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abstract

Consumers' relentless pursuit of youthful skin continues to drive innovation in skincare science. For decades, retinol has dominated the anti-aging category - delivering visible improvements, but often at the cost of irritation and sensitivity [1]. That narrative is shifting.

After four years of research, Core Biogenesis has developed the next-generation alternative: Oleosome-Growth Factors, powered by biomimetic active ingredients Oleosome-EGF and Oleosome-FGF-2. The company's proprietary whole-plant biofactory technology produces growth factors fused to plant-seed oleosomes which enables 8-10X greater stability, deeper dermal delivery, and accelerated visible results.

Oleosome Growth Factor Serum, a formulation containing 1.0% Oleosome-EGF and 1.0% Oleosome-FGF-2, demonstrated statistically significant results across four skin aging markers against 0.3% retinol in a 60-day head-to-head clinical trial [2]. The Oleosome Growth Factor Serum decreased wrinkle depth, wrinkle length, improved skin smoothness, and boosted skin brightness with a statistically significant superior outcome than retinol across four skin aging markers.

Core Biogenesis positions Oleosome-Growth Factors as the new benchmark in anti-aging skincare: biomimetic, clinically proven, ethically sourced, and built for the future of beauty.

Introduction: A Market Demanding More

The pursuit of youthful skin spans generations – from Baby Boomers to Gen Z – fueling a vibrant and expanding U.S. skincare market, projected to reach over \$31.2B by 2030 [3]. Over 34% of Americans are now aged 50 and older, while younger consumers are embracing preventive skincare earlier than ever – including the use of active ingredients and aesthetic procedures [4]. A 2024 YouGov survey identified the top skin concerns across age groups as dryness (37%), wrinkles (33%), and acne (23%) [5]. Yet despite the abundance of anti-aging products on the market, consumer frustration remains high:

- Efficacy: 90% of women surveyed reported dissatisfaction with skincare products that fail to deliver on their promises [6].
- Speed: 76% of women surveyed responded that it takes two months or longer to see noticeable results [7].
- Tolerance: Potent actives like retinol may cause redness, peeling, or sensitivity [8].

As expectations shift towards faster-acting, safe-skin ingredients that deliver visible results, the opportunity is clear: to develop a new generation of clinically-validated actives that combine performance and speed without irritation.

Nature Meets Biotech: Development of Oleosome-Growth Factor Serum

Core Biogenesis set out to solve the growing challenges in skincare: to develop a new generation of clinically validated actives that combine performance, tolerance, speed, and sustainability. Founded in 2020, Core Biogenesis is a French biotechnology company using plants as biofactories to produce next-generation protein-based active ingredients, fused to a natural delivery system for enhanced skin compatibility and performance.

Core Biogenesis biotechnology solution is focused on the body's proteins and peptides, using plant biofactories to develop biomimetic solutions. At the heart of Core Biogenesis' innovation is the use of oleosomes: natural lipid-based micro-carriers found in all oil-rich plants. Oleosomes are how nature stores and protects lipids within seeds, preserving energy and essential nutrients for germination. Structurally, they consist of a phospholipid monolayer surrounding a core of triglycerides and proteins. This unique architecture makes them inherently stable, stress-resistant, and capable of controlled release – ideal characteristics for delivering fragile actives like growth factors into the skin.

Leveraging this natural design, Core Biogenesis developed a proprietary platform to fuse biomimetic growth factors with camelina seed-derived oleosomes, creating two novel actives,

Oleosome-EGF and Oleosome-FGF-2. After four years of research and development, these ingredients emerged as a powerful alternative to legacy actives like retinol because they combine biocompatibility, efficacy, stability, and sustainability.

Oleosome Growth Factors Compared to Traditional Actives and Exosomes

Oleosome technology has been used in the skincare and cosmetic industry for nearly two decades – primarily as an emulsifier. Core Biogenesis has transformed the way that oleosomes are delivered – by leveraging the plant-seed derived oleosomes from the camelina plant as delivery systems for growth factors.

