Journal of Regenerative Aesthetic Medicine

ISSUE 5
Feb 2026

Genetic Insight for Personalised Care

The Vision of Dr Tunc Tiryaki

Delivery Technique in Polynucleotide Therapy

As part of the RAMI Regenerative Aesthetic Medicine Institute

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The Wigmore Presents team is working hard behind the scenes to make this year's conference the best ever, and we are pleased to announce two further agendas to sit alongside our focus on **injectables, longevity and regeneration, skincare, and equipment**, namely a **business agenda** on Saturday 18th April, and a **BAMAN-led nurses' educational agenda** on Sunday 19th April. The weekend promises to have something for everyone in the industry and in your team. With over 60 confirmed speakers, and more to come, you need to put this in your diary; **have you bought your ticket yet?**

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JRAM Journal of Regenerative Aesthetic Medicine

Welcome to the Journal of Regenerative Aesthetic Medicine

Reflecting on the past year, it's clear how much momentum continues to build across regenerative aesthetic medicine. RAMCE 2025 was a defining moment for our community, bringing together clinicians, scientists and industry leaders for two days of independent, evidence-led discussion. The depth of conversation and quality of education reinforced the value of shared learning within this rapidly evolving field. Highlights from the conference are captured in RAMCE 2025: A Huge Success on page 6.

As we look ahead, **Super Early Bird registration for RAMCE 2026 is now open**, with a **£50 saving** available for early booking. The conference returns on **7 November 2026**, and further details will be shared over the coming months. **Scan the QR code opposite to secure your ticket.**

This issue of JRAM explores key scientific and clinical themes shaping practice today, including epigenetic ageing, personalised genetic insight, regenerative delivery techniques and multidisciplinary perspectives across skin and hair medicine.

Let us know what you think while staying up to date with RAMI activity, education and announcements, by following us on Instagram **@ram__institute**.

Scan now to secure your Super Early Bird ticket to RAMCE 2026 for just £100 +VAT!

See you on **November 7th!**

The Team

RAMI Regenerative Aesthetic Medicine Institute

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Meet our Scientific Committee

Steering the education of The RAM Institute

Our Scientific Committee plays a crucial role in the success and credibility of The RAM Institute. Members oversee all JRAM content and curate the RAMCE programme to ensure everything we produce is cutting-edge and scientifically sound.

Professor Maurizio Cavallini

Professor Maurizio Cavallini is the Chief Medical Advisor at Monteverdi Tuscany in Italy. He graduated in medicine from the University of Milan, and holds postgraduate qualifications in plastic surgery, microsurgery and experimental surgery. A frequent writer and lecturer, Professor Cavallini has authored more than 130 pieces in notable national and international medical journals, as well as publishing books and speaking globally on plastic surgery and aesthetic medicine. He is also the President of the Italian Scientific Society of Aesthetic Medicine - Agora and adjunct professor in the University of Genova in Italy, along with being a fellow of many scientific societies in plastic surgery and aesthetic medicine.

Mr George Christopoulos

Mr George Christopoulos is a plastic surgeon and Assistant Professor of Aesthetic Medicine at the College of Medicine & Dentistry at Ulster University. He has a Master's in Health Care Management and a PhD (Distinction) in the surgical treatment of cancer from the University of Athens. Since relocating to the UK in 2015, Mr Christopoulos has completed a second Master's in Reconstructive Microsurgery (Distinction), and held roles in burns and plastics throughout the UK.

Dr Kate Goldie

With more than 15 years of global experience, Dr Kate Goldie is recognised as one of the leading figures in aesthetic medicine. Having trained more than 7,000 practitioners worldwide, her innovative approach and commitment to excellence have made her a sought-after educator and speaker. Beyond her extensive teaching, Dr Goldie is a respected thought leader, regularly sharing the stage with industry pioneers and contributing to groundbreaking research. Dr Goldie is deeply passionate about advancing the field of regenerative aesthetics and is at the forefront of new developments and innovations.

Dr Lee Walker

Dr Lee Walker is Director and Clinical Lead at the award-winning BCity Clinics in Liverpool, with extensive experience in medical aesthetics since 2001. He chairs the Complications in Medical Aesthetics Collaborative (CMAC) UK and has published widely on blindness, vascular occlusion, facial ageing, anatomy and injection technique. A member of the Royal College of Surgeons in both Scotland and England, he also holds postgraduate qualifications in clinical education. Dr Walker is part of Teoxane's international faculty and serves as an educational consultant for Revance USA.

Get in touch with the committee

Email **info@ram-institute.com** to discuss ideas and receive more information.

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RAMCE 2025 was a Huge Success

The regenerative aesthetics community came together for an inspiring day of independent, evidence-based education and collaboration

RAMCE 2025 welcomed 250 delegates for a standout day of regenerative aesthetic science, practical learning and forward-thinking discussion.

The event opened with a welcome address from Content Director Chloé Gronow and Commercial Director Simon Haroutunian, who highlighted RAMCE's role as an independent, education-focused meeting delivered as part of the Regenerative Aesthetic Medicine Institute (RAMI).

This set the tone for a full scientific programme led by the RAMI Scientific Committee, spanning injectables, topicals, devices and longevity.

An inspiring agenda

Dr Kate Goldie opened the sessions by establishing a clear, structured framework for defining regenerative aesthetics. Her talk provided the scientific grounding that shaped the narrative of the day.

The educational programme then explored regenerative aesthetics from every scientific and clinical angle. Core discussions covered advanced applications of PRP, PLLA, CaHA, exosomes, peptides, and polynucleotides, alongside the growing importance of personalised regenerative strategies informed by genomics.

This strong scientific foundation was complemented by a focus on practical decision-making, safety, longevity and the future direction of the field.

Stand-out sessions

Highlights included Professor Mark Birch-Machin offering a compelling deep dive into the role of skin mitochondria in ageing and regenerative response, giving delegates new scientific context directly applicable to clinical treatment planning. Keeping energy high, Dr John Quinn delivered an entertaining yet highly informative session on lasers, guiding clinicians on the key considerations when assessing devices.

Longevity was a key theme, led by Dr Mayoni Gooneratne, who explored how women's metabolic health, inflammation control and cellular resilience intersect with regenerative interventions. Her sessions demonstrated how longevity principles can be integrated into daily practice to provide more sustainable and holistic patient outcomes.

A major standout followed from Dr Lee Walker, who delivered one of the most anticipated presentations of the programme. His session on complications in regenerative aesthetics combined emerging research, anatomical insight and real clinical scenarios to provide practitioners with crucial tools for safer, more informed practice.

A sold-out exhibition with purpose

The exhibition featured a carefully curated group of companies, and was praised for its intimate, community-driven atmosphere, enabling meaningful conversations and high-quality interactions between partners and practitioners. Exhibitors spanned regenerative injectables, topical biologics, advanced devices, skincare, and industry

partners - creating a well-rounded showcase of science-led innovation.

Rupert Adams, commercial director of Cool Laser by Asclepion, RAMCE's Platinum Sponsor, said, "RAMCE offers something truly unique. The exhibition feels personal, focused and intelligent - you're speaking with engaged clinicians who genuinely want to understand the science behind your technology. As a Platinum Sponsor in 2025, the quality of conversations far exceeded what we typically see at bigger congresses. It's become one of the most valuable events in our calendar."

companies" and meaningful insight into cutting-edge regenerative technologies.

Across the day, clinicians highlighted how the sessions were "very relevant" and "very useful" for daily practice, with one person noting that RAMCE is helping to "elevate the concepts of our speciality and once again lead the way in aesthetic medicine."

Leadership reflections

Content Director Chloé Gronow commented, "Our goal was to curate an agenda that genuinely moves the conversation forward scientifically,

technologies. Commercial Director Simon Haroutunian said, "It's inspiring to see how committed our partners and delegates are to driving this field forward. The engagement throughout the exhibition and sessions shows that regenerative aesthetics has a very bright future - and RAMCE is at the heart of that momentum."

Five-star feedback

In a survey post-event, delegate feedback averaged 4.5 stars and above, with many respondents giving full 5-star ratings across the educational programme, the exhibition, registration process and overall event.

All respondents rated RAMCE Very Good to Excellent, with delegates describing it as "a wonderful day of learning," with talks that were "top notch... enriching and intellectually stimulating."

Others valued the diversity of expertise, noting the benefit of hearing from "not the usual suspects," and praised the exhibition for offering "a good selection of ethically and practically. The feedback shows that the community is hungry for this level of depth, and RAMCE is becoming the place where that standard is set."

Scientific Committee member Dr Kate Goldie added, "RAMCE represents exactly what our speciality needs right now - rigorous, independent science and open, unbiased discussion. I'm incredibly proud to lead a meeting where the content is shaped solely by evidence and clinical relevance."

Delegates engaged with exhibitors throughout the day, exploring leading regenerative innovations and

All respondents rated RAMCE Very Good to Excellent with 4.5-5 Star ratings

Looking to the future

The day concluded with a chaired panel discussion on the future of regenerative aesthetics, bringing together insights from across the programme and leaving delegates optimistic about the direction and potential of the field.

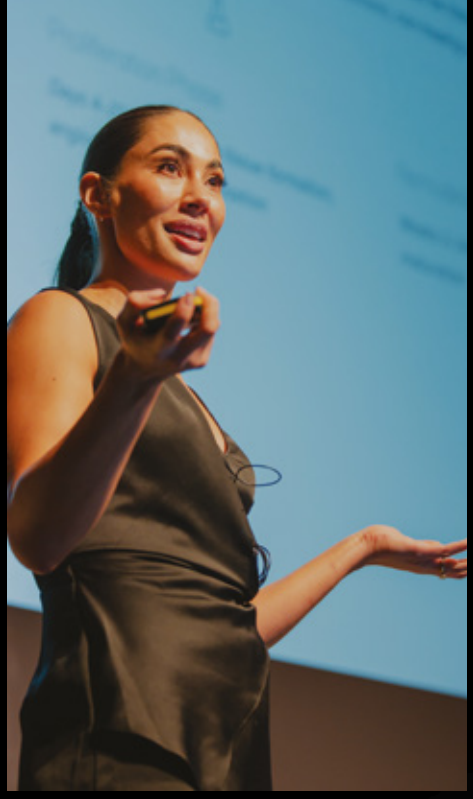
RAMCE 2026
Saturday 7 November 2026

As we look ahead, RAMCE will return on Saturday 7 November 2026. Save the date and scan the QR Code for your Super Early Bird Ticket - it promises to be another landmark gathering for the regenerative aesthetics community.

Get your Super Early Bird Ticket

Interested in speaking in 2026?

Scan the QR Code to send us your abstract submission



It's inspiring to see how committed our partners and delegates are to driving this field forward

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For UK Healthcare Professionals.
References available upon request.
UKI-SCU-2500095 DOP August 2025

News

The JRAM News Brief

Essential reading on advancements in regenerative science and aesthetic practice

Skin Biology, Ageing and Regeneration

Study finds immune system plays an active role in shaping skin development

A review published in November 2025 in Frontiers in Immunology has suggested that the immune system plays a central role in skin development, challenging the long-held view of immune cells as responders only to injury or disease.

Drawing on experimental and clinical evidence, the authors report that multiple immune cell populations, including macrophages, Langerhans cells, dendritic cells, mast cells and

innate lymphoid cells, are directly involved in organising normal skin structure. Through close interaction with keratinocytes, fibroblasts and vascular networks, immune cells influence epidermal layering, hair follicle formation, angiogenesis and long-term tissue stability.

The review describes immune signalling as a fundamental component of normal skin biology. During development and throughout life, immune cells provide regulatory cues that support controlled tissue remodelling, repair and adaptation to physiological and environmental stressors.

These findings have relevance for regenerative aesthetic medicine, where many treatments aim to influence inflammation, fibroblast activity and tissue remodelling rather than produce immediate structural change. Biostimulatory injectables, energy-based devices and combination protocols operate within the same immune-regulated environment outlined in the review, helping to explain why improvements in skin quality are typically gradual and biologically driven.

Overall, the paper supports a model of skin biology in which immune regulation underpins tissue development, maintenance and repair, aligning with regenerative approaches that prioritise long-term skin quality and functional restoration.

Loss of telomere integrity influences ageing-related changes in a controlled human cellular model

Research examines how telomere shortening drives early cellular ageing

A research article published in the Journal of Cellular Physiology in December 2025 investigates how telomere shortening contributes to cellular ageing in human stem cell-derived astrocytes, offering insight into how senescence may emerge before functional decline.

Astrocytes are a major type of support cell in the central nervous system. Rather than transmitting nerve signals, they help maintain brain health by regulating nutrients, supporting energy metabolism, clearing neurotransmitters and maintaining the tissue environment required for normal neuronal function.

Using astrocytes generated from human induced pluripotent stem cells, the researchers induced telomere shortening by inhibiting telomerase, the enzyme responsible for maintaining telomere length. This approach allowed the team to examine how loss of telomere integrity influences ageing-related changes in a controlled human cellular model.

Cells exposed to telomerase inhibition developed multiple hallmarks of cellular senescence, including reduced proliferation, DNA damage, altered nuclear structure, increased oxidative stress and elevated senescence-associated βgalactosidase activity. Significant telomere shortening was confirmed, linking these changes directly to telomere attrition.

Despite these molecular and structural signs of ageing, many core astrocyte functions were preserved. Processes such as glutamate uptake, synaptic vesicle clearance and mitochondrial integrity remained largely comparable to untreated cells, suggesting that early senescence markers do not immediately translate into functional failure.

The authors conclude that telomere shortening is a key driver of senescence-related changes, but that functional decline may occur later in the ageing process. The findings support a more nuanced view of cellular ageing, in which early biological stress precedes overt loss of tissue function, with implications for understanding ageing and regenerative capacity in long-lived tissues.

Study suggests human hair grows by being pulled upward, not pushed from the root

New research published in Nature Communications in November 2025 challenges a longstanding assumption about how human hair grows. Scientists from L'Oréal Research & Innovation and Queen Mary University of London report that human hair is not pushed out from the follicle by dividing cells in the hair bulb, as traditionally taught. Instead, growth is driven by an upward pulling force generated by coordinated movement of cells in the outer layers of the hair follicle.

Using advanced three-dimensional live imaging of human hair follicles kept alive in culture, the researchers tracked individual cell movements over time. They observed that cells in the outer root sheath - the layer of tissue encasing the hair shaft - move in a downward spiral deep within the follicle. This organised motion appears to create a pulling mechanism that draws the hair upward through the skin.

To test the mechanism, the team experimented with inhibiting key cellular processes. Blocking cell division in the hair bulb slowed hair growth only moderately, suggesting that traditional "push" forces were not the primary driver. In contrast, disrupting the cytoskeleton - the structural network that enables cell movement - greatly reduced hair growth, supporting the idea that collective cell motion generates the pulling force.

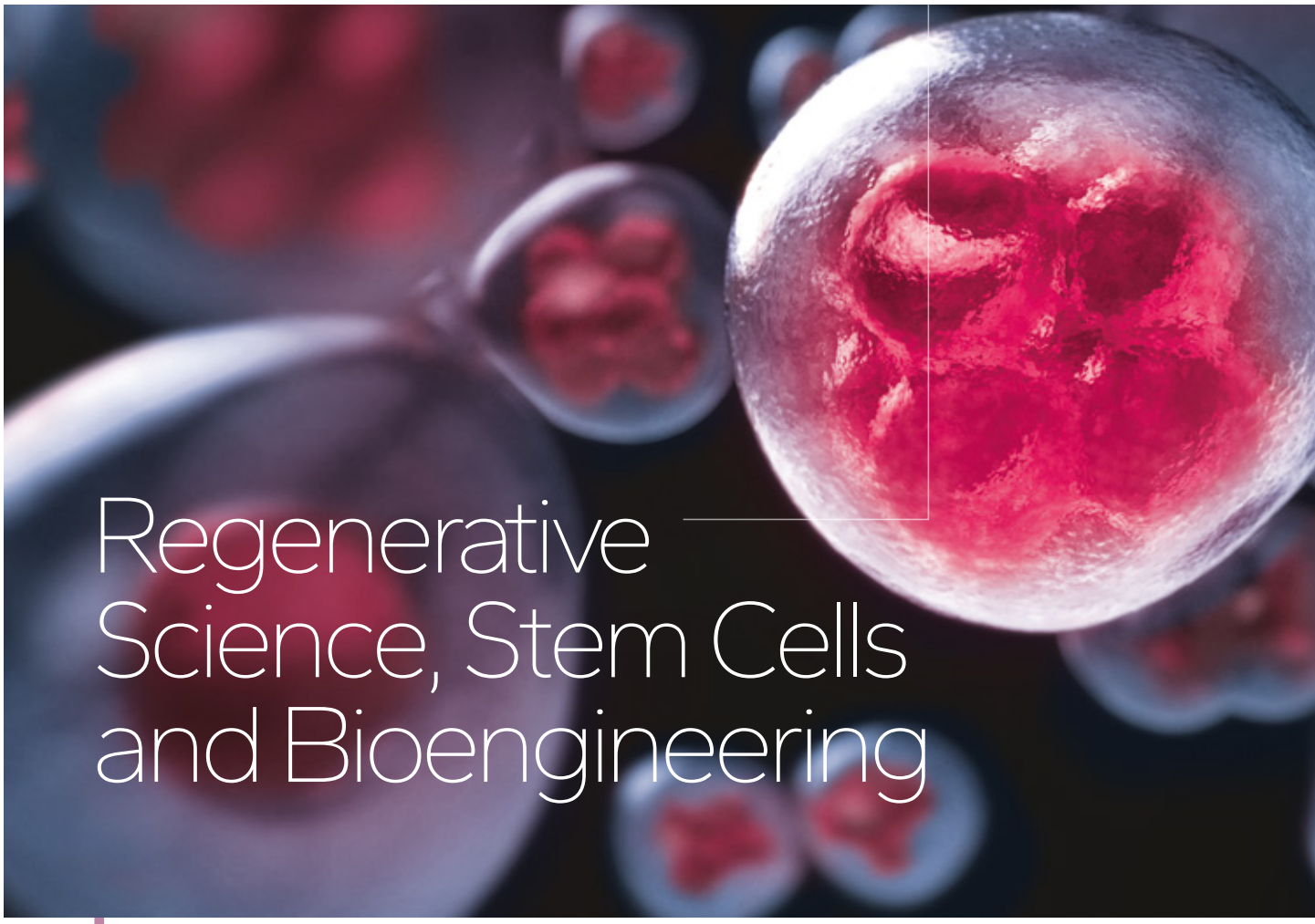
These findings revise a core concept of hair biology and may have implications for understanding hair loss and regeneration. If hair growth depends on dynamic cellular movements rather than solely on proliferation at the base of the follicle, this could influence how scientists approach therapies for conditions such as androgenetic alopecia or other forms of hair thinning. Further research will be needed to connect these mechanical insights with clinical strategies for enhancing hair regeneration.

