Innovative cosmetic raw materials and biologically active compounds in cosmetics chemistry

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Innovative, safe and effective cosmetic raw materials and biologically active compounds are the fundament of sound cosmetic products. The cosmetics industry is one of the fastest to develop, in worldwide. Recently, this development focuses also on scientific research in the field of effective cosmetic ingredients and biologically active compounds, innovative forms and technologies, so as to meet the expectations of both producers and, above all, increasingly demanding customers-consumers who on a daily basis use varied and plenty cosmetic products.

Keywords – cosmetic raw materials, biologically active compounds, biomimetic peptides

Introduction

Cosmetic raw materials and biologically active compounds are the fundament of many cosmetic products. We used natural compounds such as plant polyphenols, flavonoids, anthocyanins, proteins, polysaccharides as plant extracts, peptides, growth factors, cytokines, and stem cells and synthetic raw materials such as biomimetic peptides [1]. Biomimetic peptides are synthetic peptides that are lab-crafted to mimic naturally-occurring peptides. In skin care, biomimetic peptides can be found in targeted treatments like facial serums and antiaging cosmetics products. These compounds help reduce the appearance of skin aging [2,3].

Biomimetic peptides

Peptide synthesis has become accessible, and advances in peptide engineering, sequencing technologies, and structural bioinformatics have resulted in the rational designing of novel peptides. All these advancements would lead to the more prominent roles of peptides in many areas [4]. The cosmetics industry requires effective chemical compounds which can be synthesized cheaply and quickly. Many cosmetics products is effective cosmetic ingredients and biologically active compounds, innovative forms and technologies, so as to meet the expectations of both producers and, above all, increasingly demanding customers-consumers who on a daily basis use varied and plenty cosmetic products. Biomimetic peptides are syntetic compounds which produces biochemical, chemical, physical or physicochemical effects on the physiology and function of the skin, mucous membranes and their appendages, including hair and teeth [5]. These peptides, which can either be synthesized in a laboratory or extracted from plants, are truly revolutionizing the world of cosmetics. They are relatively inexpensive, they can easily permeate the skin thanks to their small size and the effective conjugation with carriers such as liposomes and nanosomes. They therefore effectively mimic the activity of natural proteins, physiologically affecting aging in a non-aggressive or irritating manner. As our knowledge on skin physiology and on the mechanisms of aging progress, new peptides are being identified and used to compensate for cutaneous deficiencies. Chemical compounds of the type proteins (peptides, amino acids) may be enzymes (inhibitors, catalysts), antioxidants, growth factors and regulators of skin metabolism. They take part in numerous biochemical processes taking place in the skin [6]. Production of modified peptides consisting of specially selected amino acids with a size and/or functions gives possibility to penetration the dermis (natural ones are too large often to penetrate the stratum corneum).

Biomimetic peptides are most often obtained from plant extracts (e.g. soybeans, rice) or chemical synthesis. We known carrier, signaling, neurotransmitter and enzyme modulating peptides [7]. Carrier peptides are transporting active substances deep into the skin. They attach to another component and make it easier for it to get to the target site of its activity. The first peptides were used in preparations for accelerating wound healing, and later in rejuvenating cosmetics. Signaling peptides stimulate protein synthesis and activity of fibroblasts for the production of skin support fibers, collagen and elastin, contributing to the reduction of wrinkles and skin rejuvenation. The most popular signaling peptide is palmitoyl pentapeptide-4, which stimulates the production of collagen I, III and IV type (Fig. 1).

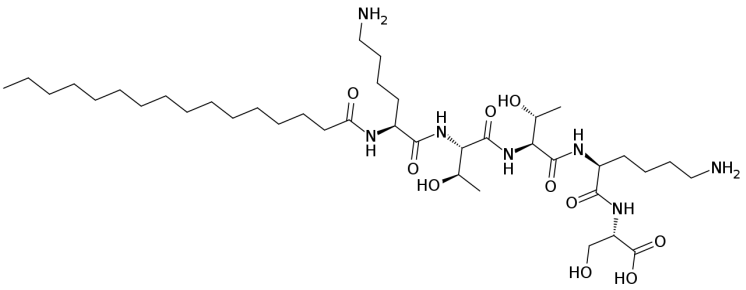

Fig.1. Palmitoyl pentapeptide-4.

Neurotransmitter peptides relax the muscles responsible for the formation of mimic wrinkles and counteract the constant tension and stress of the skin. Enzyme modulating peptides inhibit the action of enzymes in metabolic processes. Intelligent peptides (peptides with an attached chain of fatty acid, e.g. palmitic acid) facilitates the passage of the complex through the epidermis and penetration into the dermis. Other known biomimetic peptides it e.g. myristoyl pentapeptide-17 (Fig. 2) and palmitoyl tripeptide-38 (Fig. 3).

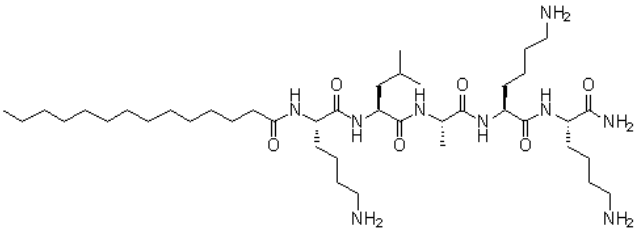

Fig. 2. Myristoyl pentapeptide-17

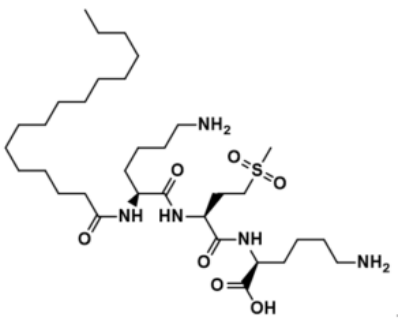

Fig. 3. Palmitoyl tripeptide-38

Biomimetic peptydes are structurally similar to natural peptides naturally occuring in the human body. The amino acids sequence in biomimetics peptides is similar to natural peptides. Peptides may aid in cell communication between the epidermis, the outer protective layer of skin, and the dermis, the very active middle layer of skin. This could help make the skin's repair process more effective, which, in turn, may help to reduce the appearance of many of the common signs of aging such as fine lines, wrinkles and discoloration. These compounds stimulate the renewal of skin cells, increasing skin density, improving its elasticity and reducing the depth of wrinkles, stimulating the production of elastin, glucosaminoglycans (including hyaluronic acid) and collagen.

Conclusion

Peptides offer a very high biological potency and the spectrum in the fields of cosmetics is continuously growing. Biomimetic peptides are components of many new generation cosmetic products. These are substances imitate the mechanism of action of their natural counterparts. They are used in cosmetics as innovative and effective cosmetic raw materials.

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