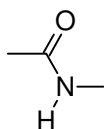


Peptides - more than transmitters and hormones

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Peptides play a major role in the development of anti aging cosmetics. They occur naturally and are quite often found as messenger proteins and hormones. Also their degradation products, i.e. the amino acids are key players in the field of cosmetic skin care.

Not only peptides but also their degradation products, the amino acids, play an important part. There are oligopeptides and polypeptides. **Oligopeptides** consist of a few and **polypeptides** of a multitude of different amino acid units linked together with an amide bond.



amide bond

Natural polypeptides with a molecular mass of more than 10,000 are also called **proteins**. They are classified into **extracellular fibrous proteins** of the connective tissue which are also called scleroproteins and **globular proteins** (spheroproteins). The group of scleroproteins e.g. comprises the different collagens, elastin as well as the keratin found in hair, nails and horny layer. Silk proteins also belong to the group of scleroproteins. Globular proteins are, among others, enzymes, albumin and hemoglobin.

For a long time proteins have been used as effective skin care substances especially in collagen and elastin products. As skin care components, however, these substances are not able to perform their natural functions as due to their size and due to a lacking transport medium they are not able to find their way to the areas where they naturally occur. On the skin surface, however, they generate a slightly tightening effect as the amide bonds link with the keratin of the stratum corneum by means of hydrogen bonds. Additionally, proteins most effectively retain water similar to amino acids and hyaluronic acid.

All purpose use

In technical respect, proteins like e.g. collagen serve as base substances for protein hydrolysates which, depending on the respective manufacturing process, contain protein fragments, i.e. oligopeptides or amino acid mixtures. Since the time when discussions about

BSE and base substances gained from dead animals have been the focus of attention, protein hydrolysates have been extracted from vegetable sources as e.g. wheat proteins.

From the protein hydrolysates, condensates with fatty acids are produced which also contain amide bonds and which offer excellent skin care features like skin tightening and moisture-retaining effects due to the fatty acid residues and the lipophilic properties connected herewith.

Following the example of Mother Nature

Furthermore, there is a multitude of natural products with a long tradition in skin care whose effects depend on their protein content. In this context, mare's milk, colostrum, the first breast milk and specifically rich in proteins and antibodies, curd cheese and other milk products should be mentioned. Also thymus peptides which are supposed to improve the immune defense system on the one hand side and stop the skin aging process on the other hand, still retained their relevance. They are still on the market as components of high quality creams for the mature and atrophic skin.

Peptides originating from thymus, epiphysis, cartilage, liver, prostate gland, heart and brain tissue still are the object of intensive research. The Institute of Bioregulation and Gerontology in St. Petersburg (Professor Dr. Khavinson) has published a variety of different studies in this connection. These peptides have been synthetically copied and tested with regard to their use in cosmetic creams. Specifically reported in this context are their anti-oxidative effects, the increased skin hydration and an augmented oxygen adsorption in the surface skin layers.

Also very well known for some time has been glutathione, a tripeptide which contributes to the redox processes in the skin and is used in skin care as a radical scavenger. Also dimeric synthetic peptides (cysteine glycine)₂ belong to this specific type.

Cysteine, i.e. an amino acid occurring in the NMF may be formed by degradation of cys-

thione-containing peptides reacts in the same way with radicals to cystine.

Currently, the anti aging sector is focussing on oligopeptides since the cosmetic research has detected their importance as messenger proteins. Reports of new peptides preferably with 2 to 6 amino acid units have been skyrocketing in the technical literature. In this context usually peptides are mentioned whose first amino acid is linked to a fatty acid. This feature increases their lipophilic characteristics and improves their penetrating behavior. The fatty acid residues are acetyl (acetic acid), caproyl (identical with hexanoyl or caproic acid), undecenoyl (undecylenic acid), palmitoyl (palmitic acid) or similar.

Caution still is recommended regarding the advertising messages on effects and efficacy profiles. The overwhelming majority of the effects described has been found out "in vitro" which means in cell cultures or similar artificial research conditions. "In vitro" and "in vivo" measurements, with "in vivo" data based on realistic conditions with volunteers, still are far apart.

A further restriction regarding a lasting anti aging treatment is the temporary effect of many products which means that the skin restores the before treatment conditions as soon as the therapy is stopped. This specifically applies for the surface-effective substances as well as those with neuromuscular effect. Or, in other words, peptides cannot work wonders! Currently, intensive research is carried out on the following peptide groups:

Peptides with stimulating effect on the collagen synthesis. They are also called matricins or collagen boosters. A prominent representative of this group is palmitoyl-pentapeptide.

Peptides with influence on the neuromuscular synapses of the mimic wrinkles. They have muscle relaxing and combined with it, wrinkle tightening effects. Prominent representative here is acetyl-hexapeptide.

Hormone like peptides. Cytokines and growth factors like fibroblast growth factor (FGF), signal molecules which control a variety of different biological processes. They usually are produced in a biotechnological process with the help of gene manipulated bacteria and then liposomally encapsulated.

Unspecific oligopeptides. Soybean oligopeptides and oligopeptides resulting from hydrolyzed milk proteins are effective on the skin surface. During the partial degradation process free amino acids are formed which support the natural NMF.

Polypeptides. Poly- γ -glutaminic acid is an example for this substance class which has moisturizing effects.

Aquaporins are proteins which enable the penetration of water through the cell membranes.

Complicated issue

Concluding, it should be mentioned that peptides and proteins are a very complex issue which can only be fragmentarily described. It still has to be clarified whether their use in the anti aging skin care has consequences on specific interdependent control circuits of the elderly skin and which kind of long term effects will result.

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