Research indicates early immune cells help programme lifelong skin pigmentation

A study published in December 2025 in Nature Communications reports that a specific population of immune cells present shortly after birth plays a critical role in establishing normal skin pigmentation later in life.
Using a mouse model, researchers found that regulatory T cells (Tregs) that migrate into the skin during a brief neonatal window support the function of melanocyte stem cells within hair follicles. Temporary depletion of these early skin-seeding Tregs disrupted melanocyte activity, leading to reduced pigmentation as the animals matured. The effect was traced to impaired signalling through the PPARγ pathway, which is known to regulate cellular metabolism and differentiation. Further experiments showed that blocking PPARγ during the same early-life window reproduced the pigmentation defect, while activating the pathway restored normal pigment formation even in the absence of Tregs. Analysis of human vitiligo samples also revealed reduced expression of PPARγ-related genes in affected hair follicles, suggesting a possible link between this immune-stem cell interaction and pigment loss in disease.

The authors note several limitations. Much of the mechanistic work was performed in animal models, and while human tissue analysis supports relevance, direct causal evidence in humans is still lacking. In addition, the study focuses on a narrow developmental window, leaving open questions about whether similar immune-pigment interactions can be modulated later in life.

Despite these limitations, the findings add to growing evidence that immune cells influence skin structure and function beyond inflammation alone. For regenerative and aesthetic medicine, the study reinforces the importance of immune-cell signalling in pigmentation biology and highlights why durable changes in skin quality and colour may be rooted in early and tightly regulated biological processes rather than rapid intervention alone.



Regenerative Science, Stem Cells and Bioengineering

Company launches “biological age zero” cell platform for regenerative medicine research

Biotech company Clonell has announced the launch of a regenerative medicine platform based on what it describes as “biological age zero” human cells, positioned as a new foundation for research into tissue repair, ageing and disease.

The platform centres on the generation of clonally derived human cells that are intended to exist in a biologically reset state, without the accumulated molecular, epigenetic and functional damage associated with ageing. According to the company, this approach aims to overcome a longstanding limitation in regenerative medicine research: variability in cell quality driven by donor age, health status and environmental exposure.

Clonell describes its cells as a standardised biological starting point that may allow researchers to study regeneration and disease mechanisms with greater consistency. By working from cells that are designed to represent a baseline, age-neutral state, the platform is intended to support clearer evaluation of regenerative processes, drug responses and therapeutic strategies.

Potential applications outlined by the company include regenerative biology research, modelling of age-related conditions, drug discovery and the development of cell-based therapies. Rather than focusing on a single treatment area, the platform is positioned as an enabling technology that could be applied across multiple areas of regenerative and translational research.

The company notes that the platform is currently intended for research use.

Study charts rapid expansion and translational challenges in mesenchymal stem cell extracellular vesicle research

A review published in December 2025 in the International Journal of Nanomedicine examines how research into extracellular vesicles (EVs) derived from mesenchymal stem cells (MSCs) has expanded over the past decade, while identifying the key challenges that continue to limit clinical translation.

Using bibliometric analysis, the authors evaluated 752 peer-reviewed publications published between 2014 and 2024, mapping global research output, collaboration networks and thematic trends. The analysis showed a steady rise in publication volume, with China and the United States leading in research activity. Major research clusters focused on engineered EVs, drug delivery platforms and regenerative mechanisms including angiogenesis, bone regeneration and immunomodulation.

MSC-derived EVs are highlighted as a promising cell-free regenerative approach, capable of delivering biologically active cargo such as microRNAs, cytokines and growth factors. By influencing cellular signalling rather than relying on direct cell engraftment, EVs are positioned as a potential alternative to whole-cell therapies in tissue engineering and regenerative medicine.

However, the review emphasises several unresolved challenges. These include limited efficiency of passive targeting, difficulties in controlling EV cargo loading, lack of standardised isolation and characterisation methods, and a fragmented and rapidly expanding evidence base that complicates comparison across studies. The authors note that these factors continue to constrain reproducibility and clinical scalability.

Review highlights exosome-mediated regenerative potential of sea cucumber bioactives

A review published in the Clinical, Cosmetic and Investigational Dermatology examines the antioxidative and regenerative properties of sea cucumber-derived bioactives, with particular emphasis on the emerging role of exosomes as key mediators of biological activity.

The review details how sea cucumbers possess a highly developed regenerative capacity, which is increasingly linked to the bioactive cargo carried within extracellular vesicles, including exosomes. These vesicles are described as nanoscale signalling particles capable of transferring proteins, lipids and RNA between cells, influencing tissue repair, inflammation control and extracellular matrix remodelling.

According to the authors, sea cucumber-derived exosomes exhibit strong antioxidative effects, helping to neutralise reactive oxygen species and support endogenous antioxidant systems. This is particularly relevant in skin biology, where oxidative stress contributes to collagen degradation, impaired fibroblast activity and delayed tissue repair.

The review also summarises preclinical evidence suggesting that these exosomes play a role in regenerative signalling. Reported effects include stimulation of fibroblast proliferation, enhanced collagen synthesis, modulation of inflammatory pathways and support of wound healing processes. Rather than acting as isolated compounds, exosomes are presented as biological delivery systems that coordinate multiple

Sea cucumbers possess a highly developed regenerative capacity

regenerative signals simultaneously.

However, the authors emphasise that most of the evidence currently comes from in vitro studies and animal models. Human clinical data remain limited, and variability in extraction methods, characterisation and dosing presents challenges for translation. The review calls for greater standardisation in exosome isolation and functional assessment, alongside well-designed clinical studies.

Study demonstrates engineered "living skin" as a long-term biological sensing platform

A study published in December 2025 in Nature Communications presents a proof-of-concept system in which engineered skin tissue functions as a long-term biological sensor, capable of reporting internal molecular signals through controlled gene expression.

In the study, researchers developed a living skin sensor display by genetically programming skin cells to express a reporter protein in response to a defined biological signalling pathway. The engineered skin was then grafted onto mice, where it remained viable and functional over extended periods.

Unlike conventional health monitoring tools, which rely on electronic devices or repeated blood sampling, this system leverages the natural regenerative capacity of skin. As the tissue renews itself, the engineered sensing capability is maintained, enabling sustained monitoring rather than single-time-point measurement.

The authors demonstrate that the skin graft can reliably report activation of the target pathway over time, showing that biological tissues themselves can act as self-maintaining sensor platforms. While the signalling pathway used in the study serves as a model system, the researchers suggest that similar approaches could, in principle, be adapted to other molecular targets in the future.

Importantly, the study remains preclinical. The authors emphasise that significant challenges remain before any human application could be considered, including biosafety, specificity, ethical considerations and regulatory oversight. The work is presented as a foundational step toward biologically integrated sensing, rather than a deployable medical technology.

Electrical stimulation found to guide stem cell behaviour for tissue engineering

Researchers from the Royal Melbourne Institute of Technology (RMIT University) have shown that very small electrical signals can rapidly influence how stem cells behave, offering a potential new approach to directing tissue regeneration and engineered tissue design.

The findings were published in December 2025 in the peer-reviewed journal Advanced Functional Materials.

Using high-resolution techniques including atomic force microscopy, the research team observed living stem cells

in real time while applying carefully controlled electrical stimulation. They found that brief electrical pulses triggered immediate physical changes within the cells, including alterations in cell stiffness and cytoskeletal organisation. These mechanical properties are known to play an important role in determining stem cell fate, influencing whether cells develop into bone, nerve or muscle tissue.

Rather than relying solely on biochemical signals, the study highlights the importance of bioelectric and biophysical cues as regulators of stem cell behaviour. The authors suggest that electrical signals act as an additional layer of instruction, helping to guide cell development in a way that more closely reflects natural biological environments.

The team also combined experimental data with computational modelling to predict how stem cells respond to different electrical patterns. This approach could support the design of future biomaterials and medical devices capable of delivering tailored electrical cues to encourage specific regenerative outcomes.

While the work remains at a preclinical stage, the study adds to growing evidence that electrical stimulation may be used alongside chemical and mechanical signals to improve tissue engineering strategies. Potential future applications include electrically active implants, improved wound-healing environments and more precise control of stem cell differentiation in regenerative medicine.

Clinical and Procedural Advances in Regenerative Aesthetic Medicine

Sculptra gains EU MDR certification for expanded body use

Galderma has announced that its regenerative biostimulator Sculptra® has received certification under the European Union Medical Device Regulation (MDR), expanding its clinical indications beyond the face to include multiple body areas.

This follows completion of the updated conformity assessment process required under MDR, which replaces the previous Medical Device Directive and imposes enhanced

safety, performance and quality requirements for medical devices in the EU.

Under the new MDR certification, Sculptra can now be used in the gluteal region, posterior thighs, décolletage and upper arms, enabling clinicians to address a broader range of aesthetic goals, such as improving skin quality (including reduction in the appearance of cellulite), enhancing firmness, lift, projection and contour across all three skin layers.

Clinical data referenced by Galderma show progressive improvements in treated areas, with visible changes in texture and firmness reported as early as one month after treatment in some cohorts. Satisfaction rates among patients and physician-rated improvement scores were high in studies of the gluteal area, thighs, décolletage and upper arms.

Galderma describes the expanded certification as part of an evolution in injectable aesthetics, reflecting shifting patient expectations for holistic, full-body approaches to regenerative care that extend beyond traditional facial rejuvenation. This expanded indication also reinforces Sculptra's positioning as a regenerative biostimulator that works by stimulating endogenous collagen production to support gradual and sustained improvements in skin structure and quality.

Research evaluates combined use of platelet-rich plasma and hyaluronic acid for skin rejuvenation

A prospective clinical study published via Springer Medizin evaluates the efficacy and safety of combining platelet-rich plasma (PRP) with hyaluronic acid (HA) for aesthetic skin rejuvenation, reporting measurable improvements across several skin quality parameters with a favourable safety profile.

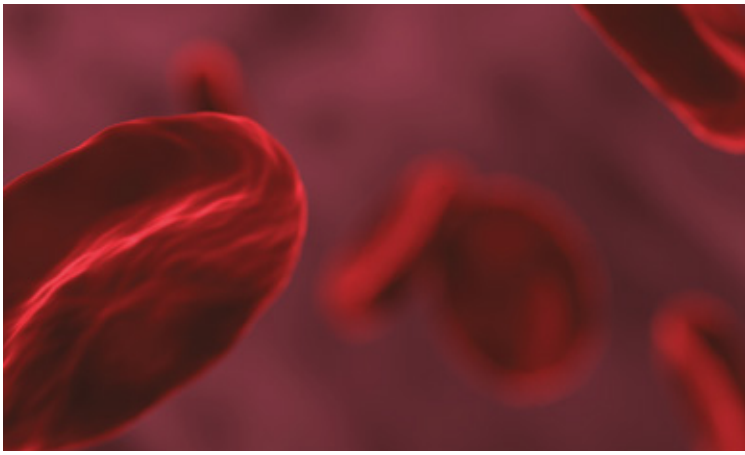
The study enrolled 30 adult patients, with 29 completing the full protocol. Participants underwent three intradermal treatment sessions at monthly intervals, receiving a combination of autologous PRP and hyaluronic acid. Clinical outcomes were assessed over a 32-week follow-up period using objective instrumental measurements alongside clinical and patient-reported assessments.

Results showed statistically significant improvements in skin firmness, with Cutometer measurements demonstrating a 54% improvement from baseline at three months and a 65% improvement at six months following the final treatment ($p < 0.0001$). Skin hydration also improved significantly and remained elevated throughout follow-up ($p < 0.01$).

Additional improvements were observed in melanin and erythema indices, indicating reductions in pigmentation and redness at six months ($p < 0.01$). Sebum levels decreased significantly after the second treatment session and remained lower at three months post-treatment ($p < 0.05$). Skin elasticity showed a statistically significant early improvement at one month post-treatment ($p = 0.0217$), although this effect was not sustained at later time points. No statistically significant changes were reported for skin texture, wrinkle depth or overall brightness.

From a safety perspective, the combination treatment was well tolerated. Reported adverse effects were mild and transient, limited mainly to local injection-site reactions such as erythema, swelling or bruising, with no serious adverse events observed.

The authors note limitations including the modest sample size, absence of a control group and relatively short follow-up, and emphasise the need for larger, controlled studies to further define optimal protocols and durability of effect.



Study reports new data supporting regenerative effects of poly-L-lactic acid in facial rejuvenation

A clinical study published in Clinical, Cosmetic and Investigational Dermatology evaluates facial volume changes following treatment with injectable poly-L-lactic acid (PLLA), using three-dimensional imaging to support its classification as a regenerative, collagen-stimulating intervention rather than an immediate volumising filler.

The study included 28 adult patients undergoing facial rejuvenation with PLLA, with volumetric outcomes assessed using standardised three-dimensional imaging at baseline and at multiple follow-up time points. Imaging analysis focused on delayed volume change rather than immediate post-injection effects, reflecting the known mechanism of action of PLLA.

Results demonstrated statistically significant increases in facial soft-tissue volume over time, with progressive volumetric gains observed across follow-up visits extending several months after treatment. Volume changes were not immediate but developed gradually, consistent with neocollagenesis. Quantitative imaging showed measurable increases compared with baseline, reaching statistical significance at later follow-up points ($p < 0.05$).

Volumetric improvements were observed in facial regions commonly affected by age-related volume loss, including the midface and lower face. The timing of peak volume increase aligned with established collagen synthesis timelines, supporting a biological rather than mechanical explanation for the observed changes.

Safety outcomes were favourable. PLLA was well tolerated when administered using established reconstitution protocols and injection techniques, with reported adverse events limited to transient injection-site reactions. No unexpected safety signals were identified during the observation period.

Results demonstrated statistically significant increases in facial soft-tissue volume over time

The authors also discuss several limitations. The study involved a relatively small sample size and did not include an untreated control group or comparator injectable, limiting the ability to directly compare outcomes or exclude confounding factors. While volumetric changes were followed over several months, the duration was insufficient to fully characterise long-term durability.

The authors further note that three-dimensional imaging, although objective, can be influenced by factors such as facial positioning and expression despite standardisation, and that volumetric change alone does not necessarily reflect broader improvements in skin quality or patient-reported outcomes.

Fibronectin-based skincare found to improve post-IPL skin recovery

A clinical study published in January 2026 in Clinical, Cosmetic and Investigational Dermatology evaluated the effects of a fibronectin-based skincare regimen on skin recovery following intense pulsed light (IPL) therapy, reporting significant improvements in hydration, barrier function and redness compared with a control treatment.

Fibronectin is a naturally occurring extracellular matrix protein involved in cell adhesion, migration and early wound repair. Its topical application appears to support barrier restoration and coordinated tissue recovery following procedures that temporarily disrupt skin integrity.

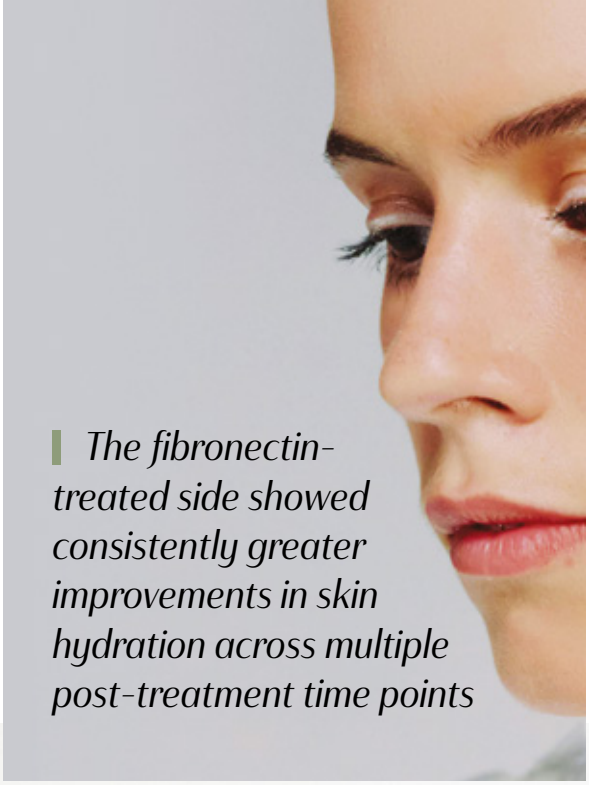
The 28-day split-face study included 32 healthy female participants undergoing IPL. Each participant applied a fibronectin-containing serum to one side of the face and a control serum to the other. Skin hydration, transepidermal water loss, erythema and skin radiance were measured at baseline, immediately after IPL, and at days 3, 7 and 28.

The fibronectin-treated side showed consistently greater improvements in skin hydration across multiple post-treatment time points, with statistically significant differences compared with the control. Measures of transepidermal water loss, reflecting skin barrier recovery, were significantly lower on the fibronectin side at days 3, 7 and 28. Redness and overall

skin radiance also improved more rapidly and to a greater extent on the fibronectin-treated side at later follow-up points.

Both investigator assessments and participant-reported feedback supported the objective findings, with no adverse events reported during the study period. The regimen was well tolerated, even in the immediate post-procedure phase when the skin barrier is most vulnerable.

The authors note that the study was limited by its modest sample size and focus on a single procedure type, and that further controlled studies are needed to determine whether similar benefits are seen across other energy-based and procedural treatments.



The fibronectin-treated side showed consistently greater improvements in skin hydration across multiple post-treatment time points

Nutrition, Bioactive and Skin Repair

Kiwifruit linked to higher skin vitamin C levels and collagen-related skin changes

A human study published in the Journal of Investigative Dermatology in October 2025 shows that increasing dietary vitamin C through whole foods such as kiwifruit raises vitamin C levels within the skin and is associated with measurable changes in skin structure and renewal.

Researchers from the University of Otago and collaborators conducted a two-phase investigation. In the first phase, skin and blood samples from adults undergoing elective surgery were analysed to assess how circulating vitamin C levels relate to concentrations within different skin layers. In the second phase, 24 healthy adults took part in an eight-week dietary intervention, consuming two SunGold kiwifruit daily, providing

approximately 250 mg of vitamin C per day. Skin and blood samples were collected before and after the intervention.

The study found that increases in blood vitamin C following daily kiwifruit intake were mirrored by higher vitamin C concentrations in both the epidermis and dermis, indicating active uptake into the skin. Higher skin vitamin C levels were associated with increased skin density, a marker linked to the collagen-rich dermal matrix, and increased proliferation of epidermal cells, suggesting enhanced skin renewal.

The authors reported a particularly strong relationship between plasma vitamin C levels and skin concentrations, highlighting the skin's sensitivity to systemic nutrient availability. While the study did not demonstrate consistent improvements in parameters such as elasticity or UV protection, it provides direct human evidence that dietary vitamin C influences skin biology.

The researchers note several limitations, including the small sample size and lack of a placebo control group. Nevertheless, the findings support the role of adequate dietary vitamin C in maintaining the biological processes underpinning collagen synthesis, dermal structure and epidermal turnover, reinforcing the relevance of nutrition in supporting skin health alongside clinical aesthetic and regenerative treatments.

Review explores emerging evidence for oral hydrolysed marine collagen in skin health

A review published in the Clinical, Cosmetic and Investigational Dermatology in December 2025 examines the emerging evidence supporting the use of orally administered hydrolysed marine collagen for skin health, while highlighting ongoing gaps in clinical validation.

The review draws on a broad and heterogeneous body of preclinical and human research rather than a formally defined dataset, reflecting the evolving nature of evidence in this area. Studies discussed span mechanistic investigations, animal models and human clinical trials, with a focus on more recent work exploring skin-specific outcomes.

The authors describe how hydrolysed marine collagen peptides are absorbed following oral intake and appear to act as biological signals rather than passive structural substrates. Once in circulation, these peptides may influence fibroblast activity, collagen synthesis and extracellular matrix turnover within the skin.

