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HYALURONIC ACID FROM BIOFERMENTATION–MOLECULAR WEIGHT<10 KDA

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Abstract

Hyaluronic acid (HA), is a biological macromolecule composed of repeating disaccharide units of [glucuronic acid + N-acetylglucosamine] that exists widely in the extracellular matrix of vertebrates. As a main component of connective tissue, HA distributes in interstitial substance of all tissues in form of macromolecular glycosaminoglycan, fulfilling its physiological functions of cell adhesion and osmotic pressure adjuster.

HA is mainly known industrially in its sodium stable powder version nammed Sodium Hyaluronate in the INCI classification. Accompanied by the growing application of biofermentation in HA production and optimization of manufacturing processes in large-scale production, more and more cosmetics and nutraceutics companies started to use Sodium Hyaluronate as basic element in their formulas.

In medical field, HA is used in ophthalmologic surgeries, intra-articular injections, drug delivery systems, products to prevent post-surgical adhesion, as well as eye drops. It is also an important moisturizing ingredient in the cosmetic field.

Normal HA is a high molecular polymer, and its molecular weight decreases together with its degree of polymerization. Compared with normal molecular weight HA, lower molecular weight HA shows different characters and functions, such as a lower viscosity in solution, and specific biological or cellular functions.

SIGNAL-10 is an oligomer of the hyaluronan family, with an extremely low degree of polymerization. This little size allows the acidic form to be stable in powder without the need to link to sodium. With the consequent original INCI name of "hyaluronic acid", SIGNAL-10 shows a very low molecular weight (less than 10 kDa - that is, less than 50 monosaccharides, which corresponds to a degree of polymerization inferior to 25). This allows this ingredient for a quicker skin moisturization performance linked to an increased skin penetration.

Based on the nature of the repeating disaccharide in the monomer and the activity of constitutive anion molecule, the moisturizing effectiveness on skin's surface is not as excellent as the one of film-forming high molecular HA, but it can penetrate through skin layers rapidly, allowing for new features in cosmetics, such as raising the skin HA content, as well as activating skin mechanisms such as anti-aging and comprehensive moisturization.

SIGNAL-10 was therefore demonstrated to optimize a quick skin activation through:

- a quicker permeation than classic forms of hyaluronans
- a quicker proliferation and regeneration of the cells that synthesize skin components (fibroblasts)
- a quick improvement of elastin synthesis
- an improved modulation of skin components through enzymes regulation (collagenase and elastase)
- a quicker improvement of global moisturization
- a trend to quickly improve skin elasticity