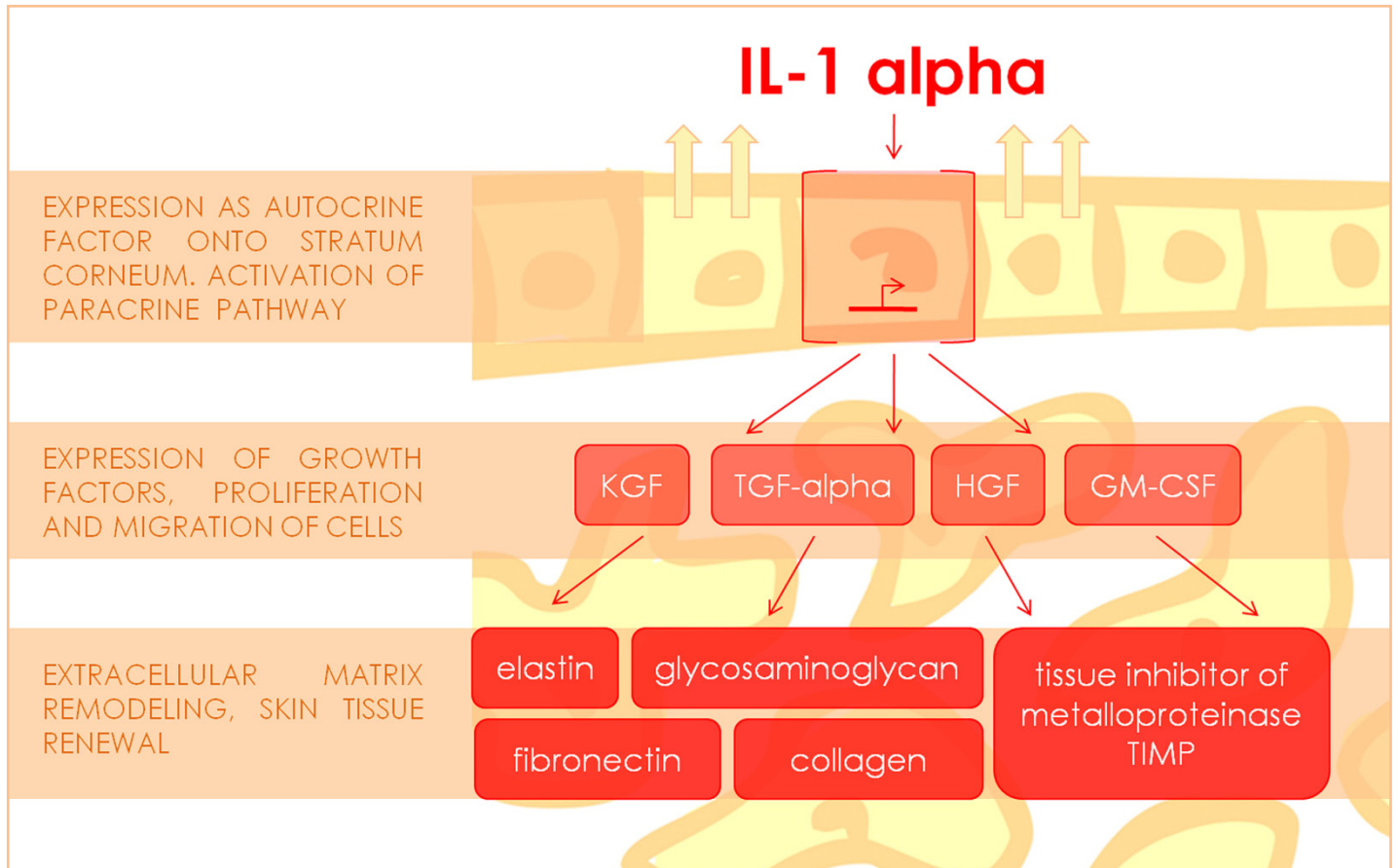


Functional network of interleukin-1 alpha – native equivalent of DERMATOPOIETIN™

Short review

Interleukin-1 alpha (IL-1 alpha) is an autocrine factor produced in the upper epidermal layers on a constitutive basis. It activates expression of growth and differentiation factors that initiate cellular proliferation and migration events leading to tissue renewal. Since its discovery in early 1980's, IL-1 alpha has undergone extensive scientific research worldwide. Some facts from these studies are presented in this short review.



Interleukin-1 alpha is a 159 amino acid long polypeptide. It is constantly produced by skin almost exclusively onto the stratum corneum (upper skin layer) of the human epidermis. IL-1 alpha serves as an autocrine factor that initiates a cascade of events directed to deeper layers of skin.

Activation of cell growth signaling cascade

IL-1 alpha activates genes encoding growth factors such as keratinocyte growth factor (KGF)¹⁻³, hepatocytes growth factor (HGF)¹, granulocyte-macrophage growth factor (GM-CSF)⁴, and transforming growth factor-alpha (TGF-alpha)⁵. These growth factors, in turn, initiate a cascade of events leading to fibroblast and keratinocyte proliferation, keratinocyte migration^{6,7}, and entire skin renewal.

There are genes of extracellular matrix components such as collagen^{8,9}, fibronectin¹⁰, elastin¹¹, glycosaminoglycan¹⁰, and tissue inhibitor of metalloproteinase (TIMP)⁸ that are directly or non-directly regulated by IL-1 alpha. For instance it stimulates collagen production nearly 2-fold and mRNA levels of type I and III collagen over 2.5-fold⁹.

IL-1 alpha suppress expression of connective tissue growth factor (CTGF), a major fibrogenic factor responsible for excessive scarring or keloid formation through promoting proliferation and collagen synthesis of mesenchymal cells¹².

Finally IL-1 alpha is also involved in maintenance of skin barrier function¹³.

Age related IL-1 alpha deficit

An important fact is that constitutive production of IL-1 alpha in skin drastically falls with aging¹⁴⁻¹⁶. Besides that, a biological response to IL-1 alpha in skin is reduced with age too¹⁴⁻¹⁶. Thus the deficit in production and activity both lead to skin renewal failure.

Skin tissue misbalance associated with age-related deficits of IL-1 alpha can be successfully solved using IL-1 alpha prepared biotechnologically³.

Conclusion

IL-1 alpha is a vital player that orchestrates entire process of skin renewal *via* initiation of a cascade of paracrine regulators, activation of proliferation of keratinocytes and fibroblasts, and regulates synthesis/degradation of extracellular matrix components. Under aging both the production and response to IL-1 alpha in skin are drastically reduced leading to disturbed skin renewal process and weak skin barrier function. It is well-documented that any mismatches arising from age-related deficits of IL-1 alpha can be successfully solved using its biotechnological equivalent. This provides a strong scientific base for the use of IL-1 alpha in anti-aging cosmeceutical products.

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