Across the human studies discussed, supplementation with hydrolysed marine collagen was associated with improvements in parameters such as skin elasticity, hydration and wrinkle appearance. Benefits were most consistently reported when collagen was combined with supportive nutrients including vitamin C, zinc or hyaluronic acid, reflecting the multi-step biology of collagen production and dermal remodelling.

The review also addresses limitations within the current literature, noting that many studies are small, vary in formulation, dosage and duration, and differ in outcome measures. As a result, the authors caution against overgeneralisation and call for larger, well-designed clinical trials to better define efficacy and optimal use.

Rosemary compound found to promote regeneration and reduced-scar healing

A study published in October 2025 in JCI Insight reports that topical rosemary extract can accelerate wound closure and reduce fibrotic scarring in adult mouse skin, and traces the effect to activation of a specific sensory-nerve receptor involved in regenerative repair.

Working in adult mouse wound-healing models, the researchers found that an ethanol-based rosemary extract improved healing speed and mitigated fibrosis. They then isolated carnosic acid, a major bioactive compound in rosemary leaves, as a key driver of the effect. Mechanistic experiments suggested carnosic acid activates TRPA1, a nociceptor expressed on cutaneous sensory neurons; when

TRPA1 was absent in sensory neurons, the pro-regenerative response was lost.

Beyond faster closure, the team reported features consistent with more regenerative repair, including restoration of skin appendages such as hair follicles and oil glands in treated wounds, aligning the findings with pathways that shift healing away from scar-dominant outcomes.

The authors position the work as a potential starting point for accessible, topical approaches to improving skin repair outcomes, but note clear translational constraints.

The evidence is currently limited to animal models, and the formulation tested (ethanol-based extract and a carnosic-acid cream) may not map directly to commercially available "rosemary" skincare products or to real-world use patterns. Human trials will be needed to determine safety, dosing, irritation risk, and whether similar anti-fibrotic effects occur in human wounds.

Researchers found that an ethanol-based rosemary extract improved healing speed and mitigated fibrosis

Study explores soapnut seed hydrosol for skin repair and antimicrobial activity

A research article published in Scientific Reports in December 2025 investigates the biological activity of Sapindus mukorossi (soapnut) seed hydrosol and its potential relevance for skin repair and skincare applications.

Sapindus mukorossi is a tree native to tropical and subtropical regions, traditionally used for cleansing due to its natural surfactant properties. In this study, researchers prepared an aqueous seed hydrosol and evaluated its antimicrobial, anti-inflammatory and wound-healing effects using a combination of laboratory and animal models.

Chemical profiling using gas chromatography-mass spectrometry identified multiple phytochemical components within the hydrosol, including compounds associated with antioxidant and antimicrobial activity. These constituents were then assessed for biological effects relevant to skin health and repair.

In antimicrobial testing, a diluted hydrosol significantly reduced the growth of Staphylococcus aureus compared with controls. In cell culture experiments, treatment improved the survival of human dermal fibroblasts under stress conditions and enhanced cell migration in scratch wound assays, indicating support for early wound closure processes.

Anti-inflammatory effects were also observed. In immune cell models, the hydrosol reduced lipopolysaccharide-induced nitric oxide production, suggesting modulation of inflammatory signalling pathways associated with tissue injury and repair.

The study further evaluated wound healing in an animal model. Wounds treated with the hydrosol showed faster closure and improved re-epithelialisation compared with untreated controls, with histological analysis supporting enhanced tissue regeneration during the healing process.

The authors conclude that Sapindus mukorossi seed hydrosol demonstrates a combination of antimicrobial, anti-inflammatory and wound-healing properties that may be relevant for skin repair applications. However, they emphasise that the findings are preclinical and that further research is required to assess formulation, dosing and safety before translation to human use.

Sapindus mukorossi is a tree native to tropical and subtropical regions

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Research in Focus:
Dr Lee Walker Co-Authors Case Study on

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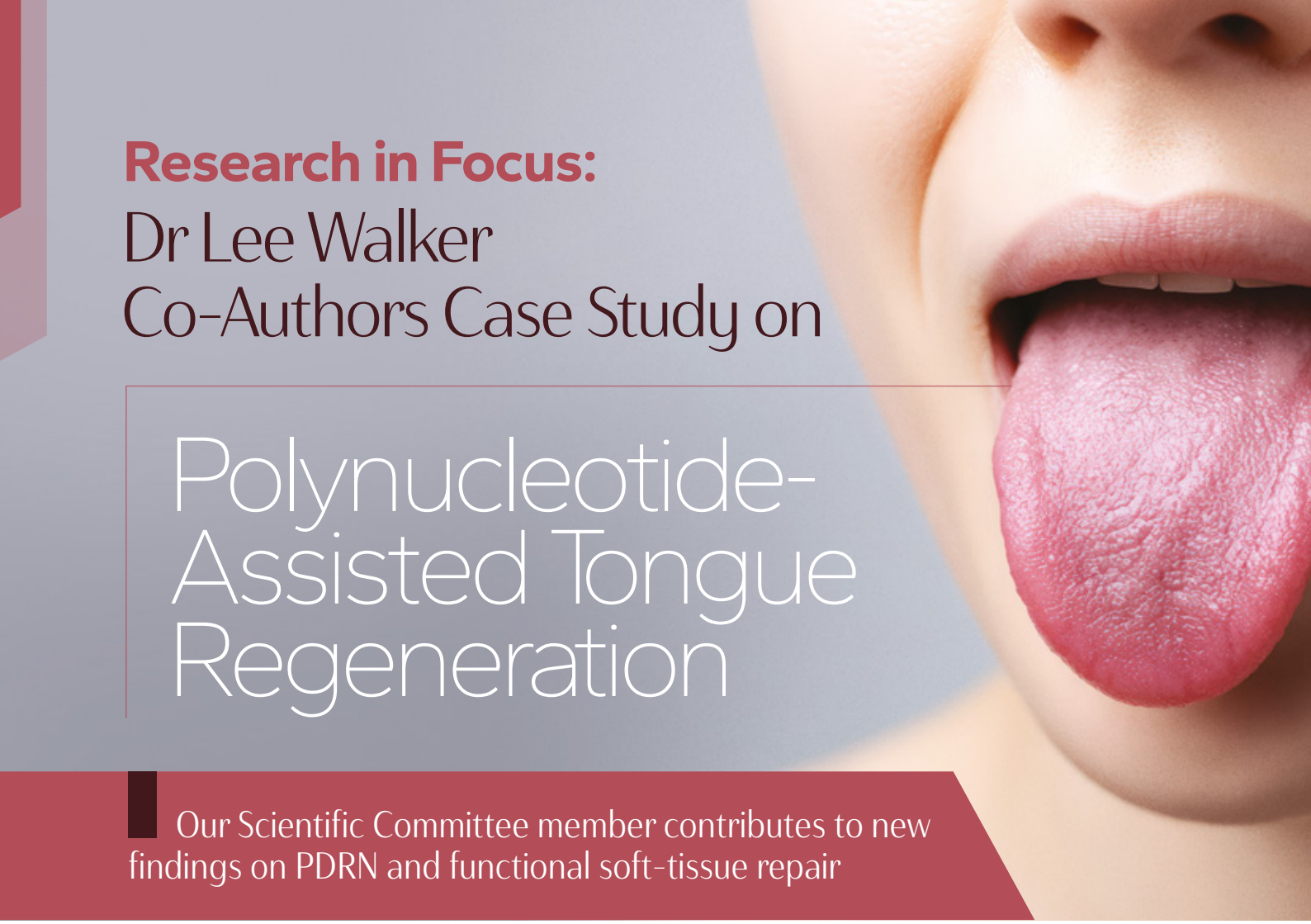


Our Scientific Committee member contributes to new findings on PDRN and functional soft-tissue repair

A new case report published in Cureus by Dr Lee Walker, alongside Dr Pamela Saavedra and Dr Paula Arroyo, explores the use of polydeoxyribonucleotides (PDRN) in supporting regeneration of the tongue apex following traumatic partial amputation.[1] The authors document the recovery of a 34-year-old male who lost approximately 30% of the tongue apex in a car accident, assessing how polynucleotides may influence both structural healing and functional restoration.

Trauma, repair and regenerative rationale

Although the tongue is known for its intrinsic regenerative capacity, with research showing that it can undergo substantial endogenous repair when vascular supply is preserved,[2] significant loss of apex tissue can still lead to long-term difficulties with articulation, swallowing and fine motor control.[3]

In this case, standard surgical repair was followed by a combined approach incorporating weekly PDRN injections, silicone gel to reduce fibrotic scarring,[4] daily oral physiotherapy exercises aimed at improving tongue mobility and functional use of the remaining tissue.[3]

Walker and colleagues note that PDRN's established actions - promoting angiogenesis, modulating inflammation and stimulating fibroblast activity - provide a clear rationale for its use in a functionally demanding area such as the lingual apex.[5]

Study approach

PDRN treatment began 12 days after surgical repair. The formulation used contained 25 mg/mL polydeoxyribonucleotides with 3 mg/mL lidocaine, administered through micro-injections of 0.05 mL placed directly into the apical region of the remaining tongue tissue, up to a total volume of 1.5 mL per session, repeated weekly for four weeks.[1]

The patient also applied a silicone gel daily, intended to help minimise fibrotic scar formation and support more favourable wound remodelling.[1]

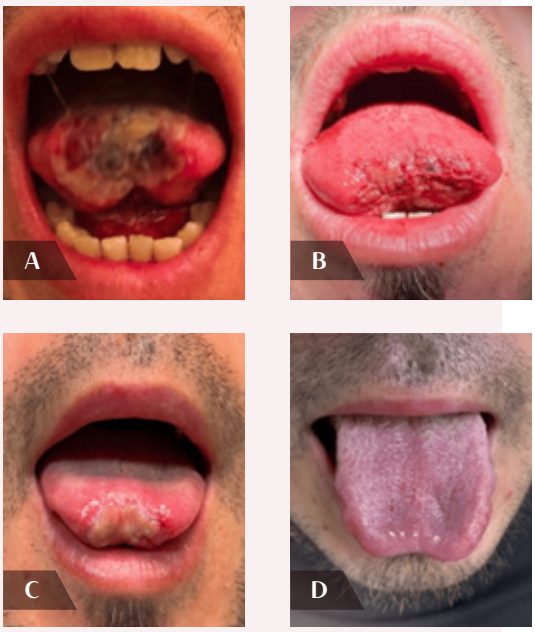
Functional rehabilitation was initiated three weeks after the accident. As part of this, the patient was advised to carry out daily oral physiotherapy exercises aimed at improving tongue mobility and functional use of the residual tissue. These exercises involved repeated practice intended to support improved use of the remaining tongue tissue during speech and swallowing, and were performed over a four-week period.[1]

Clinical progression was monitored for three months using serial photography, articulation scoring, the Eating Assessment Tool (EAT-10) and the SF-36 quality-of-life questionnaire.[1]

Findings

Serial photographs demonstrated progressive restoration of tissue volume and improved contour at the apex across the follow-up period. Functional outcomes reflected this trajectory. The patient's articulation score improved by three points, and his EAT-10 score fell from 14 to 4, indicating substantial improvement in swallowing function.

Quality-of-life scores on the SF-36 increased by around 25% in mental-health metrics and 30% in physical-health metrics. No adverse events were reported, and the full protocol - including PDRN injections, silicone-gel application and physiotherapy - was well tolerated.



Effect of surgical and pharmacological treatments on tongue regeneration (A) basal tongue traumatism, (B) the tongue aspect after the surgical procedure, (C) the tongue cicatrization at basal condition (12 days after surgery) and (D) at the end of regeneration treatment (eight weeks). Images courtesy of Saavedra P, Walker L, Arroyo P. Effect of Polynucleotides on Apex Lingual Regeneration After Amputation Due to a Car Accident: A Case Report. Cureus. 2025;17(11):e96990. doi:10.7759/cureus.96990.

Interpretation

While regeneration cannot be attributed solely to PDRN, the authors argue that the outcomes are consistent with the known biological effects of polynucleotides.[5] Within the broader multimodal strategy employed, PDRN may have contributed to an environment supportive of improved structural and functional recovery.

The authors highlight the need for controlled studies to better understand PDRN's specific role in complex soft-tissue regeneration and its potential incorporation into clinical protocols involving orofacial structures.

Discussion

The authors describe how PDRN, already recognised for its role in skin rejuvenation and tissue repair, was applied in this case as an adjuvant to support regeneration following partial tongue amputation.

The improvements observed in tissue appearance, phonemic articulation and patient-reported function suggest that PDRN may contribute positively to the natural process of lingual healing.

As emphasised in the original study, these findings represent a single clinical experience, and further research is required to determine whether PDRN provides consistent benefit in similar cases or in broader orofacial soft-tissue applications.

Dr Lee Walker

Being directly involved in this case study allowed me to see first-hand how polynucleotides may support regeneration in tissues where both structure and fine motor function are critical. The tongue is a uniquely demanding organ - even small deficits can meaningfully affect speech, swallowing and quality of life. What makes this case particularly interesting is the way PDRN appeared to complement the natural healing process, contributing to noticeable improvements in both tissue appearance and functional movement. Although this is a single case, it suggests that polynucleotides may have broader applications within oral and orofacial rehabilitation, beyond their established role in cutaneous regeneration. This warrants further exploration and could be an exciting direction for future research.

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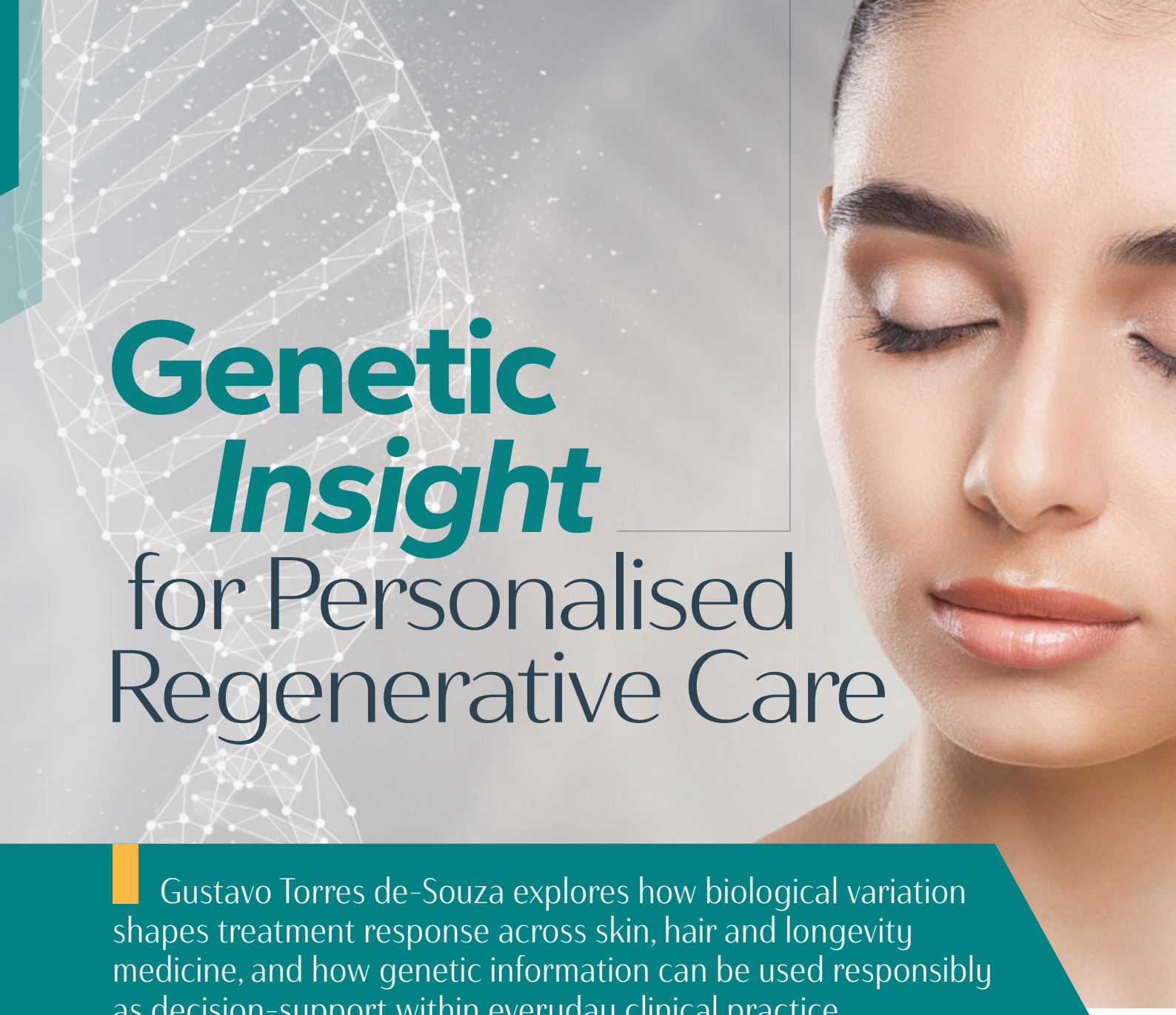

Genetic *Insight* for Personalised Regenerative Care

Gustavo Torres de-Souza explores how biological variation shapes treatment response across skin, hair and longevity medicine, and how genetic information can be used responsibly as decision-support within everyday clinical practice

One of the most persistent challenges in regenerative, aesthetic and dermatological practice is the marked variability in treatment response observed between patients who appear clinically similar.[1-3] Two individuals may present with near-identical phenotypes - comparable severity, distribution, age of onset and environmental exposure - yet respond very differently to the same intervention. One may show rapid and sustained improvement, another modest or delayed change, and a third limited benefit or early intolerance, despite appropriate diagnosis, sound technique and adherence to established protocols.

From a genetics perspective, this variability is neither unexpected nor anomalous. Clinical phenotypes frequently represent a final common outcome produced by multiple underlying biological routes.[4] Beneath similar outward presentations lie differences in drug activation and metabolism, receptor sensitivity, downstream signalling efficiency, inflammatory amplification, tissue remodelling capacity and hormonal handling. These factors shape not only treatment efficacy but also tolerability, persistence and real-world outcomes.

In pharmacogenetics, this principle is well established. Inherited genetic variation can influence pharmacokinetics, including absorption, biotransformation and transport, as well as pharmacodynamics, such as receptor structure, intracellular signalling and target engagement.[1-3] These inherited differences help explain why the same therapy may be effective and well tolerated in one patient yet suboptimal or poorly tolerated in another, even when clinical presentation appears similar.

In aesthetic and regenerative medicine, response variability is often

further compounded by multifactorial influences. Endocrine milieu, cumulative inflammatory burden, local tissue microenvironment, barrier integrity and lifetime environmental exposure all interact with inherited predisposition. Genetics does not account for all outcome variation, nor should it be positioned as a standalone explanation. However, it can explain a meaningful proportion of why identical treatments yield divergent results across patients, and therefore represents a valuable layer of biological insight when integrated responsibly into clinical decision-making.[4,5]

Genetics as decision support

In aesthetic, dermatological and regenerative medicine, genetic testing is most appropriately positioned as a decision-support tool rather than as a diagnostic instrument or a deterministic predictor of outcome.[6,7] Its value lies not in defining disease or guaranteeing response, but in providing a stable layer of biological context that helps clinicians navigate complexity, variability and uncertainty more systematically.

