Optidel
Biosystems

The technological revolution in **personalized cosmetic ingredients**

THISTLE_10

Cutting-edge solutions for a technologically demanding sector.

OPTIDEL offers an advanced solution to dissolve and concentrate natural active ingredients with low stability and insolubility, significantly enhancing their bioavailability and efficacy.

Ready-to-use technology for formulation:

Versatile solutions for both hydrophilic and hydrophobic ingredients, even the most unstable or poorly soluble compounds.

Enhances bioavailability and efficacy:

Maximizes stability by up to 90%, increases skin bioavailability by up to 60%, and multiplies efficacy up to fourfold.

Sustainability driven by innovation:

Technological solutions that enable cleaner, more efficient formulations with a lower environmental impact.

Adapted to today’s market:

Protects actives from degradation and enables the development of customized formulas aligned with the latest trends.

THISTLE_10

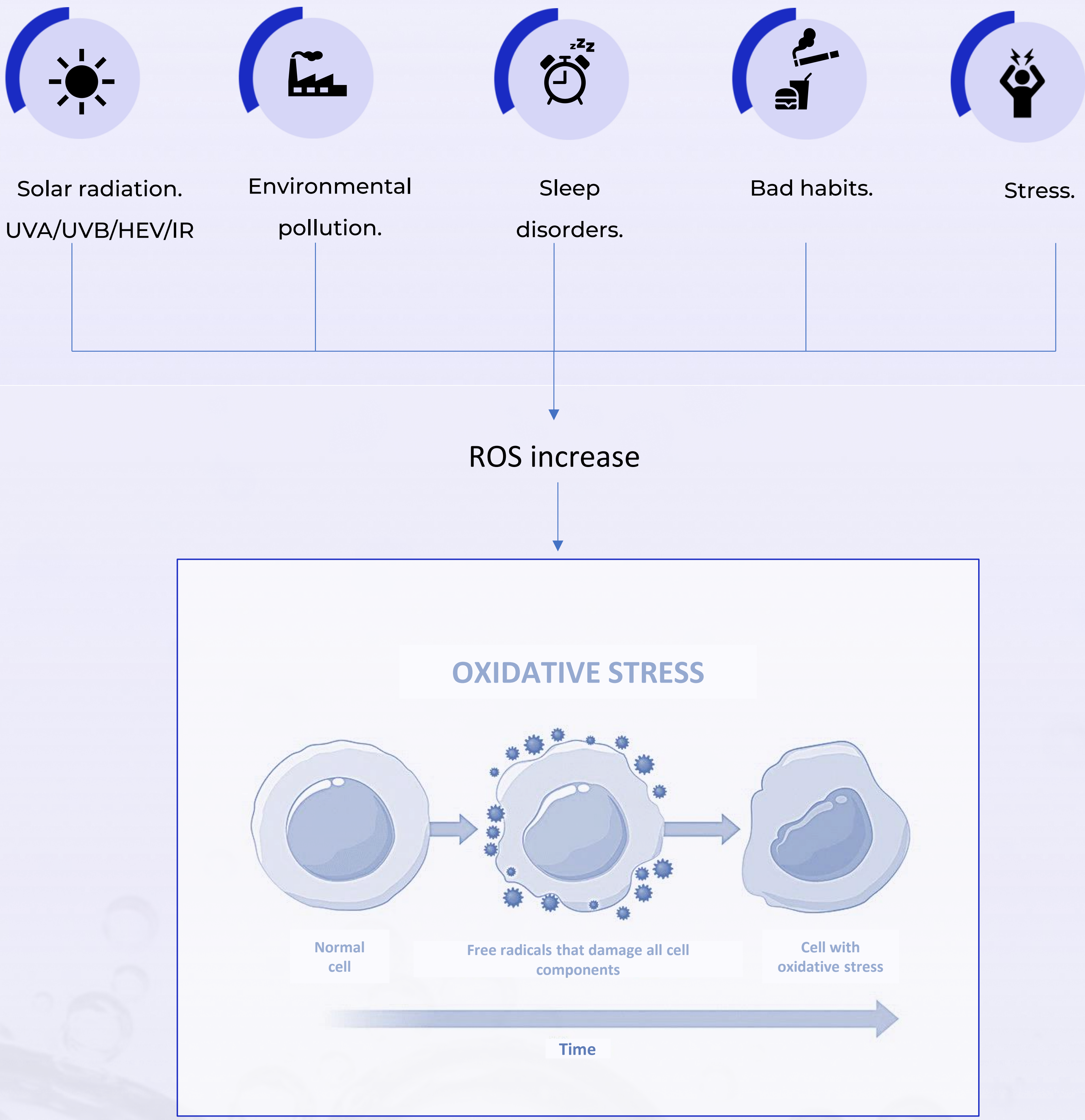
Active silymarin, antioxidant and soothing for the skin.

