

What is Epigenetics?

By Belinda Carli

Epigenetics is a relatively new skin science with many of the cosmeceutical actives using this technology launched during 2016. Epigenetic effects relate to the switching 'on' or 'off' of genes without affecting the DNA itself. For example, every individual is unique according to their individual DNA composition – it contains all instructions for how the organism functions (how our body functions, including our skin, collagen and elastin synthesis) as well as how we look. However, DNA is a highly complex sequence with several chemical 'tags' along its structure that can be marked 'readable' or 'not readable'. When 'readable', that function is considered switched 'on'; and certain bodily functions will occur. When 'readable' or 'on', it doesn't actually change the DNA sequence, but instead, makes a part of the structure active and its instructions accessible. The epigenome regulates this functionality, as does the much more widely known, micro-RNA. In this way, epigenetics utilises the DNA coding already present in the human body, but can be affected by:

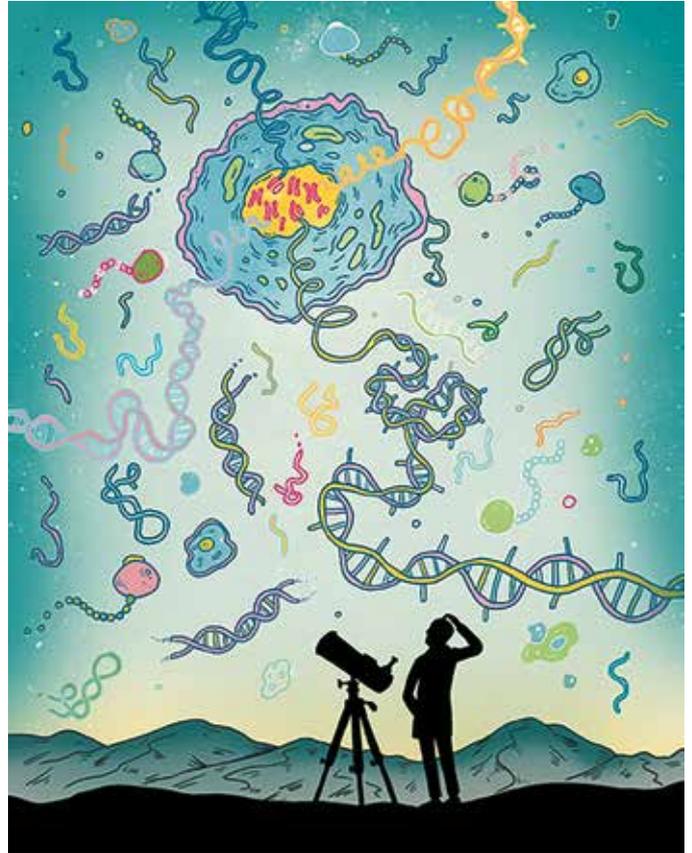
- diet;
- lifestyle, including stress effects and poor sleep;
- the environment, especially where protective mechanisms need to be activated; for example, due to UV exposure or other environmental impacts;
- age;
- cellular metabolism and division.

Where these impacts are negative and/or the cells age, the epigenome tags relative to skin cell renewal, collagen or elastin synthesis may be turned 'off' or at least not function as they did when the organism was younger. This results in reduction of cell turnover, renewal and proliferation – which ultimately leads to other age-related effects we commonly see such as less supple complexion and the formation of fine-lines and wrinkles.

In the personal care industry, epigenetic science refers to the use of specific active ingredients that are able to modify cellular activity for visible skin benefits. For example, some beneficial cellular modifications specific to materials used in cosmeceutical personal care products may include:

- cell proliferation stimulated to improve tissue regeneration;
- regeneration of skin cells in spite of their age – enabling older skin cells to mimic the activity of younger skin cells, which results in a more youthful appearance; and/or
- stimulating skin renewal and turnover.

