characteristics. It is a pre-stage of DMAE.
 - **Phytohormones (isoflavones)** develop a light estrogen-like effect in the skin which, among others, leads to a smoothing of the skin.

- **Phytosterols**, as for instance of the shea butter and of avocado oil, reduce the skin roughness. Due to their similarity to the human cholesterol, they are used in barrier creams and applied to treat barrier disorders.
 - **Spilanthol (N-2-Isobutyl-2,6,8-decatrienamide)** is the predominant active agent of para cress. Similar to certain peptides, spilanthol reduces the muscular contractions of the mimic wrinkles. It has a relaxing effect which involves a fast and visible tightening of the skin. Due to the depot effect of the stratum corneum, the dosage can be gradually lowered. Like capsaicin, spilanthol belongs to the pungent substances.
 - **UV-Filters** protect the skin against harmful UV radiation. However, they only should be used when actually needed (sun screen products). Day creams with UV filters unnecessarily inhibit the vitamin D synthesis which then has to be substituted in some way or other. UV filters will not protect the skin against IR radiation which is a further substantial trigger for the formation of wrinkles.
 - **Vitamin A (retinol)**, retinal and derivatives such as retinol acetate, retinol palmitate are transformed in the skin into vitamin A acid that in its turn can traceably reduce the wrinkle formation due to its regenerative effects.
 - **Vitamin C (ascorbic acid)** has fruit acid-like effects in higher concentrations. Correspondingly, it has a regenerating effect also on the wrinkle depth. To stimulate the collagen synthesis, stable derivatives in low dosages are used. Liposomally encapsulated ascorbic acid phosphate can be mentioned as an example in this context.
 - **Vitamin E (tocopherol)** mostly occurs as esters of the acetic acid, palmitic acid or linoleic acid. In this specific form it has no anti-oxidative effects. Precondition for the anti-oxidative effect either is the enzymatic hydrolysis of the esters in the skin or the use of free vitamin E. Until today, an influence on the collagen metabolism has been proved in vitro only.
 - **Growth factors** are natural peptides of the body with hormone-like effects in minute quantities. Growth factors either form, or are stimulated or released by various endogenous and exogenous triggers whereas cosmetic active agents can belong to the trigger factors. The interactions with their corresponding receptors release signal cascades in or on the cells, such as recovering processes.
 - The terpenes of the resin extracts of frankincense as for instance the boswellia acids inhibit the collagen degrading matrix metalloproteinases on the sun-damaged skin.
- ..and miscellaneous...
- As a matter of fact, it is rather pointless to keep on emphasizing that skin modifications cannot merely be influenced by active agents. Nicotine or excess alcohol consumption as well as weight reduction diets can counteract the cosmetic measures. Also the daily water consumption influences the amount and depth of wrinkles. In this context, not only the quantity but also the quality plays a decisive part. The water should contain an adequate amount of minerals.
- A balanced nutrition, sufficient sleep and recreational sport or gymnastics (to stimulate circulatory activity and microcirculation) are vital factors in preserving a functioning connective tissue. Restraint should be exercised in terms of skin cleansing routines. If barrier substances and NMF are repetitively removed, it isn't all surprising that the skin starts to suffer. Although the ingredients of cosmetic preparations may be excellent, they cannot replace the interactions of the naturally occurring substances.
- It is not the best solution though to concoct a wild mixture of active agents in form of a miraculous cocktail. In this context, restraint frequently beats abundance. A successful treatment means to carefully consider causes and effects in order to determine the adequate substance for the therapy.

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