Defends and repairs the skin against external aggressions, reduces redness, and strengthens the natural barrier.

The impact of oxidative stress on the skin

Oxidation is a natural process that deteriorates tissues and accelerates skin aging. External factors such as UV radiation or pollution intensify this damage, making signs of aging more visible.

When reactive oxygen species (ROS) exceed the skin's natural antioxidant defenses, progressive damage occurs in DNA, epidermal lipids, and structural proteins, compromising cellular health and function.



Mechanisms of action in sensitive skin

Oxidative stress has a significant impact on reactive and sensitive skin by triggering a cascade of cellular damage that exacerbates its natural fragility. This imbalance between free radicals and antioxidants acts at multiple levels:

🔬 CELLULAR CONSEQUENCES

- **Disruption of the skin barrier**

Free radicals oxidize the lipids of the hydrolipidic film, weakening the barrier function. This increases transepidermal water loss and allows allergens and irritants to penetrate, intensifying skin reactivity.

- **Chronic inflammation**

Oxidative stress activates pro-inflammatory pathways such as NF-κB, increasing the production of cytokines (IL-1α, IL-6) that perpetuate redness and burning sensations.

- **Accelerated structural damage**

Reduced synthesis of type I collagen
Elastin degradation by matrix metalloproteinases (MMP-1)
Inhibition of hyaluronic acid production

👁 VISIBLE CONSEQUENCES

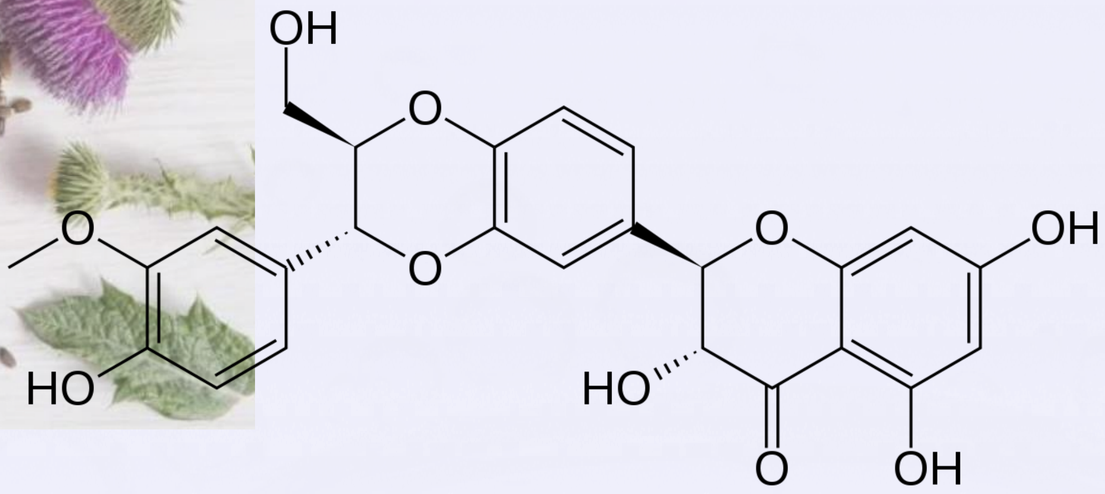
•Increased hypersensitivity
•Persistent dehydration
•Persistent erythema

1. Poon F, Kang S, Chien AL. Mechanisms and treatments of photoaging. Photodermatol Photoimmunol Photomed. 2015;31(2):65-74.
2. Baumann L. Skin ageing and its treatment. J Pathol. 2007;211(2):241-251.
3. Farage MA. The Prevalence of Sensitive Skin. Front Med (Lausanne). 2019;6:98.
4. Draelos ZD. The effect of ceramide-containing skin care products on eczema resolution duration. Cutis. 2008;81(1):87-91.
5. Fluhr JW, Darlenski R, Angelova-Fischer I, Tsankov N, Gloor M. Skin irritation and sensitive skin. In: Agache P, Humbert P, editors. Measuring the Skin. Berlin: Springer; 2017. p. 897-908.
6. Pérez-Sánchez A, Barrajón-Catalán E, Herranz-López M, Micol V. Nutraceuticals for skin care: a comprehensive review of human clinical studies. Nutrients. 2018;10(4):403.