When used responsibly, genetic information can assist clinicians in prioritising interventions that are mechanistically aligned with an individual's underlying biology, identifying treatments with a reduced likelihood of efficacy, and anticipating tolerability constraints that may influence adherence or long-term success.[6,7] This is particularly relevant in areas where therapeutic trial-and-error is common, treatment timelines are prolonged, and patient fatigue or disengagement is a frequent cause of suboptimal outcomes.

Importantly, genetic testing should not be viewed as a stand-alone solution. It does not replace clinical diagnosis, physical examination, contraindication screening or professional judgement. Rather, it functions as a baseline framework that informs probability and direction, while leaving final decisions firmly within the clinician's remit.[7,8] Genetic findings must always be interpreted in conjunction with medical history, comorbidities, concurrent therapies, lifestyle factors and patient preferences.

Genetics does not account for all outcome variation, nor should it be positioned as a standalone explanation

Within this framework, genetics helps structure choices rather than dictate them. It can support earlier prioritisation of certain biological pathways, justify combination approaches where monotherapy is unlikely to be sufficient, and help explain why a standard first-line option may not be optimal for a particular patient. Used in this way, genetic testing enhances clinical reasoning without undermining the central role of assessment, monitoring and adaptation based on observed response.[7,9]

Framing genetic information appropriately

A central principle in the responsible clinical use of genetic testing is the recognition that genetic information modifies probability rather than certainty. Most common genetic variants associated with disease susceptibility or treatment response exert modest individual effects and operate within complex, interacting biological networks.[4,5,10] Their clinical relevance is therefore highly context-dependent, influenced by environmental exposure, age, hormonal status, inflammatory burden, lifestyle factors and concurrent interventions.

In complex traits and common conditions, genetic variants rarely act in isolation. Instead, they contribute incrementally to biological tendencies that may or may not manifest clinically depending on surrounding influences. This helps explain why genetic associations often demonstrate statistical significance at a population level but limited predictive power for individual outcomes.[4,5] Presenting such information deterministically risks overstating its clinical utility and may lead to inappropriate confidence in predicted response or unnecessary concern about perceived risk.

A probabilistic framing is not only scientifically accurate but also clinically safer. It reinforces the reality that treatment outcomes remain contingent on correct diagnosis, formulation and dosing, procedural technique, adherence and follow-up. Genetics can inform likelihoods and constraints, but it does not override real-time clinical observation or evolving patient context.[7,9]

This framing also supports shared decision-making. When patients understand that genetic results indicate tendencies rather than guarantees, expectations are better aligned with clinical reality. This reduces frustration when outcomes vary, protects trust in the clinician-patient relationship, and discourages abandonment of effective therapies based on misinterpreted genetic findings.

From a professional and ethical standpoint, avoiding deterministic messaging is essential. Overinterpretation of genetic data - particularly in areas with modest effect sizes - can result in overtreatment, therapeutic inertia, or inappropriate avoidance of beneficial interventions. Responsible use requires transparency about uncertainty, proportional weighting of evidence, and continual reassessment based on observed response rather than static genetic assumptions.[9,10]

Distinguishing clinically useful genetic insight

The clinical value of genetic testing does not lie in the volume of data generated, but in the interpretation

and contextualisation of that data. Raw genetic output, such as lists of single nucleotide polymorphisms or genotype calls, has little inherent meaning unless it is translated into functional insight that connects biological variation to clinical decision-making. Without this interpretive layer, genetic results risk overwhelming clinicians with information that is technically accurate yet clinically inert.

Similarly, not all genetic associations reported in the academic literature are clinically actionable. Many statistically significant findings reflect small effect sizes, poorly defined phenotypes, or associations that lack replication across populations.[11-13] While such findings may advance scientific understanding, their direct relevance to individual patient care is often limited. Incorporating them uncritically into clinical testing risks overstating predictive value and undermining professional confidence in genomic tools.

Clinically useful genetic insight is characterised by three core features: mechanistic plausibility, actionability, and interpretability within real-world workflows. Variants or variant patterns should map to biological pathways that are well understood and relevant to the condition or intervention in question. They should inform a tangible clinical decision such as prioritising a therapeutic pathway, anticipating tolerability issues, or staging interventions, rather than existing as abstract risk markers. Finally, results must be presented in a way that clinicians can integrate efficiently alongside history, examination and follow-up data.

Importantly, meaningful insight often arises not from single variants but from patterns across pathways. Complex traits are shaped by networks of interacting biological processes, and genetic interpretation is most useful when it reflects this systems-level perspective rather than isolating individual markers.[11,14] This approach aligns more closely with how clinicians already think about multifactorial conditions and supports coherent, mechanism-aligned treatment planning.

In practice, the distinction between data and insight also has implications for patient communication. Presenting curated, clinically framed conclusions - rather than raw genetic information - reduces misunderstanding, prevents overinterpretation and supports informed consent. It reinforces the clinician's role as interpreter and integrator, ensuring that genetic testing strengthens rather than fragments clinical reasoning.[12,15]

Using genetic results to prioritise and stage interventions

In clinical practice, the most productive use of genetic information is rarely the identification of a single "correct" treatment. Instead, its greatest value lies in helping clinicians prioritise, sequence and stage interventions in a way that reduces unnecessary trial-and-error while preserving flexibility.

Genetic results can highlight which biological pathways are more likely to be rate-limiting for a given patient, allowing clinicians to justify early focus on specific mechanisms. In some cases, this may support the use of combination strategies earlier in the treatment course, particularly where monotherapy is unlikely to be sufficient. In others, it may suggest that certain interventions are best reserved as later-stage options rather than default first-line choices.[16,17]

This approach aligns well with regenerative and aesthetic medicine, where treatment outcomes often evolve over months rather than weeks. Early perceived benefit is strongly linked to adherence, and premature discontinuation remains a common cause of suboptimal outcomes. By using genetic insight to inform initial prioritisation, clinicians may improve early trajectory and patient confidence, while still adapting plans based on observed response and tolerability.

Importantly, genetic information should never create therapeutic rigidity. Results guide probability, not inevitability. Ongoing assessment, patient feedback and clinical outcomes must remain the primary determinants of continuation, modification or escalation of care.[17,18]

Genetic testing across common indications

While genetic testing should not be viewed as indication-specific in isolation, its clinical value becomes particularly clear when applied to conditions characterised by biological heterogeneity, prolonged treatment timelines and variable response despite similar presentation. In regenerative and aesthetic medicine, several common indications exemplify how genetic insight can support prioritisation, sequencing and expectation management when integrated responsibly into clinical care.

Androgenetic alopecia

Among regenerative indications, androgenetic alopecia provides one of the clearest models for pharmacogenetic decision-support. Its pathophysiology is well described, yet clinically heterogeneous, and response variability remains a persistent challenge despite established diagnostic criteria and treatment algorithms.[19-21]

Although patients may present with comparable patterns and severity of hair loss, the relative contribution of underlying biological pathways can differ substantially. Key contributors include

> *In clinical practice, the most productive use of genetic information is rarely the identification of a single "correct" treatment*

androgen metabolism and follicular sensitivity, prostaglandin-mediated cycling regulation, inflammatory modulation, vascular and metabolic support, and extracellular matrix dynamics relevant to follicular anchoring and resilience.

This biological heterogeneity maps directly onto the therapeutic landscape. Current interventions act on distinct components of follicular biology, including androgen signalling, prostaglandin balance, growth-factor and vascular support, and inflammatory burden.[22,23]

As a result, similar clinical presentations may respond very differently to the same intervention, and prolonged treatment timelines often amplify patient frustration when early visible change is limited.

Genetic insight can assist clinicians by highlighting which biological constraints are more likely to be rate-limiting in a given patient. For example, inherited variation affecting androgen metabolism or signalling may help explain limited response to androgen-targeted monotherapy, while differences in inflammatory or prostaglandin-related pathways may support earlier use of adjunctive or combination strategies. Importantly, this approach informs prioritisation and sequencing rather than deterministic prediction.

In a condition where long-term adherence is critical and discontinuation is common, aligning interventions more closely with underlying biology may improve persistence, communication and overall outcomes.[20,22]

Acne, inflammation and skin-barrier resilience

Genetic research increasingly supports acne as a multi-axis condition that extends beyond androgen signalling and sebum production. Susceptibility, severity and persistence are also shaped by inherited variation in inflammatory amplification, innate immune modulation and epidermal barrier resilience.[24-26]

Some individuals demonstrate heightened inflammatory responses to follicular stress and microbial signals, contributing to recurrent flares and post-inflammatory sequelae.[24-27] Others exhibit reduced tolerance to topical actives and environmental irritation due to barrier fragility, influencing both treatment selection and adherence.[28-30]

A genetically informed perspective supports more nuanced clinical management. Patients with a predisposition toward inflammatory amplification or barrier vulnerability may benefit from more cautious sequencing of actives, earlier emphasis on barrier-supportive strategies, and proactive reduction of inflammatory load. This approach also helps explain why some patients struggle with tolerability despite apparently appropriate regimens, and why outcomes vary even under consistent clinical supervision.

Ageing biology, tissue resilience and telomere context

Within aesthetic and regenerative medicine, ageing is increasingly understood as a dynamic balance between cumulative damage and ongoing repair. Telomere biology is often invoked within this context, but it is frequently oversimplified or misrepresented. Rather than serving as a definitive measure of biological age, telomere length should be understood as a contextual marker reflecting long-term cellular ageing dynamics and tissue maintenance capacity.[31-33]

Telomere length is shaped by both inherited predisposition and cumulative exposures across the life course, including inflammatory burden, oxidative stress, metabolic health and environmental factors.[31,32] In skin and soft tissue biology, it aligns with broader concepts of regenerative capacity, resilience and the ability to sustain repair over time. Individuals with similar chronological age may therefore exhibit markedly different tissue behaviour, recovery profiles and response durability following regenerative interventions.[31-33]

From a clinical perspective, telomere-related information is most responsibly applied longitudinally. It may support monitoring, expectation-setting and preventive discussion over time, but it should not be used to make deterministic claims about current appearance, future ageing trajectories or the likely success of isolated procedures.[32,33]

Nutrition, supplementation and metabolic variability

Nutritional and supplement-based strategies are frequently incorporated into regenerative care, yet outcomes vary widely even when recommendations appear broadly appropriate. This variability reflects substantial inter-individual differences in metabolism, nutrient handling, inflammatory tone, oxidative stress response and recovery dynamics.[28,31]

Genetic research increasingly supports acne as a multi-axis condition that extends beyond androgen signalling and sebum production

Generic dietary or supplement advice assumes relatively uniform biological constraints, an assumption that does not hold true in practice. Some patients experience clear benefit, while others see minimal change or struggle with tolerability and adherence. These differences influence not only biological response but also appetite regulation, satiety, gastrointestinal tolerance and long-term compliance, all of which are critical determinants of real-world

effectiveness.[28]

Genetic information can support more targeted prioritisation by highlighting metabolic or inflammatory tendencies that suggest certain dietary structures, micronutrient focuses or antioxidant strategies may be more relevant for a given individual.

Importantly, genetics should not be used to prescribe supplements in isolation or to justify rigid protocols. Instead, it provides context that helps clinicians decide which levers are most worth addressing first, and how to integrate nutritional support alongside medical, procedural and lifestyle interventions.[28,31]

Responsible integration of genetics in longitudinal regenerative care

The incorporation of genetic testing into aesthetic and regenerative practice carries clear professional and ethical responsibilities. Genetic information must be positioned as decision-support rather than prediction, and communicated in a manner that reflects uncertainty, proportionality of evidence and the continuing importance of clinical judgement.[8,10,30]

Genetic findings should never replace diagnosis, contraindication screening or ongoing assessment of treatment response. Overinterpretation of low-evidence associations risks both overtreatment and therapeutic inertia, while under-contextualised results may undermine patient confidence.[8,9,10] Ethical practice requires informed consent, appropriate data governance and transparency around uncertainty.[15,30]

Looking ahead, genomics is likely to function as a stable foundational layer within a longitudinal, multi-omic model of personalised regenerative care. In such a framework, genetic information defines baseline biological predispositions, while dynamic data streams, such as biomarkers, imaging, transcriptomic signals and clinical phenotyping, capture current physiological state and treatment-induced change.[34,35]

Within this model, the clinician's role remains central. The value of genetic testing lies not in certainty, but in structured insight into biological variability, enabling more coherent decision-making, clearer communication and reduced avoidable trial-and-error. When framed and applied responsibly, genetics strengthens clinical reasoning rather than replacing it, supporting realistic, staged and adaptive care in regenerative medicine.

Dr Gustavo Torres de Souza is a pharmacist and holds a doctorate in genetics. He has extensive experience in genome editing and the generation of genetically modified animals for heterologous protein production and organ xenotransplantation, developed during his master's, PhD, and postdoctoral research. Currently Scientific Director at Fagron Genomics, he specialises in pharmacogenetics, leading initiatives to integrate genetic data into clinical practice and optimise therapeutic outcomes. Dr Torres de Souza is also a member of the United States Pharmacopeia (USP) Expert Committee on Personalised Therapy and Pharmacogenomics, contributing to global standards and advancing the clinical implementation of personalised medicine.

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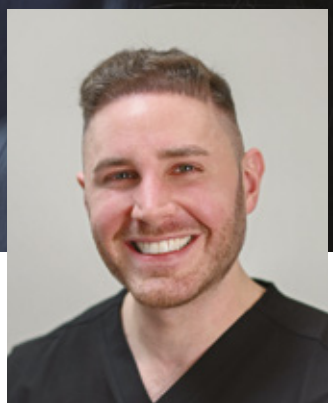
Scalp Nerve Blocks *in* Regenerative Aesthetics



Dr Ed Robinson discusses how regional anaesthesia techniques can support smoother delivery of injectable and energy-based treatments

As regenerative aesthetics continues to advance, creating the right conditions for patient comfort is essential for delivering precise, biologically driven treatments. In this article, I outline how scalp nerve blocks can support smoother, more controlled delivery of injectable and energy-based modalities for hair regeneration treatments.

What is a nerve block and why are they used?

A nerve block is a targeted regional anaesthetic technique in which local anaesthetic is deposited around a specific peripheral nerve to temporarily interrupt sensory transmission. Local anaesthetics act by inhibiting voltage-gated sodium channels within neuronal membranes, preventing action potential propagation and thereby blocking nociceptive input.[1]

This allows for effective analgesia without altering consciousness or requiring systemic analgesics.

Peripheral nerve blocks are widely used across anaesthesia, maxillofacial surgery, dermatologic surgery, and ophthalmology due to their reliability, safety, and ability to provide site-specific pain control.[2]

Their increasing application in aesthetic medicine stems from growing demand for minimally invasive and regenerative treatments performed on sensitive areas of the scalp.

Procedures such as PRP injections, polynucleotides, exosomes, microneedling, and laser therapies can be highly uncomfortable, particularly in patients with androgenetic alopecia where dermal thinning exposes tightly adherent nociceptive fibres. Regional scalp nerve blocks significantly mitigate this discomfort by anaesthetising entire territories of the anterior and lateral scalp.[3]

It must be emphasised that nerve blocks are specialist medical procedures requiring detailed anatomical knowledge, hands-on supervised training, and appropriate insurance. This article therefore provides an academic and conceptual overview, not a procedural manual.

Benefits of scalp nerve blocks

Patient specific

Superior analgesia: compared with topical anaesthetics, regional nerve blocks provide deeper and more predictable analgesia. Systematic reviews demonstrate that nerve blocks consistently outperform topical lidocaine in dermatologic and laser procedures, reducing pain scores by up to 70-80%.[3]

Ability to tolerate longer or combined treatments: advanced hair-loss protocols often combine multiple modalities including PRP, polynucleotides, exosomes, microneedling, LED and Thulium laser. Adequate anaesthesia allows for longer sessions and optimises clinical efficiency without overwhelming patient discomfort.[3,4]

Higher satisfaction and psychological comfort: studies consistently show that high-quality analgesia improves willingness to repeat treatments and enhances perceived value of care.[4] For patients with procedural anxiety, blocks provide a sense of control and confidence.

Avoidance of reactions to topical anaesthetic creams: topical anaesthetics may cause irritant dermatitis, allergic contact reactions, or erythema.[5] Patients with seborrhoeic dermatitis or scalp psoriasis are particularly vulnerable. Nerve blocks avoid this altogether.

Optimised laser-tissue interaction: many lasers, including Thulium 1927nm fractional devices, use water as a chromophore. The presence of water-rich topical creams can absorb or scatter laser energy, potentially reducing penetration or altering treatment uniformity.[6] A nerve block eliminates the need for topical application, ensuring consistency in laser physics and outcomes.

Practitioner specific

Avoiding PRP inactivation: local anaesthetic agents mixed with PRP (e.g., when injected superficially for comfort) can impair platelet viability and reduce growth factor release.[7] A block avoids local anaesthetic contact with PRP while still providing optimal analgesia.

Enhanced precision and flow: when patients experience discomfort, sudden movements may compromise needle control or microneedling depth. Adequate regional anaesthesia allows for smoother, more meticulous technique, particularly in high-precision work such as injecting along hairlines.

Reduced interruptions: pain-driven pauses elongate treatment time and disrupt sterile workflow. A block provides a continuous period of procedural calm, enhancing overall efficiency.

> *Nerve blocks are specialist medical procedures requiring detailed anatomical knowledge*

Professional differentiation: offering nerve blocks demonstrates advanced medical expertise and distinguishes medically led clinics from non-medical providers unable to perform such procedures. This aligns with best-practice, safety-focused aesthetics.

Anatomical basis of scalp nerve blocks (surface anatomy focus)

The anterior and lateral scalp receives sensory innervation from several branches of the trigeminal nerve. Anteriorly, the ophthalmic (V1) division supplies the midline and medial scalp, while the maxillary (V2) and mandibular (V3) divisions supply the lateral scalp and temporal region.[8,10,11]

Accurate knowledge of these nerves' surface anatomy is essential for successful anaesthetic blockade.

