

Stem cell approach 'makes aged skin young'

Rather than act on stem cell multiplication or proliferation, Codif Recherche et Nature is developing a new approach to improve the mobilisation and renewal capacities of ageing stem cells by giving them back the activity of their youth.

Moreover, as dermal and epidermal stem cells have a different morphology, role and function, the company has revolutionised the concept of skin stem cells by developing two dedicated active substances: Phycojuvenine for adult dermal stem cells and Phycosaccharide AI for adult epidermal stem cells.

Role of adult stem cells in skin ageing

Unlike stem cells, which are pluripotent and may generate all cell types, adult stem cells are more limited as they are already specialised according to the tissue in which they are produced. However, they do have the same cell renewal qualities as stem cells.

The adult stem cells are rare and specialised but are necessary for tissue regeneration throughout the body's life. Every day, skin integrity is maintained by dermal and epidermal adult stem cells which self-renew and generate daughter cells which then differentiate into fibroblasts or keratinocytes.

Despite the presence of these adult stem cells, the skin ages, sags, and wrinkles. It also heals increasingly slowly.

Skin ageing and slowed regeneration are due to the poor mobilisation of stem cells, and/or to a reduction in the number of stem cells capable of responding to renewal signals.¹

In both cases, these dysfunctions are due to an ageing of adult stem cells. With time, their renewal capacities fall and tissue regeneration slows down.¹

Whereas the first "stem cell" approaches consisted in the stimulation of their proliferation to activate tissue regeneration, recent studies show that the exhaustion of stocks of adult stem cells in the skin may occur following forced proliferative stress. Molecular mechanisms are therefore capable of

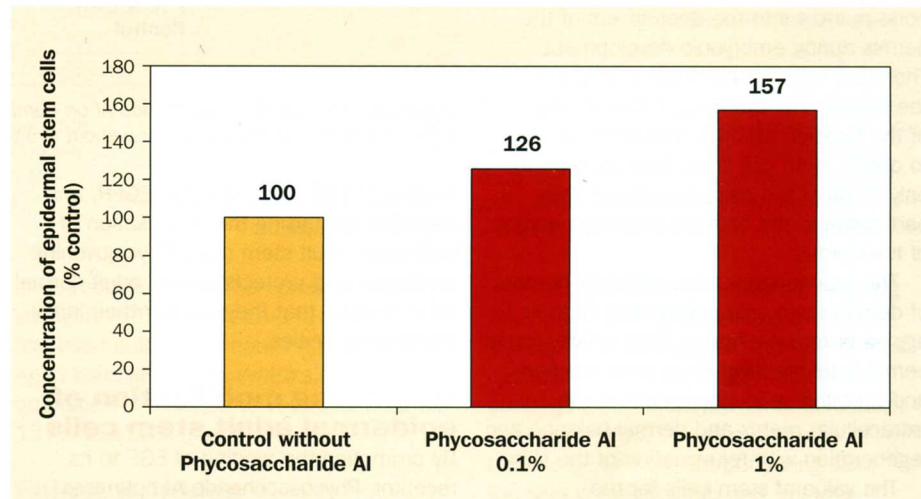


Figure 1: Effect of Phycosaccharide AI on the mobilisation of epidermal adult stem cells. Shown is the culture of epidermal stem cells with or without Phycosaccharide AI for 10 days. The number of cells is evaluated by optical density.

limiting the number of divisions of stem cells.^{2,3} Dermal and epidermal adult stem cells do not therefore have an infinite capacity for renewal.

Stimulation of regeneration of the dermis and epidermis does not therefore involve stimulation of adult stem cells, but a rejuvenation of their activity, or an optimisation of their mobilisation.

Epidermal adult stem cells

The first reservoir of adult stem cell of the epidermis is the bulge zone of hair follicles. Responsible for the integrity and balance of the epidermis, epidermal adult stem cells migrate along the dermo-

epidermal junction when damage occurs and multiply, differentiate, and regenerate injured tissue.

Their mobilisation is controlled by different factors including EGF (Endothelial Growth Factor) secreted by keratinocytes affected by the injury. By binding its receptor EGFR (Endothelial Growth Factor Receptor) located on the membrane of epidermal adult stem cells, EGF mobilises stem cells and activates tissue regeneration.

The studies of Kawada *et al*⁴ showed that some oligosaccharides, characterised by a specific mannuronic, and guluronic acid sequence, promote the assembly of

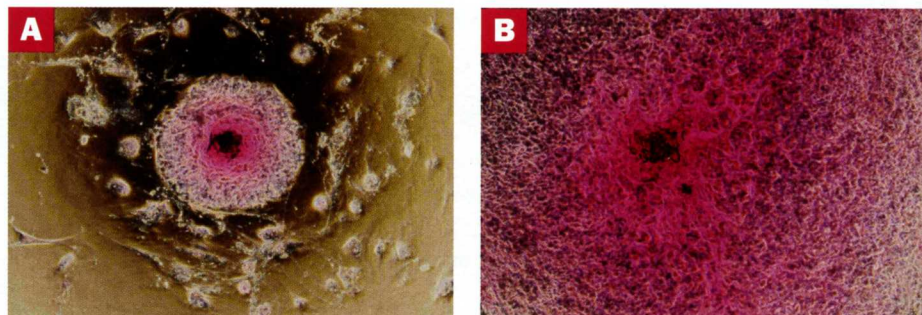


Figure 2: Effect of Phycosaccharide AI on the generation of colonies. Culture of epidermal stem cells on a fibroblast matrix without Phycosaccharide AI (2A) and with 0.5% Phycosaccharide AI (2B) for 12 days.