Thistle_10: Silybin — protection, repair, and relief.

Silybin ($C_{25}H_{22}O_{10}$) (also known as silibinin) is the main active component of silymarin, the standardized extract of milk thistle seeds (Silybum marianum). It is a flavonolignan that occurs as a mixture of two diastereoisomers, silybin A and silybin B, in approximately equal proportions.

Silybin stands out in dermatology for its antioxidant, anti-inflammatory, depigmenting, and protective properties against environmental aggressors, contributing to healthier, younger-looking, and more even skin.



Optidel’s technology allows for a high concentration of active ingredient, keeping it stable and bioavailable, thereby enhancing its efficacy.

Thanks to its structure, it is the easiest way to incorporate silybin from Silybum marianum into a wide range of cosmetic formulations.

Multifunctional ingredient thanks to the combination of antioxidant, photoprotective, and anti-inflammatory properties.

An excellent ally to protect your skin from time and the city.

The silybin used at Optidel Biosystems is extracted and purified from milk thistle seeds.

How does it work?

Advanced antioxidant power

Activates NRF2 → Keap1 complex is released and translocates to the nucleus.

Promotes transcription of enzymes:
- Glutathione peroxidase
- Superoxide dismutase
- Catalase
- Glutathione S-transferase

Antioxidant defense, prevention of photoaging, and protection against urban environmental damage.

Anti-inflammatory activity

Decreases pro-inflammatory cytokines:
- TNF-α
- IL-1β
- IL-6
- COX-2

Soothes cutaneous microinflammation, which accelerates aging and deteriorates the extracellular matrix.

Cellular protection

Silibinin inhibits these enzymes and protects the structural dermal matrix.
- Collagen I and II
- Elastin

Prevents wrinkles, sagging, and loss of elasticity
Cellular rejuvenation and health.

Cellular regeneration and longevity

Induces the expression of genes such as p53 and sirtuins (SIRT1), related to:
- DNA repair
- Ordered cell cycle
- Programmed cell death of damaged cells

This promotes younger, more functional, and balanced skin.

Improves epidermal cellular quality with consistent use.

Zheng, W., Feng, Z., Lou, Y., Chen, C., Zhang, C., Tao, Z., Li, H., Cheng, L., & Ying, X. (2017). Silibinin protects against osteoarthritis through inhibiting the inflammatory response and cartilage matrix degradation *in vitro* and *in vivo*. *Oncotarget*, *8*(59), 99649–99665. https://doi.org/10.18632/oncotarget.20587

Matsumaru, D., & Motohashi, H. (2021). The KEAP1-NRF2 System in Healthy Aging and Longevity. *Antioxidants (Basel, Switzerland)*, *10*(12), 1929. https://doi.org/10.3390/antiox10121929

Vargas-Mendoza, N., Morales-González, Á., Morales-Martínez, M., Soriano-Ursúa, M. A., Delgado-Olivares, L., Sandoval-Gallegos, E. M., Madrigal-Bujaidar, E., Álvarez-González, I., Madrigal-Santillán, E., & Morales-Gonzalez, J. A. (2020). Flavolignans from Silymarin as Nrf2 Bioactivators and Their Therapeutic Applications. Biomedicines, 8(5), 122. https://doi.org/10.3390/biomedicines8050122