	Supratrochlear nerve (branch of V1)	Supraorbital Nerve (Branch of V1)	Zygomaticotemporal Nerve (Branch of V2)	Auriculotemporal Nerve (Branch of V3)
Origin & Pathway	The supratrochlear nerve arises from the frontal nerve (a major branch of V1) within the orbit. It exits the orbit medially, passing superior to the trochlea, between the corrugator supercilii and the frontalis muscle.[8]	The supraorbital nerve is a major terminal branch of the frontal nerve. It exits via either the supraorbital notch (approximately 80% of individuals) or supraorbital foramen (20%).9 After emergence, it divides into superficial and deep branches: · Superficial branch: Travels within the subcutaneous tissue of the forehead · Deep branch: Courses under the frontalis, through the galea aponeurotica, toward the vertex	A sensory branch of the maxillary nerve (V2), the zygomaticotemporal nerve passes through the zygomaticotemporal foramen on the temporal surface of the zygomatic bone. It then ascends within the superficial temporal fascia, perforating it to supply the temporal skin.[10]	Arising from the mandibular division (V3), the auriculotemporal nerve has a distinctive course: it splits into two roots that encircle the middle meningeal artery before uniting again. It then ascends superiorly, emerging just anterior to the tragus and coursing with the superficial temporal artery.[11]
Surface Landmark	· Approximately 1.5–2 cm lateral to the midline at the superior orbital rim. · Palpable near the medial brow, often more superficial in patients with thin subcutaneous tissue.	· Located roughly 2.5–3 cm lateral to midline at the superior orbital rim. · The notch/foramen is usually palpable with firm pressure.	· Found 1 cm posterior and superior to the lateral orbital rim, just above the zygomatic arch. · Often located in a small depression between the frontozygomatic suture and temporal fossa.	· Located anterior to the tragus, typically 5–7 mm superior to its midpoint. · The superficial temporal artery provides a reliable landmark – the nerve usually lies just posterior to the artery.
Innervation Territory	· Medial forehead · Glabellar region · Anterior scalp extending several centimetres posteriorly	· Central forehead · Frontal scalp extending posteriorly towards the vertex	· Lateral forehead · Anterior temporal region · Hairline region behind the lateral brow	· Lateral temporal scalp · Superior auricular region · Temporal hairline
Clinical Considerations	The nerve is highly superficial; excessive pressure during injection may cause bruising due to dense vascularity of the glabella.	Because the deep branch travels beneath the frontalis and galea, patients may experience partial blockade unless anaesthetic spreads adequately.	The nerve lies near the sentinel vein; caution is required to minimise bruising.	Care must be taken to aspirate to avoid intravascular injection, given its proximity to the superficial temporal vessels.

Techniques and expected distribution of scalp anaesthesia

A modified scalp block involves deposition of local anaesthetic around each nerve as it emerges from bony or soft-tissue landmarks.[8,10] The goal is to achieve circumferential coverage of the anterior and lateral scalp.[12]

Expected distribution[8–11]

Nerve	Region anaesthetised
Supratrochlear	Medial forehead, glabella, medial anterior scalp
Supraorbital	Central forehead, frontal scalp to vertex
Zygomaticotemporal	Lateral forehead, anterior temple
Auriculotemporal	Temporal scalp, temple, hairline

Complete coverage enables nearly pain-free regenerative scalp treatments.

Clinical indications for scalp nerve blocks

Surgical indications

- Repair of forehead/scalp lacerations[2,3,4]
- Excision of benign scalp lesions[3,4]
- Harvesting or implantation sites in hair transplantation[12]
- Skin cancer reconstruction on the forehead or temple[2,3,8]

Aesthetic and regenerative indications

While some of these regenerative indications are not yet documented explicitly in the literature, their use is grounded in evidence from comparable scalp interventions and supported by emerging clinical practice.

- PRP injections for androgenetic alopecia[7,12]
- Polynucleotides[3,4,12]
- Microneedling with or without exosomes[3,4]
- Thulium 1927 nm fractional laser for scalp rejuvenation or hair density support[6]
- Combination multi-modality hair-loss protocols[3,4,6,7,12]

Contraindications

While scalp nerve blocks are generally safe and well tolerated, there are specific situations where they should be avoided or approached with caution. The following contraindications outline the key factors that should be assessed before proceeding.

Absolute contraindications to scalp nerve blocks are few, and most are well established in anaesthetic practice

Absolute contraindications

Absolute contraindications to scalp nerve blocks are few, and most are well established in anaesthetic practice. The key considerations include:

- Known allergy to amide-type local anaesthetics[13]
- Infection at site of injection[14]
- Patient refusal

Relative contraindications

These relative contraindications reflect established principles in regional anaesthesia and standard clinical risk assessment for superficial nerve blocks.

- Coagulopathy or anticoagulant use[14]
- Anatomical distortion from prior surgery or trauma[14]
- Peripheral neuropathy affecting trigeminal branches[2]
- Severe anxiety or inability to remain still[14]
- Significant uncontrolled hypertension (bruising risk)[14]

Complications, mitigation, and aftercare

Even though complications from scalp nerve blocks are uncommon, understanding how to recognise, mitigate, and manage them is essential for safe practice. The points below summarise the measures we can take to minimise risk and support smooth post-procedure recovery.

Potential complications[14]

Although scalp nerve blocks are generally well tolerated, practitioners should remain aware of the potential complications associated with their use.

- Pain, bruising, swelling
- Vascular puncture (particularly near superficial temporal vessels)
- Temporary sensory changes or dysaesthesia
- Inadequate block or asymmetry
- Systemic local anaesthetic toxicity (rare but serious)
- Infection

Risk mitigation[8,14]

These risk-mitigation measures align with established regional anaesthesia principles and support safe, consistent delivery of scalp nerve blocks.

- Mandatory aspiration before injection to avoid intravascular injection
- Use of minimal effective volumes
- Avoid adrenaline solutions near periorbital structures

- Monitor cumulative local anaesthetic dose
- Apply gentle post-procedure compression to reduce bruising
- Detailed pre-procedure anatomical mapping

Aftercare advice[1,2,14]

Aftercare advice should reflect the expected duration of anaesthesia, normal post-procedure findings, and early recognition of complications. Patients should be informed:

- Scalp numbness lasting 2-6 hours is normal
- Avoid heat, vigorous exercise, or hair washing until sensation returns
- Mild swelling or bruising may occur
- Seek medical review for persistent numbness or symptoms suggestive of Local Anaesthetic Systemic Toxicity (LAST), which can occur when excessive local anaesthetic enters the circulation, most commonly through inadvertent intravascular injection or overdose.

Practical tips for safer, more comfortable nerve blocks

A number of practical considerations can help ensure scalp nerve blocks are delivered safely and comfortably. The points below outline useful approaches that support consistency, precision, and a positive patient experience.

- **Buffering anaesthetic:** adding sodium bicarbonate reduces acidity, speeding onset and lowering infiltration pain. Meta-analyses confirm improved patient comfort.[15]
- **Warming the anaesthetic:** warmed solutions (37°C) significantly reduce injection pain.[16]

Scalp nerve blocks are an increasingly valuable tool in aesthetic and regenerative medicine

- **Using small-gauge needles:** 27-30G needles optimise comfort while allowing precise deposition.
- **Understanding the scalp layers:** identifying the correct plane i.e. subcutaneous tissue superficial to the frontalis or temporoparietal fascia improves reliability of anaesthetic spread.
- **Respecting the vascular anatomy:** particularly near the superficial temporal artery and frontal branch of the superficial temporal artery.

Looking ahead: data and empathy side by side

Scalp nerve blocks are an increasingly valuable tool in aesthetic and regenerative medicine, particularly for hair-loss treatments and laser-based scalp procedures. By providing deep, predictable analgesia, they enhance patient comfort, enable longer and more complex treatment sessions, and improve procedural precision for clinicians.

The supratrochlear, supraorbital, zygomaticotemporal, and auriculotemporal nerves provide accessible and reliable targets for regional anaesthesia, particularly when surface anatomy is well understood. As with all nerve blocks, however, these techniques require training, anatomical proficiency, and adherence to safety protocols.

When integrated appropriately into aesthetic workflows, scalp nerve blocks elevate both the practitioner's capability and the patient's experience, aligning with modern, medically-led, evidence-based aesthetic practice.

Dr Ed Robinson founded his award-winning clinic with the aim of applying his medical knowledge, understanding of anatomy, physiology and pharmacology to benefit his patients cosmetically, with a particular passion for regenerative medicine.

With clinics in Cheshire and London Harley Street his background is in anaesthetics, having a special interest in obstetrics.

Dr Robinson is an associate member of the British College of Aesthetic Medicine, as well as holding faculty and KOL roles for DermaFocus, Arthrex and Sciton. He is also a keen teacher and trainer, regularly providing support to other clinics and practitioners in the North West and throughout the UK.

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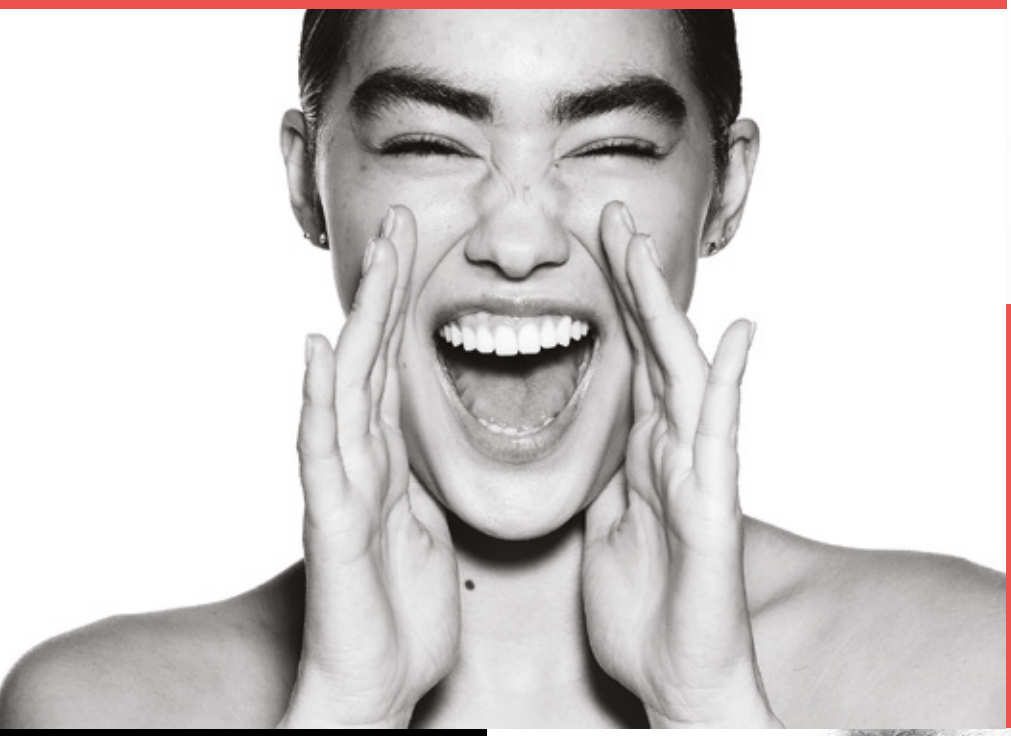

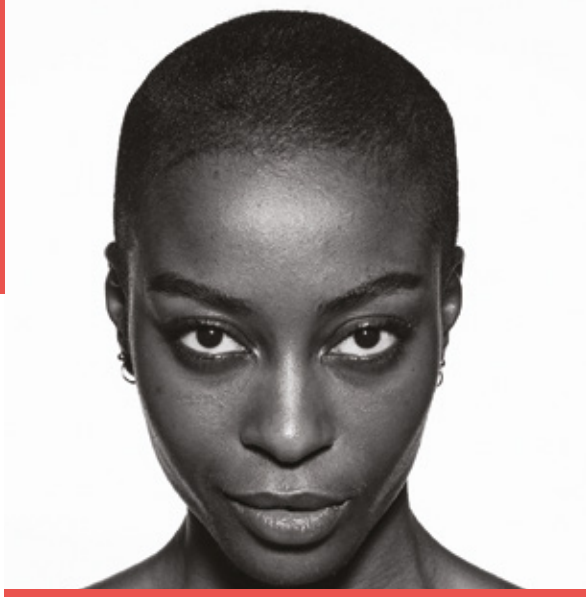

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His work has consistently focused on one central question: how to restore the body's declining regenerative capacity, rather than compensate for its loss

Lessons from Two Decades in Regenerative Practice

Drawing on more than twenty years of science, surgery, and innovation, Mr Tunc Tiryaki reflects on his impressive career and why clarity, education, and evidence must now catch up with scientific progress

Board-certified plastic surgeon and professor Mr Tunc Tiryaki has spent much of his career working at the intersection of clinical research and practical application within regenerative aesthetics.

His perspective is shaped not only by innovation, but by longevity in the field - having worked with regenerative concepts long before they became part of mainstream aesthetic discourse.

With early experience in molecular biology, his work has consistently focused on one central question: how to restore the body's declining regenerative capacity, rather than compensate for its loss.

"I grew up with science"

Mr Tiryaki's path into medicine was shaped early. "My father was a professor of molecular biology at Istanbul University," he explains, so becoming a doctor was a natural step.

After qualifying and specialising in plastic surgery, he completed subspecialty training at NYU in New York in 2000. It was there that he encountered early anti-ageing concepts, at a time when longevity and regenerative medicine were still largely theoretical.

On returning to Turkey, Mr Tiryaki joined his father and a senior partner to establish one of the world's first anti-ageing and regenerative medicine clinics in 2003. "There was no roadmap then," he says. "We were building the field as we went."

He has since established the London Regenerative Institute, designed to offer a 360-degree approach to patients' health while providing training and fellowships for other practitioners, and the renowned Tiryaki Clinic in Istanbul, while also practising from the Cadogan Clinic in London.

"When you can turn science into clinical application, everything changes"

What followed was not marketing-led innovation, but iterative clinical work informed directly by laboratory research. Early projects included autologous fibroblast cultures combined with hyaluronic acid, allowing Mr Tiryaki to explore how cellular therapies might be translated safely into practice.

"I had a rare advantage," he reflects. "A basic science team from my father's laboratory, and a clinical team applying those ideas directly."

This dual access accelerated his understanding of stem cells, tissue regeneration, and how emerging concepts could be responsibly introduced into patient care.

"Regeneration is not the same thing as wound healing"

One of the most consistent lessons from Mr Tiryaki's career has been the need to distinguish regeneration from repair.

"In the simplest sense, regenerative medicine means restoring the body's own regenerative power," he explains. "Ageing and chronic disease happen because that capacity declines."

In aesthetic medicine, he believes this distinction is often misunderstood. "Many technologies create injury and rely on wound healing. That is not regeneration," he says. "True regeneration is about increasing tissue capacity, not triggering damage and repair."

"Stem cells are what excite me most right now"

For Mr Tiryaki, the reason stem cells continue to dominate his thinking is simple: they address multiple aspects of ageing at once.

"Facial ageing isn't just skin," he explains. "It's loss of bone volume, ligament support, and tissue integrity." Stem cell-based approaches, he argues, offer a way to intervene at this deeper level, rather than focusing solely on surface change.

One of the most consistent lessons from Mr Tiryaki's career has been the need to distinguish regeneration from repair

There is still a long way to go - more research, more data, more learning

By using autologous stem cells, it becomes possible to restore volume, support ligamentous structures, and increase regenerative cell populations in areas where they have declined - a multi-layered approach that aligns closely with how ageing actually presents clinically.

"It's the closest thing we have to restoring what has been lost," he says. "Not masking it, but biologically supporting the tissue."

Alongside this clinical focus, he has also worked to make stem cell-based concepts more consistent and practical in everyday settings. One example is Lipocube, a compact medical device, to be launched later this year, designed to process a patient's own fat tissue at the point of care.

"The idea was to simplify what we were already doing surgically," he explains. "To take autologous fat, isolate its regenerative components, and return them to the patient in a controlled, reproducible way."

"**Standardisation** doesn't come from opinion - it comes from data"

A recurring challenge in regenerative medicine, Mr Tiryaki believes, is the lack of consistency in how treatments are delivered. "For example, stem cell therapies are highly technique-dependent," he explains. "Small differences in injection depth, volume, or anatomical placement can significantly affect outcomes."

To address this, his team began systematically analysing their own clinical experience rather than relying on anecdote alone. "We uploaded more than 3,000 stem cell injections into an AI system," he says. "Not to replace clinical judgement, but to understand patterns - where to inject, how much to inject, and why those decisions mattered."

By mapping injection sites, volumes, tissue planes, and observed outcomes, the system was used to identify repeatable principles that could inform safer, more predictable practice.

Similar principles underpin his recent work with exosomes, including the development of systems to isolate the regenerative signalling molecules from a patient's own blood. Building on familiar PRP workflows, these approaches aim to concentrate exosomes and secretomes in a way that remains autologous, controlled, and clinically practical.

"We're refining what is already there," he explains. "Concentrating the components that drive regeneration, while reducing variability and uncertainty."

"If something is very cheap, it's neither safe nor effective"

When advising practitioners on how to evaluate new technologies, Mr Tiryaki is direct.

"Regenerative products cannot cost £20," he says. "That alone should raise questions."

His assessment framework is simple: understand who is behind the product, whether credible clinicians or scientists are involved, and whether there is published, peer-reviewed evidence. "It's common sense," he emphasises.

"**Science is moving faster** than the systems around it"

Reflecting on the uneven global adoption of regenerative therapies, Mr Tiryaki believes there are lessons to be learned

Regenerative medicine is not about novelty or enhancement, but about helping the body recover capabilities it once had

from international approaches. "Science is moving very fast," he says. "But the systems around it are always behind."

He points to countries such as Japan, where regenerative treatments are formally assessed and monitored by national health authorities, allowing innovation to progress within defined clinical pathways. In contrast, he notes that many regions rely heavily on external regulatory frameworks that struggle to keep pace with emerging science.

In the United States, newer 'right to try' approaches are also changing how patients can access experimental regenerative therapies under informed consent, creating space for carefully monitored clinical use while longer-term evidence continues to develop.

"The answer isn't removing oversight," he says. "It's creating frameworks that can evolve with biology, rather than block it."

"**The real limitation** now is education"

Looking ahead, Mr Tiryaki believes regenerative aesthetics is already emerging as a subspecialty, but one constrained by gaps in understanding rather than lack of innovation. "Everyone wants to be part of it," he says. "But people don't yet know what is right and what is wrong."

For him, the next phase of the field must focus on structured education, realistic expectations, and evidence-led practice. "There is still a long way to go," he says. "More research, more data, more learning."

"**It's safer** – and that matters"

Despite the challenges, Mr Tiryaki remains deeply committed to regenerative approaches. "There are fewer complications," he says simply. "It's safer, so it feels better to be delivering these treatments as a clinician."

For him, the next phase of regenerative medicine will be defined less by new tools, and more by how responsibly existing ones are applied.

After two decades working across science, surgery, and innovation, his perspective is clear: regenerative medicine is not about novelty or enhancement, but about helping the body recover capabilities it once had - carefully, thoughtfully, and with respect for biology.

