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Matrikine technology and barrier repair: the Ultimate in anti-age skin care?

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Introduction

Among all the demands the consumer makes to cosmetic products for skin care activity, a truly efficacious wrinkle treatment is still the most important benefit hoped for, ahead of simple moisturisation, elusive cellulite reduction and short term skin firming. The non negligible success of 'Botox®' treatment is proof of this fact. However, not all consumers are ready to undergo the procedure, to afford the cost at regular intervals and to affront the risk, however well it may be circumscribed.

Skin care from a jar is still preferable to most ladies, and as the population ages (or better, as the percentage of aged population increases), the demands for wrinkle reducing activity from cosmetic formulation gets stronger. Certainly, progress has been made over the years, from AHA's in the early 90's, to Retinol derivatives in the second half of the decade, for which measurable wrinkle reducing activity has been shown. The following generation of anti-wrinkle products, based on lipo-peptide technology [1], although introduced in 1992, took some years to find acceptance and widespread use; from 2000 onwards, however, the newly baptised "Matrikine concept" [2] gained followers and rapidly became a reference in wrinkle treatment around the world [3, 4]. The drawbacks of instability and irritation, often associated with previous wrinkle treatments, do not exist with this approach.

The concept of Matrikines

What is the secret behind the "soft" concept of Matrikines, how does it work and what can be done to improve it even further?

Horace in his Odes (vol. III) said it all when he spoke of the 'injuries of time'. Wrinkles and dry skin and all their consequences are the 'wounds' that time inflicts on our skin; the sun and the environment only accelerate the process. So wound healing became the focus of tissue research, and the skin is a wonderful model to study wound healing.

Nature is economical and we can always learn from her. During the wound healing process (the complexities of which are such that we cannot go into details here) macromolecules like collagen, elastin, glucosaminoglucones, are broken down into

smaller fragments by specific hydrolytic enzymes: collagenases (of the MMP type and others), elastases, hyaluronidases. The break-up of collagen or elastin is not random, however, as would occur in purely chemical (acid) hydrolysis; oligopeptide fragments of defined amino acid sequence are released, some of which have biological signalling activity, i.e. they play the role of 'local hormones' or paracrine secretion. Some specific fragments stimulate collagen neosynthesis in the nearby fibroblasts in order to speed the tissue repair process, others help attract fibroblasts to the site of the wound (chemotaxis), others again participate in interconnection and binding of macromolecules to their specific sites of attachment, all the while keeping the breakdown enzymes at bay [5]. Thus, the debris pieces, generated as a consequence of the traumatic event, are employed by nature to help in repairing the damage.

Peptides of this type are thus called Matrikines. The name derives from the well known concept of cytokines, trigger molecules (=kinins) within or without the cell (=cyte), but specifically destined to restore the Matrix of the broken tissue. These peptides are usually small, containing between 3 and 8 amino acids, seldom more, or less. They could not be used as such for cosmetic purposes, but the discovery that attaching a lipophilic fatty acid chain to these molecules lent them the bioavailability and ease of penetration [1] which they needed to be active in living human skin, all of a sudden opened the field of cosmetic skin treatment to peptide - and specifically to Matrikine technology [6]. Palmitoylated tri-, tetra-, penta- and hexapeptides, derived from collagen, immunoglobulin, laminin and elastin sequences as well as other sources, made headlines [7] as they showed wrinkle reduction in numerous human clinical trials, benchmarked against retinol, vitamin C, or neutral vehicles. Inevitably, many cosmetic brands formulated these first Matrikines in complex compositions, logically combining various actives together with the basic active wrinkle reducing agent for further, additive or, more difficult to prove, synergistic, effects. 1)

Proof of true wrinkle repair

One such skin repair boosting effect was however discovered in a different context. In retrospect the logic appears sound, the