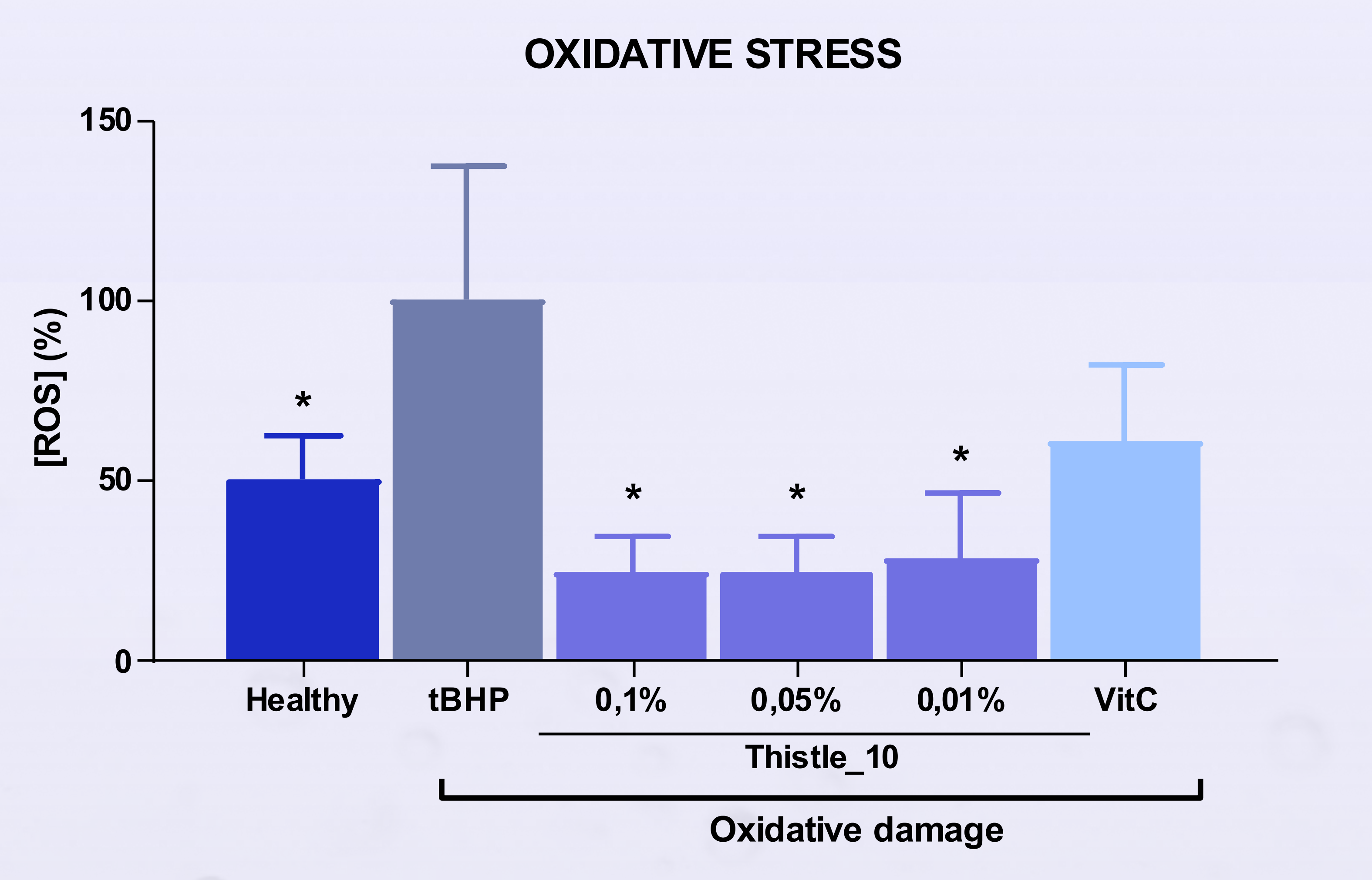
Choi, S., Ham, S., Lee, Y. I., Kim, J., Lee, W. J., & Lee, J. H. (2023). Silibinin Downregulates Types I and III Collagen Expression via Suppression of the mTOR Signaling Pathway. *International journal of molecular sciences*, *24*(18), 14386. https://doi.org/10.3390/ijms241814386

Lee, J. H., Park, J., & Shin, D. W. (2022). The Molecular Mechanism of Polyphenols with Anti-Aging Activity in Aged Human Dermal Fibroblasts. *Molecules (Basel, Switzerland)*, *27*(14), 4351. https://doi.org/10.3390/molecules27144351

Antioxidant effect: ROS activity assay

Advanced protection: Thistle-10 provides proven defense against environmental stress, helping to maintain skin health and youth.