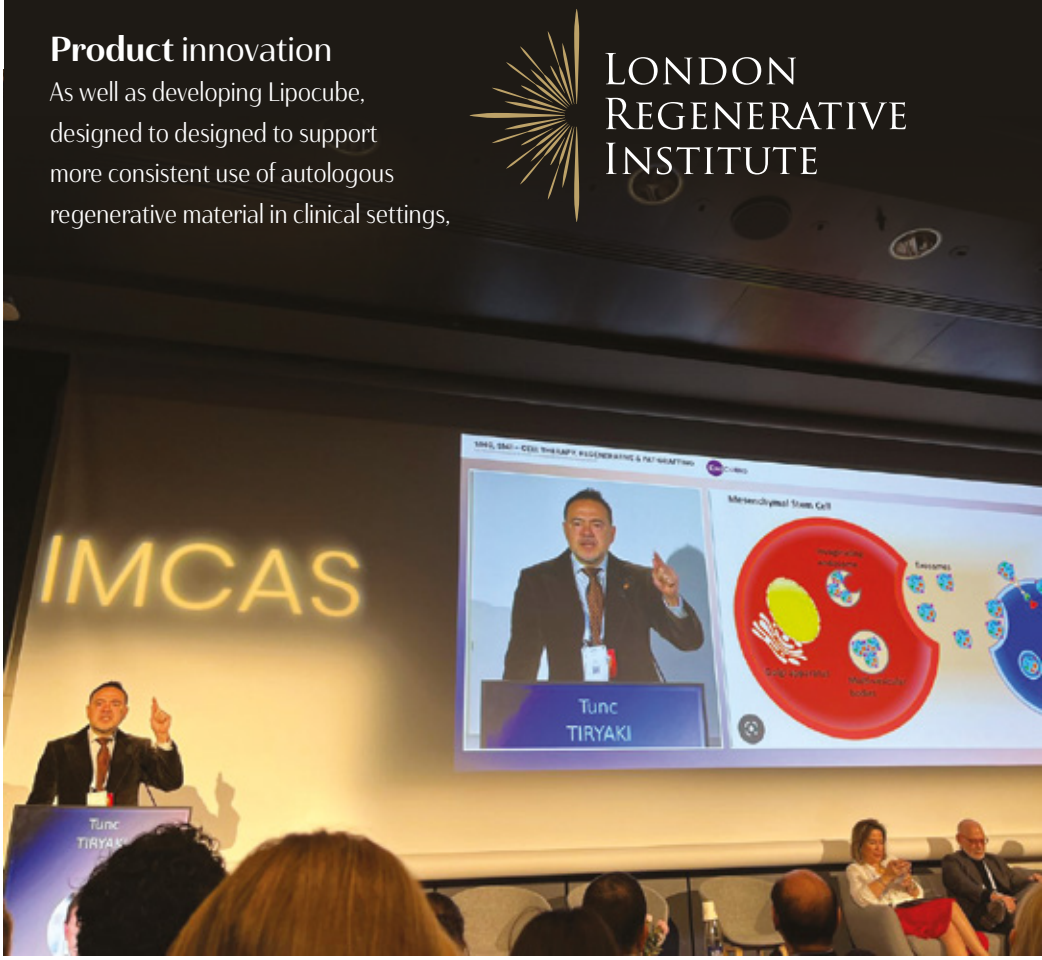
Education, Innovation & Clinical Translation

London Regenerative Institute

Founded in 2017, London Regenerative Institute was established to address the gap between regenerative science and real-world clinical practice. The Institute brings together surgeons, dermatologists, and scientists through structured education, fellowships, and supervised clinical exposure, with a focus on translating regenerative biology into reproducible, evidence-led protocols.

Product innovation

As well as developing Lipocube, designed to designed to support more consistent use of autologous regenerative material in clinical settings, Mr Tiryaki is a co-founder of Morphyia, a regenerative skin and scalp care line developed from insights gained through clinical and laboratory research. The range applies principles of cellular communication and regenerative signalling to topical formulations, with a focus on supporting skin resilience, repair, and scalp health. Morphyia reflects his interest in how regenerative science can be responsibly translated beyond the clinic into evidence-aligned consumer applications.



Delivery Technique *in* Polynucleotide Therapy

Dr Jordan Faulkner explores the anatomical and clinical factors influencing the choice between needle and cannula delivery in polynucleotide treatments, and how this decision may affect treatment outcome

As polynucleotide therapies have become more widely adopted in regenerative aesthetic practice, practitioners are increasingly seeking clarity not only on product selection, but on practical aspects of treatment delivery. One question that arises consistently during training and peer discussion is whether polynucleotides should be administered using a needle or a cannula.

This is often framed as a binary choice. In reality, the answer is rarely that simple. In my experience teaching polynucleotide techniques, the question itself is valid, but the expectation of a universal answer is not. Delivery method cannot be separated from anatomical region, tissue composition and clinical indication, and applying a single approach across all areas risks oversimplifying a complex interaction between technique and outcome.

Rather than advocating for one tool over the other, this article aims to explore how needle and cannula delivery each offer specific advantages and limitations, and why a considered, anatomy-led approach is more clinically appropriate than a uniform technique.

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Biological considerations and delivery depth

When the question of needle vs. cannula arises, it is usually followed closely by a second: does the choice of delivery tool actually affect outcome? To answer that meaningfully, it is necessary to consider where polynucleotides are intended to act.

The regenerative effects of polynucleotides are largely mediated within the dermis, where fibroblasts play a central role in extracellular matrix turnover, collagen synthesis and tissue repair.[1]

This biological rationale underpins much of the published guidance describing intradermal delivery for polynucleotide treatments.[2,3] Intradermal micro-bolus injection allows relatively precise placement within this compartment, facilitating interaction with fibroblast-rich tissue while limiting dispersion into deeper planes.[2,3]

Cannula delivery, by contrast, offers less precision in terms of depth control. Even when introduced with the intention of superficial placement, cannulae are more commonly positioned in the subdermal plane rather than within the dermis itself, reflecting both their blunt tip design and the resistance encountered at the dermal-subdermal junction.[4-6]

In anatomical regions where subcutaneous fat is well developed, this may result in partial deposition of product within adipose tissue rather than the dermis.

The clinical significance of this remains incompletely defined, and available literature does not demonstrate clear inferiority of one approach over the other. From a mechanistic perspective, subdermal deposition may reduce the proportion of administered product available within the fibroblast-rich dermal compartment, potentially altering the biological exposure achieved compared with targeted intradermal delivery. [4,7]

This distinction is frequently discussed anecdotally, not as a prescriptive rule, but as one factor to be weighed alongside anatomical region, vascularity and clinical indication.

Downtime, bruising and practical treatment considerations

Discussion around delivery technique frequently extends beyond biological targeting to include downtime and visible post-treatment effects. While polynucleotides are associated with a favourable safety profile and a low incidence of significant complications, transient bruising remains the most commonly encountered adverse effect in routine practice.[2]

Intradermal needle techniques require multiple skin punctures, each representing a discrete opportunity for vascular disruption. Although the absolute risk associated with any single puncture is low, cumulative punctures increase the likelihood of visible bruising. In addition, intradermal micro-bolus placement is typically associated with transient bleb formation, reflecting superficial dermal deposition of product. These blebs resolve spontaneously but may be noticeable in the early post-treatment period, particularly within the first 24 hours.[4,8]

Cannula-based delivery alters this risk profile. By requiring a single entry point, cannula techniques reduce the number of skin penetrations and may therefore lessen the likelihood of puncture-related bruising.[5,6]

While cannula use does not eliminate bruising risk entirely - particularly if traction is applied to a vessel - it is commonly associated with fewer and less conspicuous early post-treatment signs when compared with multiple needle entry techniques.[5-9]

In my experience, these practical considerations are often as influential in technique selection as theoretical differences in depth or distribution. Patient expectations, social visibility of the treated area, and tolerance for short-term downtime all play a role in determining whether a needle or cannula approach is more appropriate in a given context.

This article aims to explore how needle and cannula delivery each offer specific advantages and limitations

The periocular region

The periocular region is often where the limitations of a uniform approach become most apparent. Anatomically, this area differs substantially from much of the face and presents a unique combination of structural, vascular and social considerations.

Dermal thickness in the infraorbital region averages approximately 0.4–0.6 mm, compared with 2.5–3.0 mm in the lateral cheek.[10] This reduced dermal depth limits the margin for error when attempting precise intradermal placement and increases the likelihood of vascular interaction. The region is also highly vascular, further elevating the risk of bruising when multiple punctures are performed.[11]

In addition, the subcutaneous fat layer beneath the tear trough is minimal or absent, particularly in lighter skin phenotypes.[12] This anatomical feature contributes to the characteristic blue-pink hue observed clinically, reflecting the visibility of the underlying orbicularis oculi muscle and its vascular supply. The limited subcutaneous fat in this area means that subdermal delivery is less likely to result in significant product loss.

Taken together, these factors often shift the balance towards cannula-based delivery in the periocular region. While cannula placement may be less precise in terms of dermal targeting, the relative lack of subcutaneous fat reduces the potential impact of subdermal dispersion. Conversely, the use of multiple intradermal needle injections in this region increases the risk of bruising, with greater social and psychological impact than bruising in less conspicuous facial areas.

In practice, these considerations frequently resonate with practitioners as they highlight how anatomical context should guide technique selection. The periocular region therefore serves as a clear example of why the question of needle versus cannula cannot be answered in absolute terms.

Mid and lower face

Beyond the periocular region, the anatomical considerations that influence delivery technique change appreciably. Across the mid-face and lower face, the dermis is thicker, vascular density is reduced, and the subcutaneous fat compartment is more developed.[6] These factors alter both the risk profile and the practical implications of needle versus cannula delivery.

In these regions, the likelihood of bruising associated with intradermal needle placement is generally lower than in the periocular area. At the same time, the presence of a more substantial fat compartment increases the chance that subdermal cannula placement may result in a proportion of product being deposited outside the dermis.

From a mechanistic perspective, this may reduce the proportion of administered polynucleotide available to interact directly with fibroblast-rich tissue.

For this reason, I often find that needle-based intradermal delivery is more easily justified across much of the mid-face and lower face. This approach allows more consistent dermal targeting while maintaining an acceptable downtime profile in areas where transient bruising is less socially conspicuous.

This does not suggest that cannula use is inappropriate in these regions, but rather that the relative advantages of dermal precision become more relevant once vascular risk and dermal thickness are less limiting factors.

Indication-led technique selection

While regional anatomy provides a useful framework, clinical indication remains an equally important determinant of delivery technique. This becomes particularly apparent when treating perioral rhytides and atrophic scarring.

Perioral lines are multifactorial in origin, reflecting dermal thinning, collagen loss, fat atrophy, dehydration and repeated muscular movement.[13] As a result, they rarely respond optimally to a single intervention and often require a multimodal approach incorporating neuromodulators, fillers, energy-based devices and regenerative injectables.

From a delivery perspective, cannula-based techniques may offer an additional mechanical benefit in this region. Perioral lines frequently correspond to fibrous attachments between skin and underlying muscle. Traversing these planes with a cannula can produce a mild subcision effect, partially releasing tethering structures while simultaneously delivering a regenerative stimulus.[13,14] In this context, the choice of cannula is driven less by depth of delivery and more by the mechanical interaction with tissue.

A similar rationale applies to the management of atrophic acne scarring, where fibrotic strands tether the dermis to deeper structures.[14] In such cases, the delivery tool contributes directly to treatment effect, and cannula use

The question of whether to use a needle or a cannula when delivering polynucleotides will likely be a continued point of discussion

may be advantageous regardless of the theoretical benefits of intradermal placement.

These examples illustrate why delivery technique should be selected not only on anatomical grounds, but also in response to the specific structural characteristics of the condition being treated.

Evidence base, limitations and clinical interpretation

Despite the growing use of polynucleotides in regenerative aesthetic practice, there remains limited published evidence directly comparing delivery techniques. The majority of available literature focuses on product composition, biological mechanism and overall clinical safety, rather than on comparative evaluation of needle versus cannula administration.[3,7,15]

Within training environments and professional discussion, unpublished observations are sometimes referenced. These have been reported to show no statistically significant difference in global outcomes between delivery methods. However, in the absence of peer-reviewed publication, such findings should be interpreted cautiously and cannot be used to support definitive technical recommendations.

This limitation in the evidence base reinforces the importance of clinical reasoning grounded in anatomy and indication, rather than reliance on protocolised technique. Where robust comparative data are lacking, in my opinion, practitioners must draw on established anatomical knowledge, mechanistic plausibility and cumulative clinical experience when selecting a delivery approach.

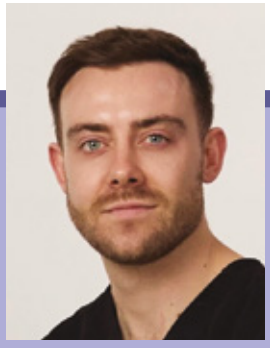
Importantly, the absence of clear evidence favouring one technique over another should not be interpreted as equivalence in all contexts. Rather, it highlights that outcome is likely influenced by a combination of factors, including tissue characteristics, vascularity, treatment area and patient-specific priorities, with delivery method representing one variable within a broader clinical decision-making process.

Making a decision

The question of whether to use a needle or a cannula when delivering polynucleotides will likely be a continued point of discussion. Both techniques are widely used, both are supported by clinical experience, and both can achieve effective outcomes when applied appropriately. The difficulty lies not in choosing between them, but in assuming that one approach can be applied uniformly across all anatomical regions and indications.

As explored in this article, delivery technique should be viewed as context-dependent, informed by regional anatomy, tissue composition, vascularity and the specific structural characteristics of the concern being treated. In some areas, dermal precision may reasonably take precedence; in others, minimising bruising or leveraging a mechanical effect may be more clinically relevant.

In the absence of definitive comparative evidence, an anatomy- and indication-led approach provides a practical and defensible framework for decision-making. Rather than seeking a single correct answer, clinicians are better served by understanding why one tool may be more appropriate than another in a given situation, and by adapting technique accordingly as experience develops.



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Dr Jordan Faulkner is a full time cosmetic physician and founder of Allo Aesthetics. He is the founder and lead mentor of Unite Aesthetics Initiative and is a clinical educator at Interface Aesthetics. Dr Faulkner is a brand ambassador at Revanesse and faculty member at DermaFocus. He is the co-owner of Myokine Ltd and won Rising Star of the Year at the Aesthetics Awards '25.

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Er:YAG Laser and Plant-Based Exosomes in Hair Regeneration

Dr Arna Shab and Dr Catharina Shab explore the mechanistic rationale and early clinical observations behind combining non-ablative Er:YAG laser therapy with plant-based exosomes to support hair density, scalp health and regenerative outcomes

Abstract

The non-ablative 2940-nm Er:YAG laser therapy in SMOOTH mode (Fotona's HaiRestart® protocol) represents a novel approach to stimulating hair growth. In parallel, plant-derived exosomes have emerged as innovative, ethically sound bioactive carriers with regenerative and anti-inflammatory properties. In combination, both modalities may exert synergistic effects: the laser induces a wound-healing-like stimulus, while exosomes deliver growth factors and regulatory molecules directly to the hair follicles. Preliminary experimental and clinical data suggest that this combination has the potential to enhance the efficacy of alopecia treatments beyond that of monotherapies.

Background

Androgenetic alopecia (AGA) and diffuse effluvium are based on multifactorial pathomechanisms, including genetic predisposition, hormonal dysregulation, inflammation of the follicular microenvironment, and impaired microcirculation.[1,2] Standard therapies such as minoxidil and finasteride have demonstrated efficacy but require long-term use and are sometimes associated with adverse effects.[3]

Against this background, energy-based procedures (e.g., non-ablative Er:YAG laser) and cell-free regenerative approaches (e.g., plant-derived exosomes) are gaining increasing importance.

Non-Ablative Er:YAG Laser Therapy (HaiRestart®)

The HaiRestart® protocol employs sub-ablative 2940-nm Er:YAG pulses in SMOOTH mode, which thermally stimulate the epidermis and upper dermis without tissue ablation. This process induces:

- Activation of regenerative signaling pathways (Wnt/β-catenin, VEGF)[4]
- Improvement of microcirculation[5]
- Stimulation of dermal papilla cells[6]

Clinical studies have reported significant improvements in hair density and quality, particularly in female patients with androgenetic alopecia (AGA).[7] Side effects are limited to transient erythema or mild heat sensations.

Vegan Exosomes (Exocean®) as Regenerative Bioactive Carriers

Exosomes are extracellular vesicles (30-150 nm) that transport proteins, miRNAs, and lipids. While conventional exosomes are derived from human or animal cells, plant-derived exosomes provide an ethical, vegan, and immunologically compatible alternative.[8,9]

Their mechanisms of action include:

- Promotion of cell proliferation
- Reduction of proinflammatory cytokines
- Activation of growth factors such as VEGF, IGF-1, and FGF[10-12]

In hair follicle models, plant-derived exosomes have been shown to prolong the anagen phase and protect follicular cells from oxidative stress.[12]

Rationale for the Combination: Laser + Exosomes

The combination of HaiRestart® laser therapy and plant-derived exosomes follows a synergistic concept:

1. **Laser-induced permeability:** Sub-ablative thermal effects facilitate the translocation of exosomal vesicles through the epidermal barrier.
2. **Regeneration trigger + growth factor reservoir:** While the laser activates wound-healing mechanisms, exosomes deliver bioactive mediators directly to the follicles.
3. **Additive inflammation modulation:** Both modalities reduce microinflammatory processes within the follicular microenvironment.[6,11]
4. **Microcirculation + signal transduction:** Improved blood supply (via laser) combined with cellular activation (via exosomes) creates an optimal environment for follicular growth.

Clinical Perspectives

The literature on laser-exosome combinations is still limited; however, several advantages have emerged:

- Enhanced efficacy compared to monotherapy; similar to studies combining laser with minoxidil.[13,14]
- Improved tolerability, as both modalities are minimally invasive and low-risk.
- Multimodal action: structural stimulation (laser) combined with molecular signaling (exosomes).

Future studies should investigate:

- Optimal protocols (number of sessions, treatment intervals, exosome dosage)

Energy-based procedures and cell-free regenerative approaches are gaining increasing importance

- Long-term effects and durability of results
- Comparisons with PRP and other regenerative approaches

Safety

Both the laser and plant-derived exosome preparations are considered safe:

- Laser: nearly painless, transient erythema, no scarring.[7]
- Exosomes: when applied topically, demonstrate a favorable safety profile in preclinical and clinical studies.[8,9,12]

The combination is therefore considered low-risk, provided it is administered by trained healthcare professionals.

The combination of non-ablative Er:YAG laser therapy and vegan exosome preparations represents a promising new approach

Case Report:

Treatment of Hair Loss with HaiRestart® Laser in Combination with Exocean® Exosomes

A 47-year-old male patient with androgenetic alopecia (Hamilton-Norwood grade IV) underwent a combined therapy consisting of the HaiRestart® laser (Fotona®) and Exocean® exosomes. The treatment aimed to stimulate hair follicles, improve microcirculation, and promote cellular regeneration through exogenous exosomes.

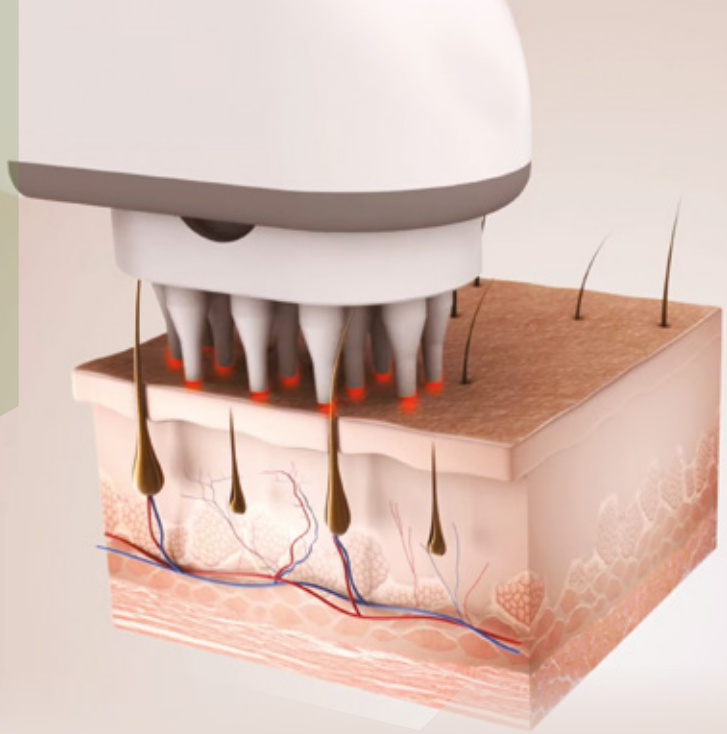
A total of three treatment sessions were performed at intervals of approximately four weeks. The laser therapy was applied in a non-ablative Er:YAG mode to achieve targeted follicular heating and activation of regenerative processes without epidermal damage. Immediately afterwards, topical application of Exocean® exosomes (~5 ml per session) was performed, with micro-openings created via fractional Er:YAG mode to optimise delivery into the scalp.