Exosomes are gaining attention for their regenerative potential. They are cell-derived vesicles containing a complex mix of proteins including RNAs, and lipids, and while they hold promise in clinical medicine, their use in cosmetics is not regulated. Their biological complexity and variability make them hard to standardize, and sourcing from human, animal, or microbial cells introduces ethical, regulatory, and safety concerns. Their mechanism of action in topical skincare is still not fully understood.

Here we compare the advantages of oleosome growth factors compared to retinol and traditional growth factor technologies and exosomes:

- 1. Stability** – Oleosome-fused growth factors are 8 to 10 times more stable than unencapsulated proteins. In a 12-week stability study, they retained over 92% of bioactivity, compared to 8% for naked growth factors [9]. Exosomes are sensitive to environmental conditions, which can make maintaining their activity in skincare formulations complex. Ensuring they remain effective when applied to the skin requires further innovation [10].
- 2. Safety and Penetration** – Oleosomes mimic the skin's lipid structure, enabling deeper penetration into both the epidermis and dermis and allowing active proteins to reach their target cells more than naked growth factors according to a January 2025 study [11]. It is important to note that oleosomes penetrate the epidermis and dermis and do not travel further. Compared to exosomes which are nanometer and have the risk of absorption into the bloodstream.
- 3. Efficacy** – Oleosome-EGF and Oleosome FGF-2 are bio-identical to human growth factors, triggering essential pathways for collagen I synthesis, skin repair, and pigmentation modulation – leading to faster, more visible anti-aging benefits. Exosomes show regenerative potential, but research and clinical studies are needed to understand the full potential in topical skincare [12].

4. Ethical Sourcing – Oleosome-EGF and Oleosome FGF-2 are 100% vegan, produced entirely in closed greenhouse systems in France without any animal or human cells. Exosomes and other growth factors may include non-plant cells including sourcing from human, animal, or microbial cells.

5. Sustainability – Plant biofactories allow for full ingredient traceability and year-round production with minimal land and water use. These are carbon-conscious, avoiding fermentation-based methods that rely on chemical solvents and generate high emissions.

Clinical Trial Results – Oleosome-Growth Factor Serum vs. Retinol

To validate its next-generation approach to anti-aging skincare, Core Biogenesis set out to benchmark its Oleosome-Growth Factor Serum, 1.0% Oleosome-EGF and 1.0% Oleosome-FGF-2, against the industry's gold standard: retinol. The company selected a 0.3% concentration of retinol – the maximum allowed under new EU cosmetic regulations – to ensure a rigorous, head-to-head comparison.

An independent 60-day clinical study was conducted with 44 Caucasian men and women aged 40 to 65, all exhibiting visible signs of aging such as crow's feet wrinkles, uneven skin tone (melasma), and compromised texture. Participants were randomly assigned into two groups. The study lasted 60 consecutive days with each participant applying the product on their face twice daily in the morning and evening.

- Group A of 22 participants applied a facial serum base containing 1.0% Oleosome-EGF and 1.0% Oleosome-FGF-2.
- Group B of 22 participants applied a facial serum base (identical to Group A's serum base) containing 0.3% retinol.

The study evaluated eight parameters in order to evaluate the anti-wrinkle, firming, depigmenting efficacy, and barrier effect linked to skin aging and regeneration:

1. Skin firmness (R0 – Cutometer)
2. Skin elasticity (R2 – Cutometer)
3. Skin barrier integrity (TEWL)
4. Pigmentation/dark spots (ITA ratio)
5. Skin smoothness (clinical grading – Likert scale)
6. Maximum wrinkle depth (Antera 3D)
7. Maximum wrinkle length (Antera 3D)
8. Skin brightness (L* value – Antera 3D)

Methods and Materials

The following methods and materials were used in the clinical evaluation. Measurements were taken before the start

of treatment (T0), and after 14 days of product use (T14), 30 days of product use (T30) and 60 days (T60) (For ITA° value related to skin pigmentation).