- At concentrations of 0.1% and 0.05%, Thistle-10 reduces ROS levels to 25% compared to the healthy group, showing a reduction of over **150%** versus induced oxidative damage.
- Thistle-10 demonstrates strong antioxidant activity, significantly reducing ROS to levels lower than those observed in healthy cells — making it 50% more effective than vitamin C.



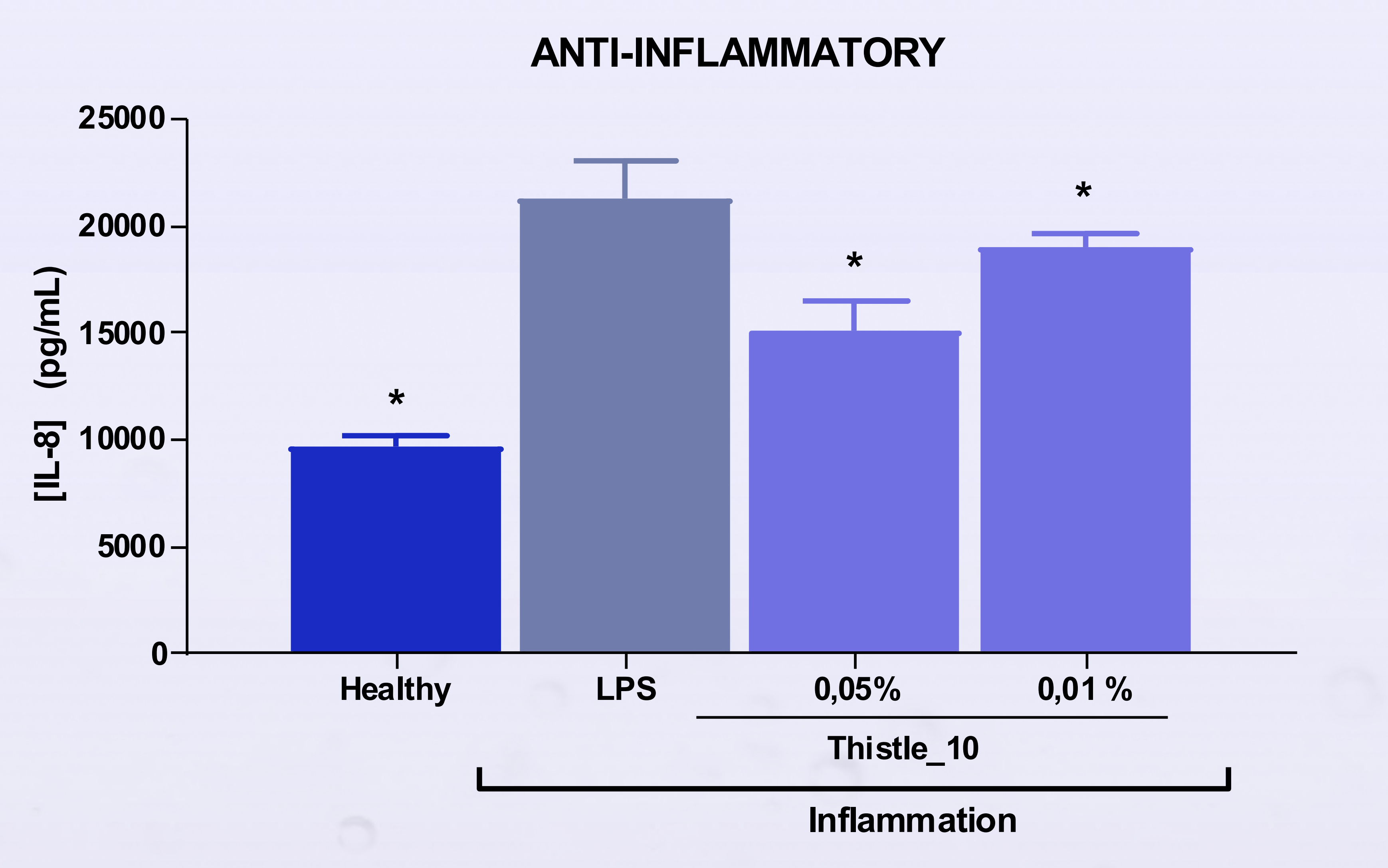
ROS production (percentage) in the HaCaT keratinocyte cell line obtained in the antioxidant assay after 4 hours of exposure to tBPH with the test ingredient at the indicated percentages. The positive control, tBPH insult, represents the cells treated with the oxidizing agent tBPH alone. Bars represent the mean of six technical replicates from a single independent assay. Error bars represent the standard deviation. Statistical significance * $p < 0.005$.