After the second session, the patient reported a marked reduction in perceived hair loss and an improvement in scalp condition, with less seborrhea and flaking. Upon completion of the third session, a visible increase in hair thickness and strength was observed, particularly in the vertex and frontoparietal regions. The patient reported improved hair quality and high satisfaction with the aesthetic outcome. No adverse events or unwanted reactions occurred at any point.

Before: Image at baseline before the start of treatment

After: Image four weeks after the third session

In summary, the combination of HaiRestart® laser and Exocean® exosomes in this case demonstrated excellent tolerability and a significant improvement in hair density and structure. This method represents an effective, minimally invasive, and regenerative treatment option to support hair growth in androgenetic or diffuse alopecia.



Summary

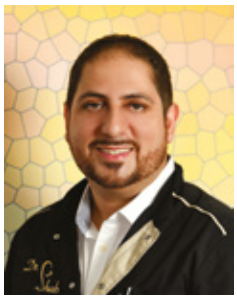
The combination of non-ablative Er:YAG laser therapy and vegan exosome preparations represents a promising new approach for stimulating hair growth. Both modalities act through complementary mechanisms - thermal regeneration and exosomal signaling - and may enhance efficacy in androgenetic alopecia (AGA) and diffuse effluvium.

However, current observations are primarily based on individual case reports and small observational studies; large-scale, randomised, controlled trials are still lacking and will be necessary to fully assess efficacy and safety.

Although the current evidence remains limited, this combination therapy expands the available spectrum of treatment options and can be used adjunctively with established therapies such as minoxidil, finasteride, or PRP.

Disclosure: The authors declare that this article was prepared for educational and scientific discussion purposes. The HaiRestart® protocol (Fotona®) and Exocean® exosome products discussed are commercially available technologies. The authors have clinical experience using these modalities in practice. No external funding was received specifically for the preparation of this manuscript. The views expressed are those of the authors and are based on current literature, mechanistic rationale, and early clinical observation.

Dr Catharina Shab is highly experienced in aesthetic medicine and offers a broad range of treatments. Her key areas of expertise include advanced hair therapies and specialised procedures for the female intimate area. Internationally active, she shares her knowledge at major aesthetic medicine conferences and contributes to the field through respected scientific publications. Dr Shab prioritises safety and natural-looking outcomes in all treatments. She designs each procedure individually to achieve the best possible results for her patients.



Dr Arna Shab has developed extensive expertise in aesthetic medicine, performing a wide range of procedures throughout his career. His training included international work, and he continues to present on key topics at major aesthetic medicine conferences worldwide. Colleagues frequently seek him out for invited lectures and scientific publications that showcase his techniques and insights. Dedicated to achieving high-quality, natural results, he upholds a strong commitment to patient safety. Every procedure is thoughtfully tailored by Dr Shab to ensure the most effective and personalised outcome.

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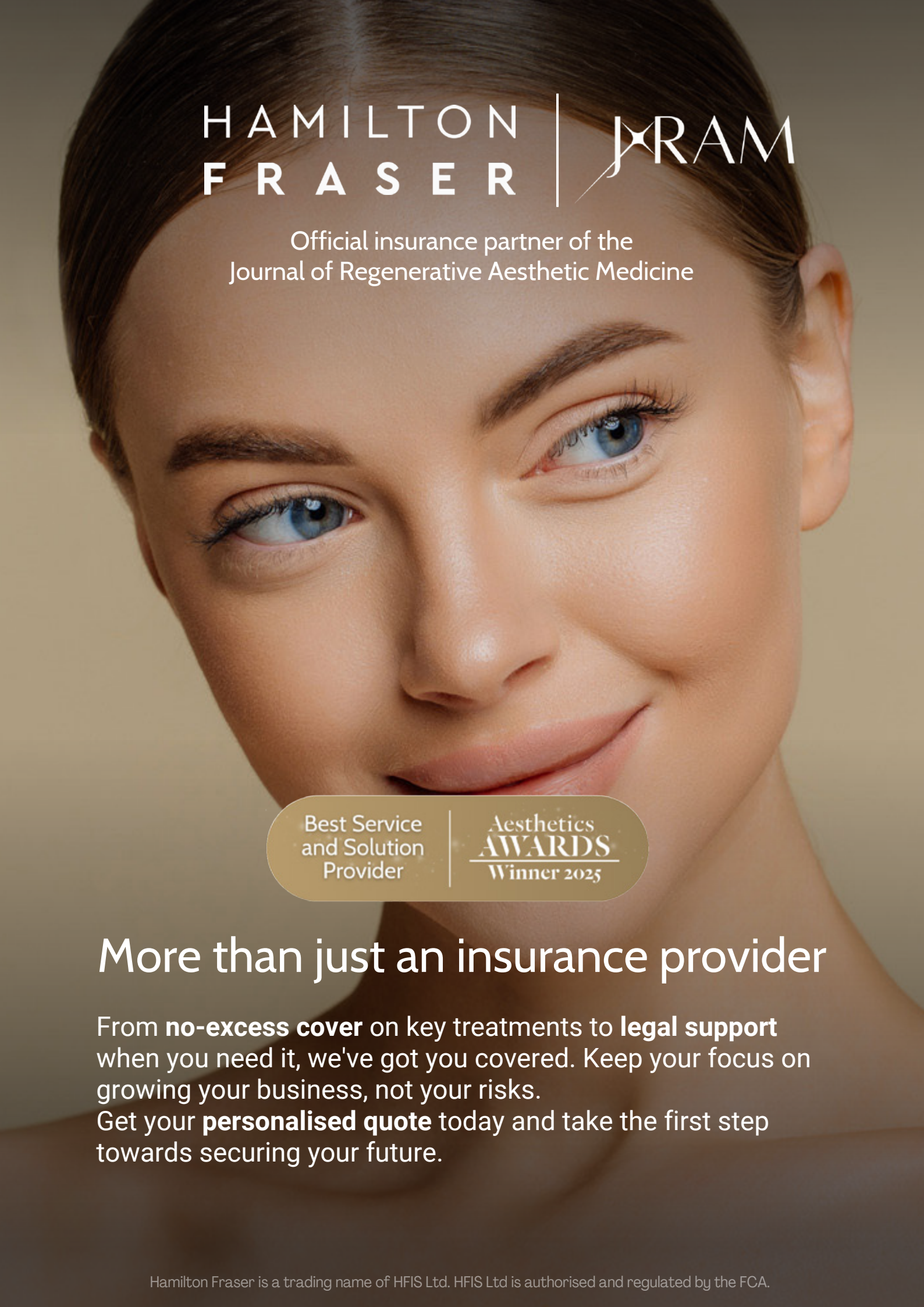
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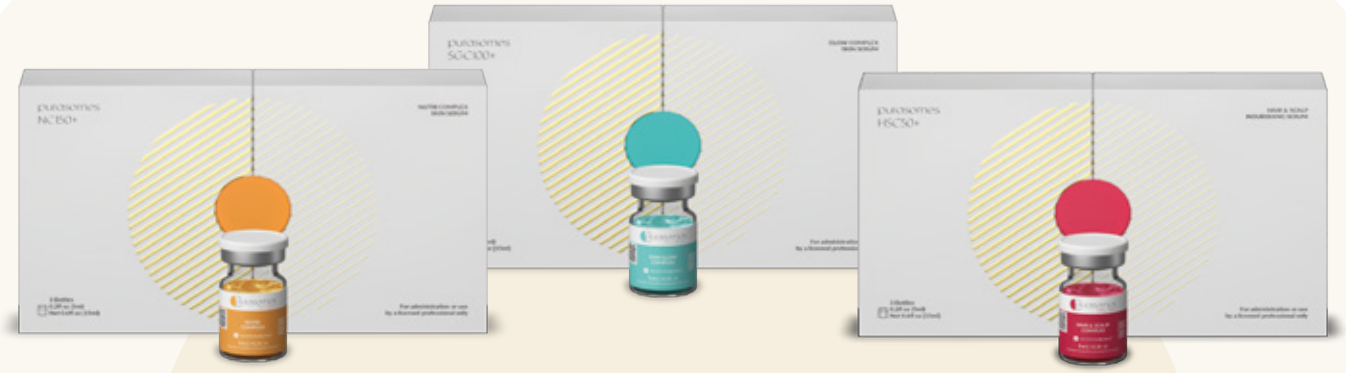

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I have observed how structured skin conditioning and maintenance protocols can support the outcomes of medical aesthetic treatments

Optimising the Epidermis for Enhanced Results

Liliana Lucianelli explores how non-invasive hydradermabrasion and skin conditioning strategies can support tissue readiness, treatment response and long-term maintenance when integrated with regenerative procedures

Over the past decade, the field of skin care has undergone a significant transformation, moving away from purely cosmetic approaches toward treatments designed to support skin physiology, barrier function, and cellular regeneration. Within regenerative aesthetic medicine, increasing attention is being paid to the role of the epidermis not simply as a surface layer, but as an active biological interface that influences treatment response, recovery, and long-term skin quality.

Within this evolving landscape, non-invasive epidermal optimisation treatments have become an integral component of modern aesthetic practice, particularly when used alongside regenerative and biostimulatory procedures.

As an aesthetician and beauty advisor at Balance Clinic in Milan, where I work in close collaboration with Dr Pierluigi Gigliofiorito in the management of integrated aesthetic pathways, I have observed how structured skin conditioning and maintenance protocols can support the outcomes of medical aesthetic treatments.

When appropriately selected, device-based hydradermabrasion treatments can function as supportive tools for preparing the skin prior to regenerative interventions and for maintaining skin health over time.

Epidermal optimisation and regenerative aesthetic practice

Regenerative aesthetic medicine increasingly focuses on improving tissue quality, cellular signalling, and biological resilience rather than addressing isolated surface concerns. While many regenerative treatments act primarily within the dermis or deeper tissue planes, their effectiveness is influenced by the condition of the epidermis, barrier function, and inflammatory load at the skin surface.[1-4]

Epidermal optimisation strategies aim to support these factors through controlled exfoliation, hydration, and topical delivery of bioactive substances, without inducing tissue injury or inflammatory disruption. Within this context, treatments such as hydradermabrasion represent one approach to non-ablative skin conditioning rather than a standalone aesthetic solution.[5-8]

The role of hydradermabrasion treatments

Hydradermabrasion refers to a category of non-invasive epidermal treatments that combine controlled exfoliation, cleansing, extraction of surface impurities, and topical infusion of active substances within a single session. These treatments are designed to improve epidermal function and skin quality without

inducing tissue injury or provoking significant inflammatory responses.

From a biological perspective, hydradermabrasion aims to reduce corneocyte build-up, surface congestion, and environmental burden while supporting hydration and barrier homeostasis. Unlike ablative or aggressive resurfacing techniques, this approach preserves epidermal integrity and avoids the creation of micro-lesions, making it particularly suitable for integration alongside regenerative and injectable procedures.[9-11]

Simultaneously, the skin is exposed to topical formulations containing humectants, antioxidants, peptides, and calming agents. While penetration remains primarily superficial, improved surface conditions and hydration may enhance epidermal-dermal signalling and patient tolerance of subsequent regenerative treatments.[12-14]

A typical session lasts between 30 and 45 minutes and requires no downtime, allowing patients to resume daily activities immediately. This non-disruptive profile underpins the use of hydradermabrasion as a preparatory or maintenance strategy within regenerative treatment pathways.

In my own clinical practice, I use HydraFacial as a hydradermabrasion platform due to its reproducibility, safety profile, and adaptability within multidisciplinary treatment plans. Its value lies not in replacing regenerative interventions, but in supporting skin conditioning and long-term maintenance when used with appropriate clinical judgement.

Biological rationale for use alongside regenerative treatments

One of the most clinically relevant effects is reduction of surface congestion and inflammatory burden. By facilitating removal of excess sebum, keratin debris, and environmental pollutants, these treatments may contribute to a more stable epidermal environment prior to regenerative intervention.[15-17]

Another key factor is hydration. Adequate epidermal hydration supports barrier function, optimises trans-epidermal signalling, and may improve patient tolerance and recovery following injectable or device-based regenerative procedures. The infusion of hyaluronic acid and humectant substances helps restore hydrolipid balance, resulting in skin that appears more elastic and resilient.[18-21]

From a regenerative perspective, controlled exfoliation may also support more uniform cellular turnover without triggering inflammatory cascades. This is particularly relevant when planning treatments that rely on fibroblast activation, neocollagenesis, or tissue remodelling, such as biostimulatory injectables or polynucleotide-based therapies.[22-24]

Integration with regenerative and injectable treatments

The value of hydradermabrasion becomes most apparent when incorporated into a structured aesthetic medicine programme rather than used in isolation. At Balance Clinic, epidermal optimisation treatments are integrated alongside regenerative procedures including dermal fillers, botulinum toxin, biostimulation, microneedling, and selected chemical peel protocols.

In preparation for regenerative injectables, such treatments may be used to improve hydration, reduce superficial congestion, and support overall skin quality prior to intervention. This allows the physician to work within a more balanced tissue environment, potentially contributing to more predictable and harmonious outcomes.

Following injectable treatments, timing is critical. Epidermal treatments involving suction or manipulation are typically postponed for one to two weeks, depending on the procedure performed and individual tissue response, to avoid interference with product integration or healing processes.

When used alongside microneedling or controlled chemical exfoliation, hydradermabrasion treatments are more commonly positioned within maintenance or recovery phases, where the focus shifts toward calming the skin, restoring hydration, and supporting barrier recovery.

Protocol design and clinical judgement

The integration of epidermal optimisation treatments within regenerative aesthetic medicine relies on personalised protocols and close interdisciplinary collaboration.

Treatment timing, frequency, and topical formulation selection must be adapted to the patient's skin condition, treatment history, and regenerative objectives. These treatments should not be applied routinely or automatically, but rather incorporated based on clear clinical rationale.

The role of the aesthetician is central in this process, particularly in ongoing skin monitoring, protocol adjustment, and communication with the medical practitioner. This collaborative model ensures that epidermal treatments support, rather than compete with, regenerative strategies.

Personalisation and booster selection

Personalisation remains essential within epidermal optimisation protocols. Within the context of HydraFacial treatments, this is primarily achieved through the selection of targeted booster serums, which are incorporated during the hydradermabrasion process to address specific skin priorities.

Depending on individual skin presentation, boosters may be selected to support hydration, address oxidative stress, improve barrier function, or target early signs of ageing. These

formulations typically contain combinations of humectants, antioxidants, peptides, and other bioactive compounds designed for superficial epidermal delivery.

Within a regenerative framework, the role of HydraFacial boosters is not to drive biological change independently, but to support skin conditioning, comfort, and resilience, particularly when treatments are being delivered alongside injectable or device-based regenerative procedures.

In this context, personalisation through booster selection allows the aesthetician to fine-tune epidermal support while remaining aligned with the broader regenerative treatment plan established by the medical practitioner.

Indications and precautions

Despite a favourable safety profile, epidermal hydradermabrasion treatments require careful patient assessment. Active dermatitis, cutaneous infection, recent sunburn, or acute inflammatory skin conditions represent contraindications or indications for protocol modification, as epidermal manipulation may exacerbate inflammation or delay barrier recovery.[25,26]

Conclusion

Non-invasive epidermal optimisation treatments represent a valuable supportive component within contemporary regenerative aesthetic medicine. Evidence increasingly suggests that epidermal health, barrier function, and hydration status influence tissue response, recovery, and the longevity of regenerative outcomes.[27-30]

When integrated thoughtfully into personalised, multidisciplinary treatment pathways, hydradermabrasion treatments may contribute to improved skin conditioning, enhanced recovery, and maintenance of regenerative results over time. Rather than functioning as standalone aesthetic solutions, such treatments are best understood as modulators of the skin environment that support biological processes initiated by regenerative and injectable interventions.

Disclaimer: This article discusses hydradermabrasion treatments within the context of regenerative aesthetic medicine. Specific technologies are referenced as illustrative examples based on clinical experience rather than as endorsements. Treatment selection, sequencing, and protocol design should always be guided by individual patient assessment, practitioner expertise, and current evidence-based guidelines.

Comment from Dr Pierluigi Gigliofiorito

Hydradermabrasion represents a strategic support for regenerative procedures such as fillers, as it improves skin tissue quality by creating an optimal biological environment for the integration and effectiveness of injectable treatments. Through deep cleansing, controlled exfoliation, and intensive hydration, it promotes oxygenation, elasticity, and barrier function, while reducing oxidative stress and cutaneous inflammation - thereby contributing to more harmonious, long-lasting results and improved post-procedure recovery.

Liliana Lucianelli is an aesthetician and beauty advisor specialising in aesthetic medicine. She works alongside physicians and plastic surgeons, combining advanced treatments and innovative technologies for skincare. Her approach blends scientific expertise, a holistic vision, and personalised attention, with the goal of enhancing natural beauty and overall patient well-being.

Dr Pierluigi Gigliofiorito is a medical doctor specialising in aesthetic medicine and plastic surgery. He is known for his scientific, personalised approach focused on achieving harmonious results. By integrating advanced techniques and innovative technologies, he ensures safe, effective treatments tailored to each patient's aesthetic and functional needs.

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A recent narrative review synthesises current evidence showing that both intrinsic ageing and environmentally driven photoageing are underpinned by epigenetic change.

Epigenetic Clocks and Skin Ageing

We examine a recent review published in Clinical, Cosmetic and Investigational Dermatology that explores epigenetic ageing of the skin and the emerging role of epigenetic clocks in regenerative aesthetic practice

Skin ageing has traditionally been attributed to cumulative cellular damage, oxidative stress, hormonal change and the gradual depletion of structural proteins. While these mechanisms remain relevant, a growing body of evidence suggests they represent downstream effects rather than primary drivers. Increasingly, ageing skin is understood as a failure of biological regulation – a progressive loss of control over how genes are switched on and off within skin cells.

A recent narrative review published in Clinical, Cosmetic and Investigational Dermatology synthesises current evidence showing that both intrinsic ageing and environmentally driven photoageing are underpinned by epigenetic change.[1] Rather than altering DNA sequence, these processes modify gene accessibility and expression, influencing pathways involved in regeneration, inflammation, extracellular matrix maintenance and cellular senescence.

This perspective has important implications for regenerative aesthetic medicine. It helps explain why clinically similar patients may age differently, respond variably to treatment, and demonstrate divergent regenerative capacity over time. Understanding skin ageing as a dynamic, biologically regulated process – rather than a purely structural decline – provides a more coherent framework for evaluating current interventions and for interpreting emerging biomarkers such as epigenetic clocks.

Epigenetic mechanism in ageing skin

Epigenetics refers to a set of molecular mechanisms that regulate gene expression without altering the underlying DNA sequence. In skin, the most relevant epigenetic layers include DNA methylation, histone modification and chromatin organisation, alongside regulation by non-coding RNAs such as microRNAs.[1-3] Together, these systems determine which genes involved in regeneration, inflammation, extracellular matrix (ECM) maintenance and cellular senescence are accessible or silenced at any given time.