- **Multiprobe Adapter Systems MPA® (Courage-Khazaka)**, equipped with Cutometer®, used for the evaluation of skin elasticity and firmness effect
- **Antera 3D®** camera developed by **Miravex Limited**, used for evaluation of wrinkle depth and length, mean pores area, and L* parameter for skin brightness
- Multiprobe Adapter Systems MPA® (Courage-Kkazaka) equipped with **Tewameter® TM300** used for the measurement of TEWL was used to measure skin barrier integrity
- **Environmental Thermohygrometer**
- **Likert Scale (1-5) (absent – very noticeable)**

Clinical Trial Results

Across the eight clinical parameters evaluated, the Oleosome-Growth Factor Serum demonstrated statistically significant superiority and faster visible results in four key areas compared to retinol: wrinkle depth, wrinkle length, skin smoothness, and skin brightness. The Oleosome-Growth Factor serum also demonstrated clinical equivalence to retinol in the following 4 parameters: skin firmness, skin elasticity, barrier function, and pigmentation.

Here we review the clinical data from the four parameters where Oleosome Growth Factor Serum outperformed retinol.

Maximum Depth of Wrinkles

Participants applying the Oleosome-Growth Factor Serum experienced a statistically significant 18.6% reduction in maximum wrinkle depth after 14 days, and a 25.5% reduction by day 30.

In contrast, those using retinol saw a 9.2% reduction in wrinkle depth at day 14 (which did not achieve statistical significance) and a 16.3% reduction by day 30 (**Figure 1**).

As shown in **Table 1**, oleosome growth factor serum had statistically significant results in reducing wrinkle depth in 14 days compared to retinol.

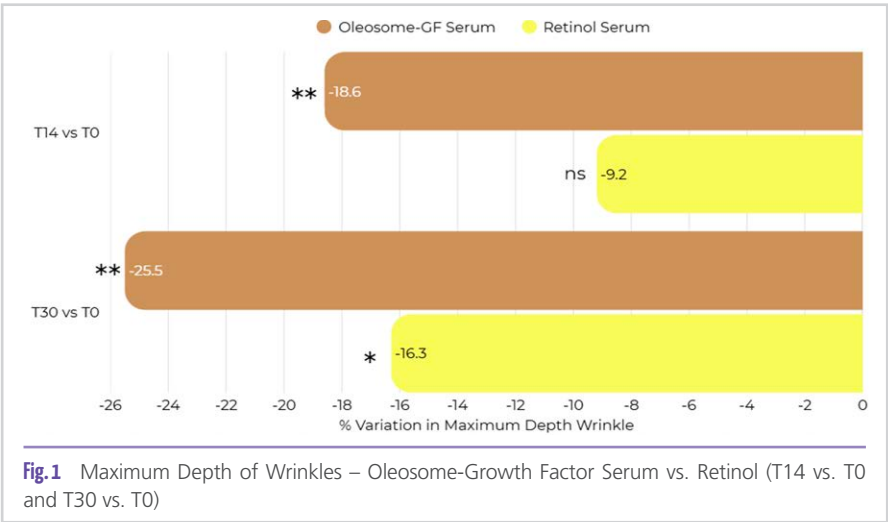


Fig.1 Maximum Depth of Wrinkles – Oleosome-Growth Factor Serum vs. Retinol (T14 vs. T0 and T30 vs. T0)

	T-Test	Significant	Summary	P Value*
Oleosome-GF Serum	T14 vs T0	Yes	**	0,0081
Retinol	T14 vs T0	No	Ns	0,0969
Oleosome-GF Serum	T30 vs T0	Yes	**	0,0023
Retinol	T30 vs T0	Yes	*	0,0319

P values refer to a statistically significant variation : >0.05 (ns), <=0.05 (*); (0.001 (), 0.0001 (***), <0.0001 (****))*

Table 1: Statistical Significance for Maximum Depth of Wrinkles – Oleosome-Growth Factor Serum vs. Retinol (T14 vs. T0 and T30 vs. T0)