Anti-inflamatory activity

Comprehensive protection: Thistle-10 reduces inflammation markers, helping to protect the skin against external aggressors.

- **−50% IL-8 at 0.05% concentration**

Thistle-10's action suggests effective modulation of the IL-8–mediated inflammatory response under conditions of cellular stress.

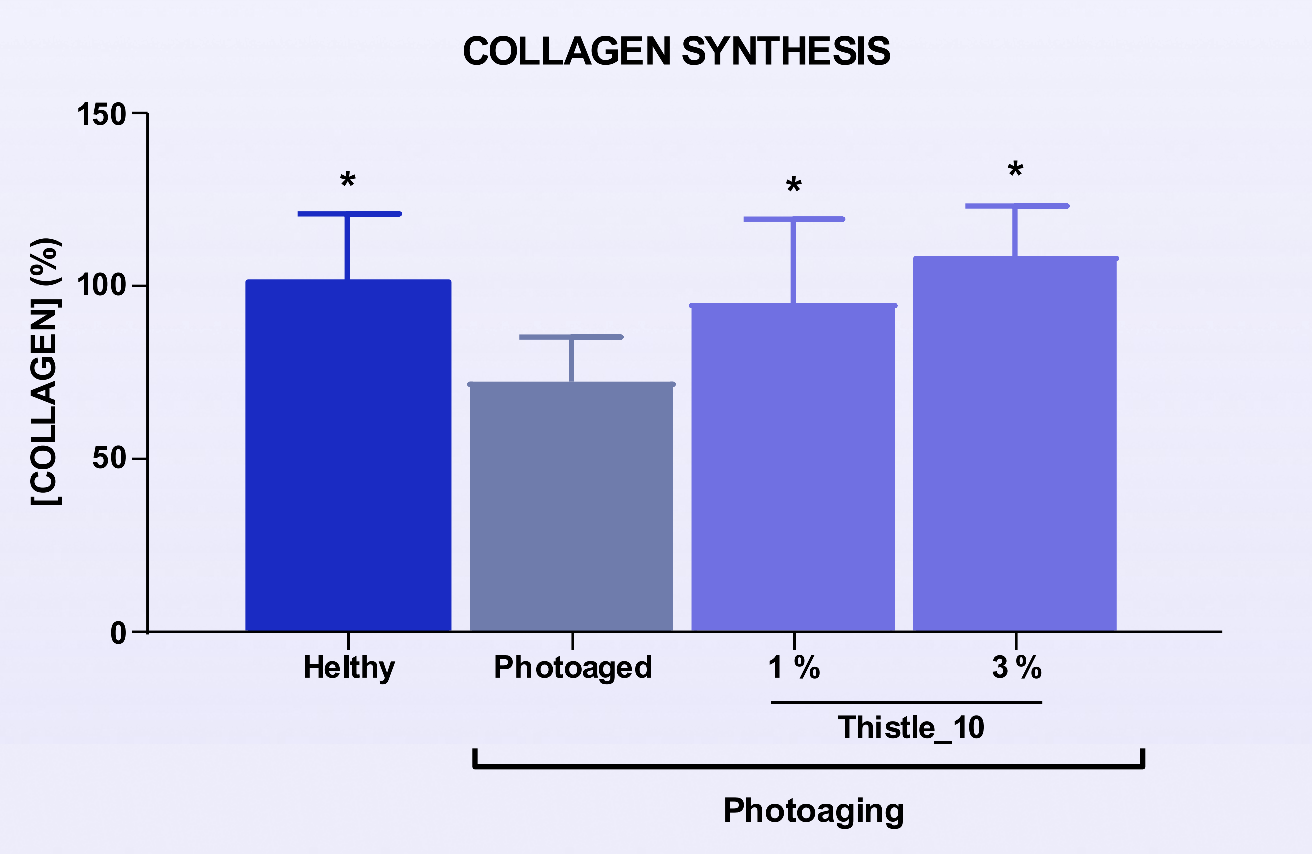


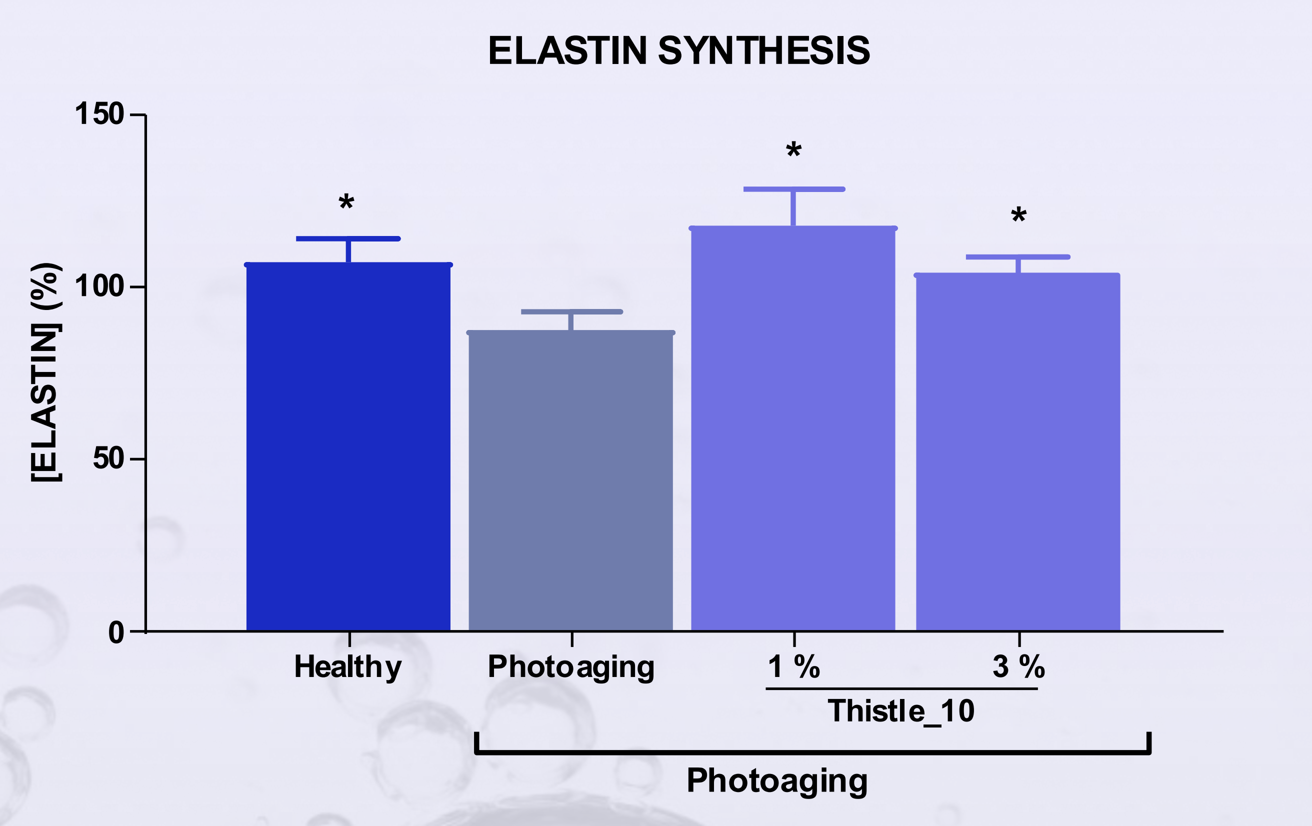
In vitro assay performed on differentiated human monocyte cells (THP-1), stimulated with LPS to induce inflammation. The compound was applied at various concentrations for 24 h, and its effect was assessed by measuring IL-8 levels via ELISA. The reduction of this proinflammatory cytokine confirmed its anti-inflammatory action.

Structural skin protection

Proven Dual Recovery:Thistle_10 simultaneously restores collagen and elastin in photoaged skin, effectively returning firmness and elasticity.

- Thistle_10 significantly reverses the loss of collagen and elastin induced by photoaging, restoring both structural components to levels equal to or higher than healthy skin.
- **At 3%, Thistle_10** shows outstanding efficacy in the comprehensive recovery of the extracellular matrix, with collagen and elastin values matching or exceeding the reference levels.
- **At 1%, Thistle_10** especially enhances elastin synthesis, exceeding baseline levels and improving skin elasticity, while also significantly recovering collagen.





