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# A dermatologist's take on regenerative medicine

Repair, rejuvenation, replacement and regeneration are the four Rs of regenerative medicine. Here's what you need to know.

By RITU GUPTA



Regenerative medicine in dermatology is aimed at stimulating regeneration of skin cells. Picture: iStock

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Regenerative medicine is a relatively new field that encompasses multiple sub-specialties including dermatology. As a fast-growing area, it's worth understanding what it's all about.

In aesthetic or cosmetic dermatology, regenerative medicine essentially looks at the four Rs: repair, rejuvenation, replacement and regeneration of tissues. Rather than trying to reduce the signs of ageing, it is looking at the root cause and trying to stimulate regeneration of skin cells.

This can be done in a number of ways, including cell-based treatments such as stem-cell therapy, platelet-rich plasma and growth factors, tissue engineering and bioengineered skin.

These can be used not only in aesthetic dermatology, but also in more medical applications, for things such as burns, diabetic ulcers, and also in some inflammatory skin diseases such as dermatitis and blistering skin diseases.

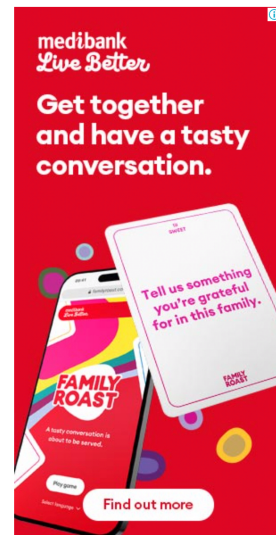
Stem cells that are derived from fat cells, or adipocyte stem cells, have shown promising results in reducing scarring, wrinkling and hair loss.

## Vampire Facial

Similarly, platelet-rich plasma has been shown to stimulate wound healing and reduce hair loss. Platelet-rich plasma was popularised with the term "Vampire Facial", in which a person's own blood is taken, spun down, and the resulting plasma, which contains a significant number of growth factors, is either injected into the skin or applied to the surface of the skin.

Non-cellular based regenerative therapies include the use of exosomes, which are small carrier

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molecules containing bioactive ingredients that are either applied or injected to stimulate hair growth, reduce pigmentation, or to stimulate wound healing.

The source of the exosomes is important, as is the source of the bioactive carrier molecules. Bioactive molecules that come from stem cells, some studies show, are far more active than those that do not.

## Salmon Sperm Facial

Another popular rejuvenation treatment is the "[salmon sperm facial](#)", which uses DNA polynucleotides that come from farmed salmon sperm. These have been shown to also have powerful anti-inflammatory effects and [to stimulate collagen](#) and elastic tissue and to inhibit apoptosis or programmed cell death.

Other bio-stimulatory injections can be used to slowly and gently stimulate a person's own collagen and elastic tissue. Some of these are based on polydioxone, which is also used to make absorbable stitches, which are used extensively in dermatology and plastic surgery in the repair of skin excisions, performed, for example, in skin cancer removal. Another biostimulator is based on calcium, using calcium hydroxyapatite to stimulate new collagen and elastic tissue formation.

## Restore muscle tone



Lasers, off-label medications and cell-based treatments are among the tools of regenerative medicine for dermatologists, targeting renewal rather than anti-ageing. Picture: iStock

Lasers can also be used in regenerative dermatology. Erbium and carbon dioxide lasers resurface the skin, removing the epidermis (the outer layer of the skin) and the upper part of the dermis (the second layer of the skin), which stimulates wound healing and regrowth of new skin cells as well as collagen and elastic tissue and new blood vessels.

Other energy-based devices aim to restore the resting muscle tone that we lose with age and stimulate muscle cell growth and muscle hyperplasia, increasing the size of muscle cells to help with functional strength and to address the loss of muscle that occurs each decade, particularly after the age of 60.

Many of these treatments are looking not only at how someone looks but also at improving their health span. Health span is the number of years a person is expected to live free from disease. So these are treatments that are aimed at making someone not only look better, but also to feel better and to have stronger core strength and to be healthier.

## Off-label medication

Some oral medicines that have been used off-label, often for many years, have shown promise in reducing the signs of ageing. These include Metformin, a medication that has been in use for 60 years and is traditionally an anti-diabetic agent. The very large TAME (Targeting Ageing with Metformin) study in the US has 3000 volunteers and is testing the drug's effect on ageing, cognition, its cardioprotective effect and other age-related chronic conditions. Results are due soon after years of trials but look very promising.

Another medication, rapamycin, which can be used topically but has also been taken orally, has shown evidence of anti-ageing effects. Oral hydrolysed collagen has been shown to increase skin hydration and elasticity, but the source of the collagen is important; fish collagen has been shown to be superior to other forms, but again, more studies are needed.

Nicotinamide, which is vitamin B3, also has anti-inflammatory effects and may have some anti-ageing effects.

## Caution needed

The use of such medications to fight ageing is an emerging field, but it is a field where people need to be cautious and we need better studies. We need human studies because promising results in mouse models and in primates don't necessarily translate into the same effect in humans.

We also need to be careful about potential side-effects. Rapamycin, for example, is also an immunosuppressant. Metformin can cause a reduction in Vitamin B12 among other rare side effects.

So although it's quite an exciting time in traditional medical and cosmetic dermatology and plastic surgery, it's also important not to jump on the bandwagon. As is often the case, regulation of an emerging field by the appropriate authorities may lag behind the industry itself. This can lead to lesser-trained and even unscrupulous providers taking advantage of the public's desire for youthfulness and for anti-ageing treatments.

This applies to bio-stimulators, lasers and energy-based devices that stimulate collagen remodelling and other treatments that have an anti-ageing effect.

[It is wise to consider who is treating you](#) as the only accredited specialists with the highest level of training in the aesthetic or cosmetic field are dermatologists and plastic surgeons.

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