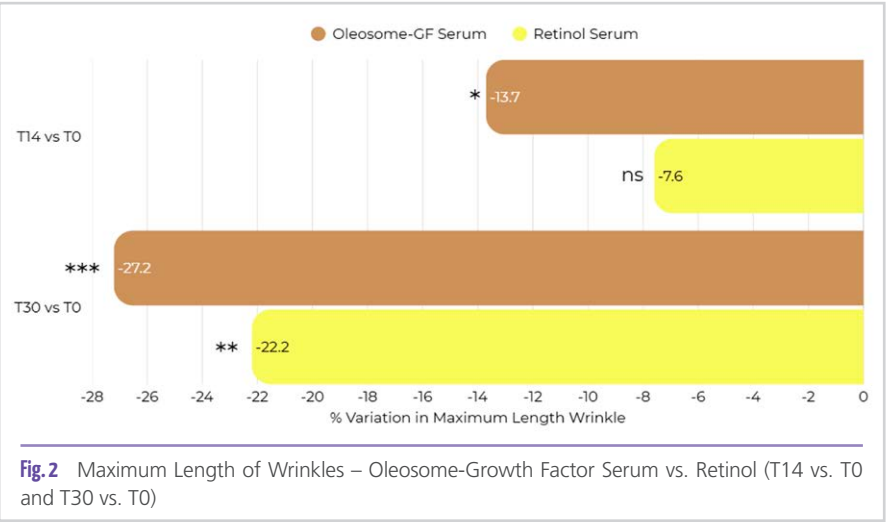


Fig.2 Maximum Length of Wrinkles – Oleosome-Growth Factor Serum vs. Retinol (T14 vs. T0 and T30 vs. T0)

Maximum Length of Wrinkles

Participants applying the Oleosome-Growth Factor Serum experienced a statistically significant 13.7% reduction in maximum wrinkle length after 14 days, and a 27.2% reduction by day 30.

In contrast, those using retinol saw a 7.6% reduction at day 14 and a 22.2% reduction by day 30, with statistical significance reached only at 30 days (**Figure 2**).

As shown in **Table 2**, oleosome growth factor serum had statistically significant results in reducing wrinkle length in 14 days compared to retinol.

Skin Smoothness

Clinical grading revealed a rapid and significant improvement in skin texture:

- 55% of participants using the Oleosome-Growth Factor Serum reported noticeable improvement after 14 days
- 77% showed improvement after 30 days

Grading scores progressed from moderate at day 14 to evident by day 30.

In the retinol group, 45% of participants improved by day 14, and 59% by day 30, with grading increasing from moderate to intermediate (**Figures 3-4, Table 3**).

Skin Brightening

The Oleosome-Growth Factor Serum demonstrated a statistically significant improvement in overall skin brightness by day 30, 0.8% compared to 0.6% in retinol, with a more visible radiance and even tone compared to retinol did not achieve statistically significant results at day 15 or day 30 (**Table 4**).

	T-Test	Significant	Summary	P Value*
Oleosome-GF Serum	T14 vs T0	Yes	*	0,0172
Retinol	T14 vs T0	No	Ns	0,3120
Oleosome-GF Serum	T30 vs T0	Yes	***	0,0003
Retinol	T30 vs T0	Yes	**	0,0088

P values refer to a statistically significant variation : >0.05 (ns), <=0.05 (*); (0.001 (), 0.0001 (***), <0.0001 (****))*

Table 2: Statistical Significance for Maximum Depth of Wrinkles – Oleosome-Growth Factor Serum vs. Retinol (T14 vs. T0 and T30 vs. T0)