In youthful skin, epigenetic regulation is tightly controlled. Genes supporting stem cell function, fibroblast activity and matrix renewal remain accessible, while pro-inflammatory and degradative pathways are actively restrained. With ageing, this balance progressively deteriorates. Ageing skin demonstrates excessive silencing of genes involved in tissue repair and regeneration, alongside loss of repression in other genomic regions, contributing to genomic instability and inappropriate gene activation.[1,4]

Environmental exposures accelerate these epigenetic shifts. Ultraviolet radiation, air pollution and tobacco smoke induce epigenetic changes that mirror advanced ageing, promoting sustained inflammatory signalling and collagen degradation rather than transient injury responses.[1,5] These effects help explain why photoaged skin often shows features of premature biological ageing, with reduced regenerative capacity and exaggerated inflammatory responses compared with intrinsically aged skin.

Crucially, these changes are not isolated molecular events but reflect a broader decline in regulatory precision across the genome. As epigenetic control becomes less coordinated, skin cells lose the ability to respond adaptively to stress and repair signals, laying the biological groundwork for visible ageing, delayed healing and increased susceptibility to damage.

Measuring biological skin age with epigenetic clocks

Epigenetic clocks are analytical tools that estimate biological age by measuring predictable changes in DNA methylation at specific CpG sites across the genome. Unlike chronological age, biological age reflects the cumulative impact of intrinsic ageing and environmental exposure on tissue function.[6-8] In skin, epigenetic age often correlates more closely with photoageing, inflammatory burden and regenerative capacity than calendar age alone.[1]

Although commonly discussed as a single concept, epigenetic clocks can be broadly divided into several functional categories, each with different strengths and limitations.

Pan-tissue epigenetic clocks

The earliest epigenetic clocks were designed to estimate biological age across multiple tissues using shared methylation signatures.[6] These clocks provide a generalised measure of ageing and have been widely used in systemic ageing research. However, because they average ageing patterns across diverse organs, they may lack sensitivity to tissue-specific processes relevant to skin, such as photoageing and environmental exposure.

Skin- and blood-specific clocks

Recognising that different tissues age at different rates, later models were developed using methylation data from skin and blood.[8,9] These clocks improve

Epigenetic clocks are analytical tools that estimate biological age by measuring predictable changes in DNA methylation at specific CpG sites across the genome

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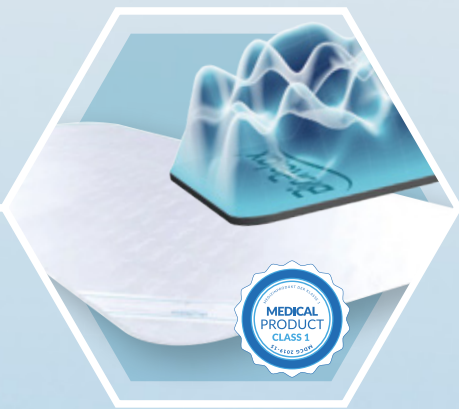

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accuracy when assessing keratinocytes and dermal fibroblasts and better reflect cutaneous ageing trajectories. For aesthetic medicine, these tissue-specific clocks are particularly relevant, as they capture changes associated with UV exposure, barrier disruption and dermal remodelling.

Second-generation (phenotypic) clocks

More recent clocks extend beyond chronological prediction to incorporate methylation patterns associated with physiological decline, morbidity and mortality risk.[7,10] Rather than asking "How old is this tissue?", these models allow inference about biological resilience and healthspan. In the context of regenerative aesthetics, such clocks may ultimately prove more informative than age alone, as they reflect functional tissue state rather than time elapsed.

Exposure-responsive clocks

Certain methylation signatures are especially sensitive to environmental stressors such as smoking, pollution and ultraviolet radiation.[1,5,11] These exposure-linked patterns are particularly relevant in photoageing, where biological ageing is accelerated relative to chronological age. They provide molecular evidence that the exposome actively reshapes skin biology rather than simply causing cumulative damage.

Across all types, the review emphasises that epigenetic clocks are biomarkers, not mechanisms. They reflect statistical associations between methylation patterns and ageing outcomes, rather than direct drivers of ageing. Used appropriately, they offer insight into biological ageing trajectories and regenerative capacity, but they should not be interpreted as targets for direct manipulation.[1]

Why epigenetic clocks matter in regenerative aesthetic practice

Although epigenetic clocks are not yet deployed as routine clinical tests, they represent one of the most robust molecular measures of biological ageing currently available and are widely used in human ageing and skin research. Their relevance to regenerative aesthetic practice lies less in immediate patient application and more in the biological framework they provide for understanding ageing trajectories, patient variability and treatment responsiveness.

One of the most clinically useful insights offered by epigenetic clocks is their ability to explain heterogeneity between patients who are similar in chronological age. Biological ageing does not progress uniformly. Patients with accelerated epigenetic ageing demonstrate molecular patterns associated with increased inflammatory signalling, reduced accessibility of regenerative gene programmes and diminished tissue resilience. Clinically, this may present as slower healing, shorter duration of treatment benefit or heightened sensitivity following intervention.[1,8] By contrast, patients with a younger biological age may show more robust and sustained regenerative responses despite comparable chronological age.

Epigenetic clocks also reinforce the central role of environmental exposure in shaping skin ageing. Ultraviolet radiation, air pollution and tobacco smoke induce methylation patterns that accelerate biological ageing of the skin and are consistently captured by epigenetic age models.[1,5,11] These findings support a preventative, biology-led approach to regenerative aesthetics, in which photoprotection, barrier optimisation and inflammation control are considered foundational rather than adjunctive. From this perspective, procedural interventions act within - and are influenced by - the broader biological ageing context of the tissue.

In research settings, epigenetic clocks are increasingly used to explore whether aesthetic and dermatological interventions influence biological ageing trajectories. Fractional laser resurfacing, for example, has been associated with epigenetic changes consistent with partial biological rejuvenation beyond surface remodelling alone.[12] While such findings remain investigational, they suggest that regenerative treatments may exert benefit by improving genomic regulation and signalling coherence, rather than acting solely through mechanical injury or collagen stimulation.

Crucially, epigenetic clocks are biomarkers of biological state, not direct drivers of ageing. The review cautions against framing them as targets to be "reset". Broad or indiscriminate attempts to manipulate epigenetic regulation risk destabilising genomic control and activating undesirable pathways.[1,4] For regenerative practitioners, this underscores the importance of controlled, localised and biologically coherent interventions that support physiological repair mechanisms and long-term tissue stability, rather than attempting wholesale molecular reprogramming.

In research settings, epigenetic clocks are increasingly used to explore whether aesthetic and dermatological interventions influence biological ageing trajectories

Limitations and clinical considerations

While epigenetic clocks provide valuable insight into biological ageing, the

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review emphasises several important limitations that are particularly relevant when translating these concepts into regenerative aesthetic practice.

First, epigenetic clocks are associative biomarkers, not mechanistic explanations. They identify methylation patterns that correlate with ageing outcomes, but they do not, in themselves, define causation. A shift in epigenetic age reflects a change in molecular state rather than proof that ageing has been reversed. This distinction is critical when interpreting early intervention studies and avoiding overstatement of regenerative impact.[1]

Second, skin is a highly heterogeneous organ composed of multiple cell populations, including keratinocytes, fibroblasts, immune cells and vascular elements, each with distinct epigenetic trajectories. Most epigenetic clock analyses rely on bulk tissue or cultured cell populations, which may mask cell-specific ageing dynamics.[1,8] As a result, epigenetic age estimates represent an averaged signal rather than a precise map of regenerative potential across different skin compartments.

Third, the review cautions against simplistic approaches to epigenetic intervention. Global manipulation of DNA methylation or chromatin structure – for example, indiscriminate demethylation or broad chromatin opening – risks genomic instability, inappropriate gene activation and disruption of essential regulatory networks.[1,4] These concerns reinforce why regenerative aesthetic strategies must prioritise localised, controlled and context-specific biological modulation, rather than systemic or untargeted molecular reprogramming.

Finally, the authors highlight the need for longitudinal human data linking epigenetic age shifts to durable clinical outcomes. While early studies suggest that certain interventions may influence epigenetic signatures associated with ageing, robust evidence demonstrating sustained functional benefit in human skin remains limited.[1] This underscores the importance of cautious interpretation and continued emphasis on established clinical endpoints such as tissue quality, resilience, healing and long-term safety.

Implications for practice

Epigenetic ageing reframes skin ageing as a loss of precise gene regulation, in which repair and regenerative pathways become progressively harder to activate, rather than simply a passive loss of collagen and elastin. Changes in DNA methylation, chromatin organisation and non-coding RNA signalling alter how skin cells access and interpret genetic information, influencing inflammation, tissue resilience and regenerative capacity.

Epigenetic clocks provide a measurable reflection of this biological ageing process, integrating intrinsic ageing with cumulative environmental exposure. For regenerative aesthetic practitioners, their value lies not in immediate clinical deployment, but in how they deepen understanding of patient variability, treatment responsiveness and long-term tissue behaviour.

Together, these insights support a shift toward biology-led practice that prioritises tissue environment, regulatory balance and sustained regenerative capacity alongside procedural intervention. As research evolves, epigenetic biomarkers may increasingly inform patient stratification and outcome assessment. In the interim, recognising ageing as a modifiable biological trajectory reinforces the central aim of regenerative aesthetics: supporting the skin's capacity to function, adapt and repair more like its younger self.

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Pharmacists are trained to think about how molecules behave in biological environment

The Pharmacist Perspective

In an increasingly biologically driven field, senior clinical pharmacist Piril Sideras discusses how the systemic thinking that pharmacists bring to regeneration offers a distinctive and much-needed dimension to modern aesthetic practice

Regenerative aesthetics centres on the complexities of cellular pathways, biologics and long-term tissue remodelling, requiring practitioners to engage deeply with the underlying science rather than rely solely on procedural skill.

As the science progresses, so too does the need for practitioners who can interpret that complexity with confidence and precision. Pharmacists - whose experience is long rooted in mechanisms, safety, and systemic understanding - are finding themselves uniquely aligned with this evolution.

While every profession has an essential role in aesthetic medicine, pharmacists contribute something different: a way of thinking shaped entirely by molecular behaviour, biological interaction, and evidence-based decision-making. My NHS background also shaped how I communicate with patients; treatment planning becomes a shared process rather than directive, and for me the scientific reasoning and the human aspect of care are inseparable.

In a discipline built around biostimulation and tissue repair, that perspective is not only valuable, but increasingly essential.

Thinking in mechanisms, not just methods

My approach to regenerative aesthetics is shaped by the same instinct that guided my pharmaceutical career: I need to understand exactly how something works before I use it. Pharmacists are trained to think about how molecules behave in biological environments - how they degrade or maintain stability, how they interact with inflammatory pathways, how long they remain active, and how different health conditions influence their effects. These competencies are core components of pharmacy education at both national and international levels, embedded within regulatory training standards that emphasise molecular behaviour, pharmacokinetics, pharmacodynamics, immunology and clinical risk assessment.[1-3]

With regenerative treatments, these questions matter enormously. We are not simply placing product - we're stimulating biological processes that continue long after the appointment ends. Understanding what is happening at a cellular level brings clarity to decision-making and confidence to the treatment pathways I recommend.

When evaluating a regenerative product, I look not only at clinical evidence and safety profiles but also at how predictably it behaves in tissue. Part of this evaluation involves anticipating how a product may interact with the patient's immune and inflammatory responses, as this can significantly shape outcomes. Effective regenerative practice relies on a clear grasp of underlying biological mechanisms as much as the technical procedure itself.

Seeing the whole patient, not just the skin

What differentiates pharmacists is our systemic lens. Regeneration does not happen in isolation. It is shaped by immune function, metabolic health, hormonal balance, medication interactions, inflammatory status, wound-healing tendencies, and wider lifestyle factors.

In every consultation, I begin by understanding why someone's concern exists biologically. Is it extra-cellular matrix disruption? Chronic low-grade inflammation? Hormonal changes affecting collagen synthesis? This informs not only which treatment is suitable, but whether their biology is primed to respond in the first place.

This approach is especially important in patients with complex health histories or on long-term medications - areas pharmacists are exceptionally prepared for. Understanding interactions and physiological variance enables more personalised, safer and more realistic treatment planning.

Translating science into clinical precision

With regenerative treatments, the details matter: depth, dilution, concentration, placement, sequencing, and timing all influence biological response. Pharmaceutical training provides a structured framework for making these decisions by emphasising critical evaluation, pattern recognition and consistency in clinical judgement. This allows pharmacists to assess treatments in a systematic way, rather than relying on trends or anecdotal experience.[4-6]

This includes anticipating individual variation, understanding how underlying health conditions shape collagen synthesis, and tailoring timelines according to each patient's regenerative capacity. Mapping these timelines also requires understanding the rate at which a patient's cells can realistically remodel or produce new collagen, so expectations remain biologically grounded rather than aspirational.

It also strengthens safety management. Recognising early biological signals, anticipating inflammatory reactions, and having confidence in complication pathways all stem from a solid understanding of molecular behaviour.

Regeneration as a journey

Pharmacists are also trained to respect biological timelines. Regeneration unfolds over months - collagen synthesis, extra-cellular matrix remodelling and cellular recovery cannot be rushed. Using this understanding, I design treatment journeys that support these natural processes rather than impose unrealistic timelines.

Equally, regeneration is influenced by factors such as nutrition, inflammation, gut health, stress and sleep. Discussing these factors is not stepping outside scope - it is acknowledging the systemic realities that directly shape tissue response. Regenerative aesthetics sits at the intersection of aesthetic medicine and systemic wellbeing, and pharmacists are comfortable operating at that intersection.

Providing meaningful contribution

As regenerative aesthetics continues to evolve, pharmacists have a valid and important place within the wider multidisciplinary landscape. Our training equips us with specific forms of scientific and clinical knowledge that complement the strengths of other practitioners and support safer, more thoughtful use of biologics and biostimulatory treatments. Pharmacists often sit at the interface of scientific understanding and clinical application, helping to interpret complex biological information in practical, patient-centred ways.

When evaluating a regenerative product, I look not only at clinical evidence and safety profiles but also at how predictably it behaves in tissue

1. **Safety, governance and ethical practice**
   Pharmacists bring established expertise in medicines optimisation, risk mitigation, pharmacovigilance and ethical prescribing - areas that naturally enhance the safe delivery of regenerative treatments.
2. **Evidence-based evaluation of emerging technologies**
   Regenerative aesthetics moves quickly, and pharmacists' grounding in critical appraisal helps ensure new technologies are assessed in a systematic, evidence-driven way rather than through marketing influence or anecdotal trends.
3. **Complication recognition and management**
   Understanding mechanisms, interactions and inflammatory pathways supports more nuanced interpretation of tissue responses and earlier recognition of potential safety signals.
4. **Research, trials and real-world data**
   Our background in analysing methodologies, interpreting safety data and monitoring outcomes positions pharmacists to contribute meaningfully to research and post-marketing surveillance.
5. **Education and shared professional learning**
   By bringing mechanism-led reasoning and structured clinical evaluation into discussions, pharmacists can support and enrich the collective knowledge base across multidisciplinary teams.
6. **Supporting robust yet enabling regulation**
   Pharmacists can contribute to the development of regulatory frameworks that protect patients while still allowing space for responsible innovation - an important balance as regenerative technologies become more sophisticated.

A collaborative path forward

The future of regenerative aesthetics is undeniably multidisciplinary. What excites me most is not the idea of pharmacists leading or directing the field, but the potential we unlock when clinicians from all backgrounds bring their unique strengths together. Doctors, nurses, dentists and pharmacists each offer distinct, complementary ways of thinking. For pharmacists, that contribution is rooted in science: understanding molecules, systems, interactions and evidence. As biologics, biostimulation and tissue-health-first approaches become central to modern practice, that perspective becomes increasingly valuable.

At its core, regenerative aesthetics is about supporting people to feel more like themselves again. The science fascinates me, but it is the human outcome - the confidence, the comfort, the restored sense of self - that drives my work. If we continue progressing with integrity, rigour and collaboration, pharmacists will remain an important and meaningful part of the regenerative aesthetic landscape.

"This article offers a timely and accessible perspective on the expanding role of pharmacists in regenerative aesthetic medicine. As treatments increasingly rely on biologics, biostimulation, and long-term tissue remodelling, a clear understanding of product mechanisms and systemic interactions is essential. Pharmacists' expertise in pharmacodynamics, pharmacokinetics, and risk assessment is particularly valuable when managing patients with complex medical histories or polypharmacy. The focus on biological timelines and realistic regenerative potential supports effective patient education and expectation management. Overall, the article shows how pharmacy-informed thinking complements procedural expertise, contributing to safer, more personalised, and evidence-based care within a multidisciplinary setting as regenerative aesthetics continues to evolve.

Mr George Christopoulos

Piril Sideras is a highly experienced aesthetics practitioner and registered pharmacist prescriber with seven years of clinical practice in non-surgical medical aesthetics. As the founder of Piril Sideras Aesthetics & Skin Sanctuary, she is recognised for her evidence-based approach, meticulous technique, and focus on natural, balanced outcomes.

Piril specialises in full-face rejuvenation, skin health optimisation, and regenerative treatments, prioritising safety, patient education, and ethical practice. With a strong commitment to continuous professional development, she integrates advanced modalities with personalised treatment planning to achieve consistent, high-quality results for her patients.

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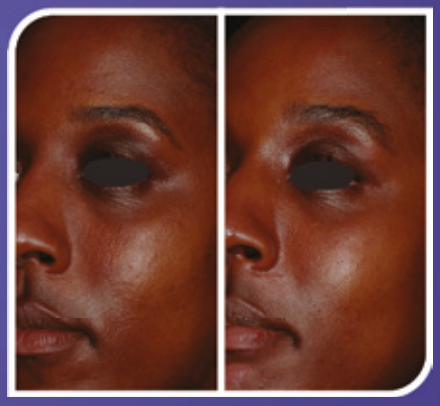

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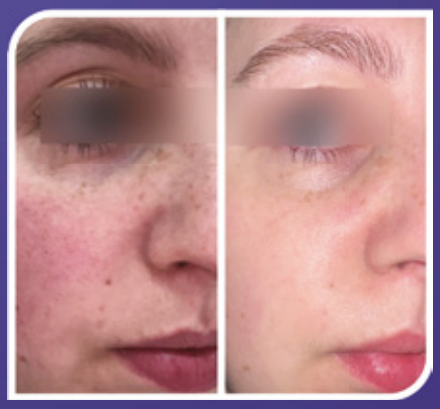

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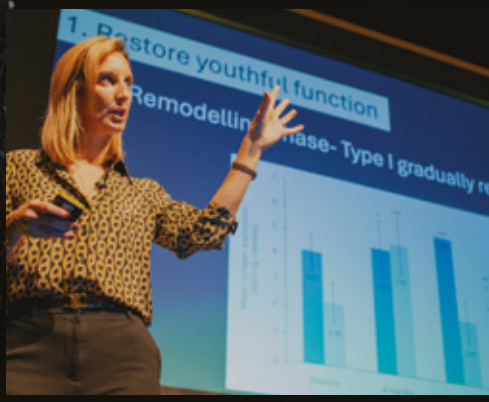

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