Improvements to skin tissue regeneration, revitalized skin cell function and renewed skin cells all have noticeable visual results: younger, smoother looking skin. It's as if a younger cell functioning is suddenly switched back 'on'; and cells are then instructed to proliferate and regenerate as if much younger.



What are some of the most exciting actives using Epigenetics?

Key actives incorporating epigenetic science include:

- **Reproage Peptide by Lipotec:** an epigenetic regulator known as microRNA-145 specifically represses the activity of stem cell transcription factors, reducing the essential characteristic of stem cells that give them the ability to self-renew and differentiate (also referred to as a cells' 'stemness'). mRNA-145 is found in higher levels in aged skin. Utilising epigenetic science to modulate mRNA-145 levels, Reproage Peptide 'reprograms' cellular activity at the epidermal basal layer and supports cell 'stemness', incorporating epigenetic and stem cell science. In-vivo results have shown Reproage Peptide rejuvenates epidermal self-renewal activity to behave up to 17 years younger and in doing so, provides dramatic skin smoothing anti-ageing skin benefits for a complete, and very noticeable anti-ageing effect.
- **Dermagenist by BASF Care Creations:** fibroblasts exist in the dermal layer of the skin, producing protein molecules which form the extracellular matrix, allowing epidermal cells to form the top layers of the skin. As the skin ages, the activity of the fibroblasts decreases and the skin becomes thinner, less firm and devitalised.

Based on Majoram extract, this Dermagenist alters age-related epigenetic changes to revive aged fibroblasts and restore their natural ability to produce these essential matrix proteins for greater skin firmness, density and more youthful appearance.

- **RoyalEpigen P5 by Mibelle AG Biochemistry:** a royal jelly mimic that utilises epigenetic science to modify gene expression to improve tissue regeneration by stimulating cell proliferation, activate protein turnover and improve tissue regeneration by stimulating cell proliferation. The result is smoother, more even skin tone and a more youthful complexion.

- **Chronogen by Ashland:** an anti-ageing tetrapeptide that utilises epigenetic science to boost the expression of 'clock genes'. Its unique activity provides dual benefits: a selective 'switching on' of protective genes during the day to defend against UV-light induced damage; and an alternative 'switching on' of regenerative genes at night to repair and reverse damage, restoring cell functionality for a more youthful appearance on waking.

- **PhytoRNx Baobab by Ashland:** a unique baobab extract that helps maintain homeostatic expression of key protein regulators for multiple functions of miRNA in the skin. This extract returns expression of these regulators to the level of young cells, boosting expression of key molecules involved in skin regeneration, moisturisation and visible anti-ageing effects. In-vitro and in-vivo results have shown a clinically proven reduction in wrinkle size and depth.

Interesting materials incorporating the high science of epigenetics and stem cells include **PhytoCellTec Alp Rose** and **PhytoCellTec Solar Vitis**, both by **Mibelle AG Biochemistry:** actives based on plant stem cell extracts with epigenetic factors and metabolites to protect skin stem cell functions under extreme climate and UV conditions respectively.

What is the future for Epigenetics?

Epigenetic science is an emerging trend because of its ability to modify cellular activity – currently actives are targeted at anti-ageing benefits, but we're bound to see other skin-tastic effects from this technology in the future. It is important to remember that we are not altering the DNA by utilising epigenetic science, and the use of cosmeceuticals can only provide a transient effect while the material is being used. The mechanism of epigenetic cosmeceutical products needs daily, if not twice daily applications to keep the activity going. If the products are discontinued, the switching 'on' effect is not activated and the organism will revert to its normal functioning.

The use of epigenetic actives does however open the door for all sorts of exciting developments in the ongoing quest to turn 'on' of the fountain of youth, as it were. We're sure to see many more exciting materials be launched in this sector in the future, as it is an emerging science with big potential.



Belinda Carli

belinda@personalcarescience.com.au
www.personalcarescience.com.au

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