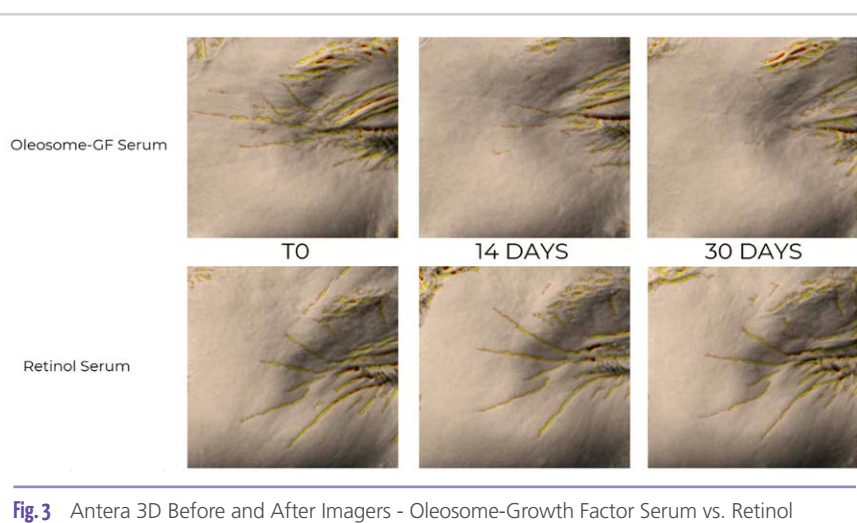
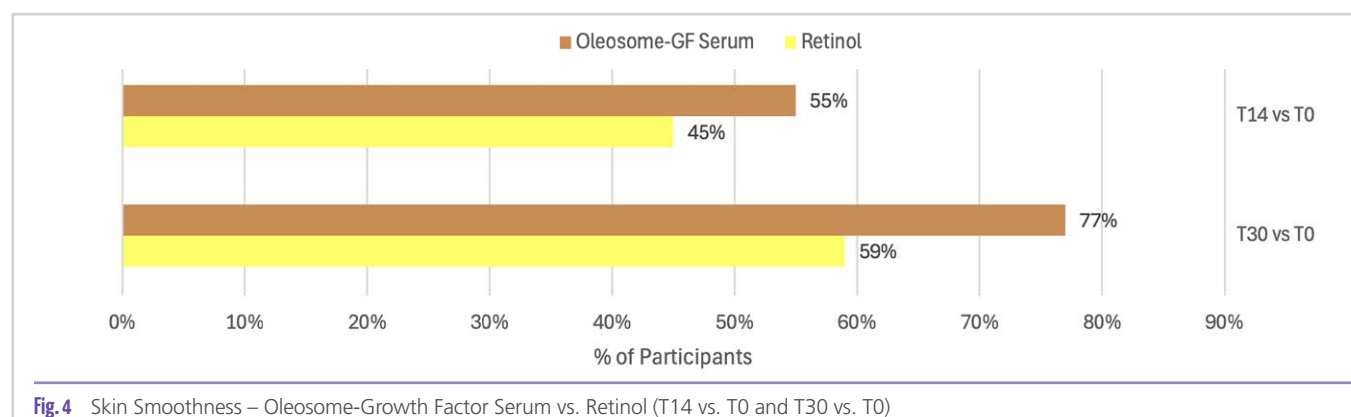


Fig. 3 Antera 3D Before and After Imagers - Oleosome-Growth Factor Serum vs. Retinol



	Wilcoxon Test	Significant	Summary	P Value*
Oleosome-GF Serum	T14 vs T0	Yes	***	0,0005
Retinol	T14 vs T0	Yes	**	0,0020
Oleosome-GF Serum	T30 vs T0	Yes	***	<0,0001
Retinol	T30 vs T0	Yes	**	0,0015

P values refer to a statistically significant variation : >0.05 (ns), <=0.05 (*); (0.001 (), 0.0001 (***), <0.0001 (****))*

Table 3: Statistical Significance for Maximum Depth of Wrinkles – Oleosome-Growth Factor Serum vs. Retinol (T14 vs. T0 and T30 vs. T0)

	T-Test	Significant	Summary	P Value*
Oleosome-GF Serum	T14 vs T0	No	Ns	0,0116
Retinol	T14 vs T0	No	Ns	0,4606
Oleosome-GF Serum	T30 vs T0	Yes	*	0,0271
Retinol	T30 vs T0	No	Ns	0,3729

P values refer to a statistically significant variation : >0.05 (ns), <=0.05 (*); (0.001 (), 0.0001 (***), <0.0001 (****))*

Table 4: Statistical Significance for Skin Brightness – Oleosome-Growth Factor Serum vs. Retinol (T14 vs. T0 and T30 vs. T0)

Results and Discussion

Taken together, the clinical findings highlight the Oleosome-Growth Factor Serum as a high-performance alternative to retinol – delivering faster, statistically superior results in four key markers of skin aging, while matching retinol's performance across all remaining parameters. These results support the potential of biomimetic, plant-derived growth factors as a next-generation solution for visible skin rejuvenation.

The performance of Oleosome-Growth Factors represents more than just a new active – it signals a shift in the skincare industry's expectations for both efficacy and safety. Compared to retinol, long regarded as the benchmark for anti-aging, the Oleosome-Growth Factor Serum delivered statistically superior results in wrinkle depth, wrinkle length, skin smoothness, and brightness – and did so faster, with visible improvements as early as day 14. Retinol, by contrast, showed slower onset and required 30 days to reach statistical significance in key parameters like wrinkle depth and length.

This difference is more than cosmetic. Oleosome-Growth Factors work differently: they mimic the body's own signaling proteins, activating natural regenerative processes like collagen synthesis and tissue repair without triggering inflammation. The result is a gentler, faster-acting alternative with better tolerability – proven in a head-to-head trial at the highest retinol concentration allowed under EU regulations (0.3%). In short, the oleosome growth factors work faster organically, helping the body to repair and build collagen naturally, using plants as a sustainable source.

Conclusion

Looking ahead, The clinical results of Oleosome-Growth Factors validates outperformance with statistical significance in four major categories over retinol for skin aging, most notably in wrinkle depth and length in 14 days. Based on published data which correlates wrinkle depth reduction with age appearance, the 18.6% wrinkle depth reduction observed at day 14 translates to an estimated 3.9 years younger appearance in just two weeks – a result that few, if any, topical actives have achieved without irritation [13].

Core Biogenesis' technology offers both consistency and clinical proof through years of research and testing. The company produces human-identical growth factors (EGF and FGF-2) entirely in plants, then fuses them to camelina-derived oleosomes – a natural, highly stable lipid delivery system found in oil-rich seeds. This fusion results in 8–10X greater stability, improved dermal penetration, and fully traceable, sustainable production within closed greenhouse systems in France.

As biotech continues to reshape the future of skincare, Core Biogenesis stands at the forefront – offering a solution that has

Frequently Asked Questions (FAQs)

1. Are Oleosome-Growth Factors globally compliant?

Yes. Both Oleosome-EGF and Oleosome-FGF-2 are globally compliant cosmetic ingredients. They are registered with an approved INCI name by the Personal Care Products Council (PCPC, USA) and are also listed with NMPA codes for regulatory compliance in China, facilitating their use in global formulations.

2. How do you formulate with Oleosome-Growth Factors?

Oleosome-GF ingredients are easy to formulate and compatible with a wide range of skincare formats. For best results, they should be added to the batch at a temperature below 45°C and incorporated using gentle mixing. They can be used in serums, night creams, moisturizers, lotions, and a variety of oil-in-water or water-in-oil emulsions.

3. What is the shelf life of Oleosome-Growth Factors?

Both Oleosome-EGF and Oleosome-FGF-2 have been stability-tested and carry a shelf life of 2 years under recommended storage conditions.

4. What is the recommended usage level?

Oleosome-Growth Factors have been clinically tested at 1% usage level for both Oleosome-EGF and Oleosome-FGF-2. This concentration was used in two independent clinical studies, including the head-to-head trial against 0.3% retinol, demonstrating visible, statistically significant improvements in key anti-aging parameters.

5. Can Oleosome-Growth Factors replace retinol or peptides in existing formulas?

Yes. Given their faster onset of action, biomimetic activity, and enhanced tolerability, Oleosome-Growth Factors can serve as a next-generation alternative to retinol or as a complement to peptides in high-performance skincare formulations. Their versatility and proven clinical efficacy make them ideal for innovation-driven brands looking to elevate their anti-aging offerings.

biological integrity, is sustainable, ethically-sourced, clinically validated, and is built for the next era of beauty innovation.

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