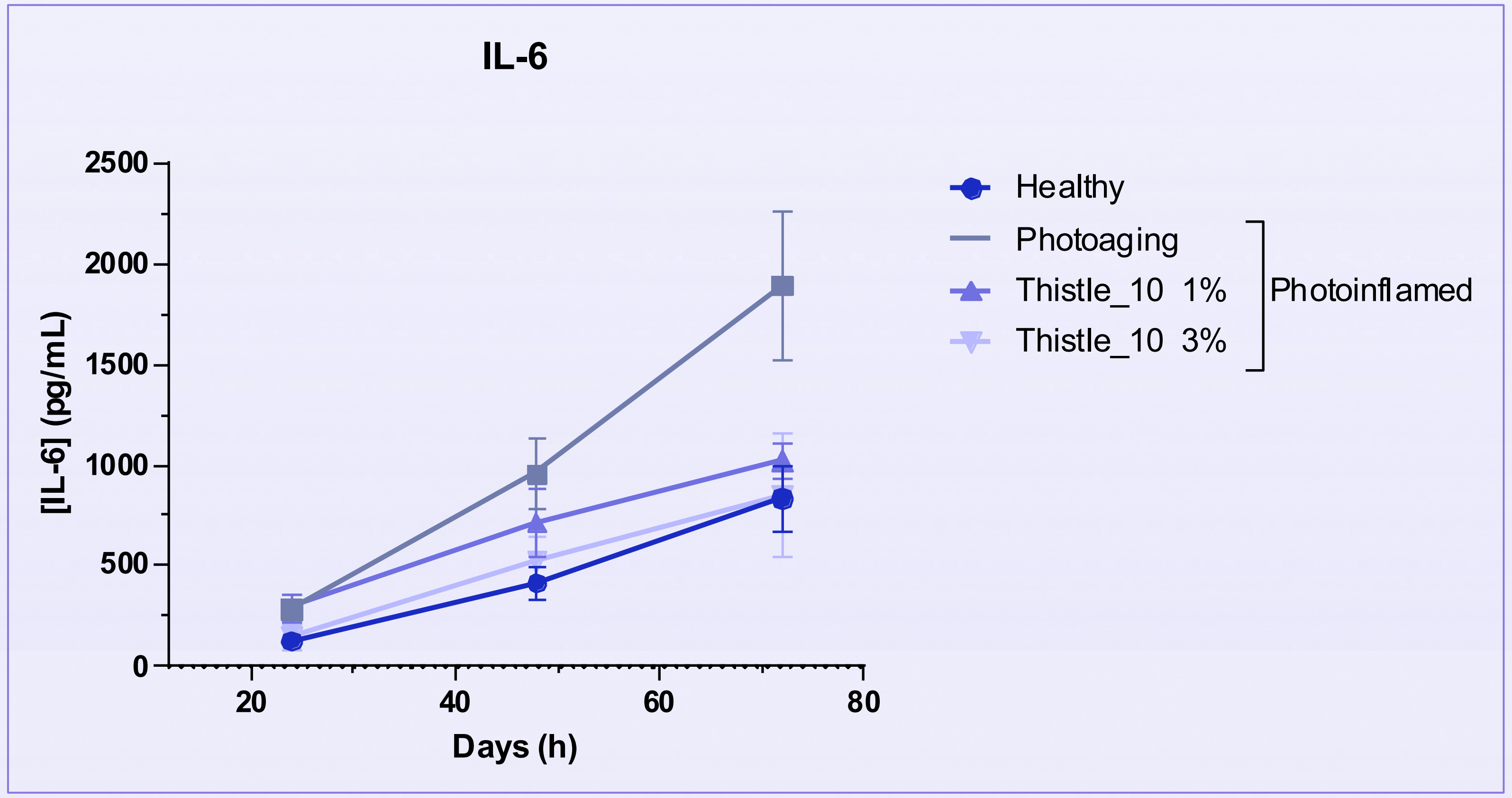
The ex vivo study evaluated the ability of Thistle10 to modulate the extracellular matrix in photoaged human skin explants (Phototype III, 47 years old), subjected to simulated solar irradiation and corticosteroid treatment. Soluble collagen and elastin levels were quantified using specific colorimetric assays, allowing assessment of the treatment's capacity to preserve or restore these key structural components against photoaging-induced damage.

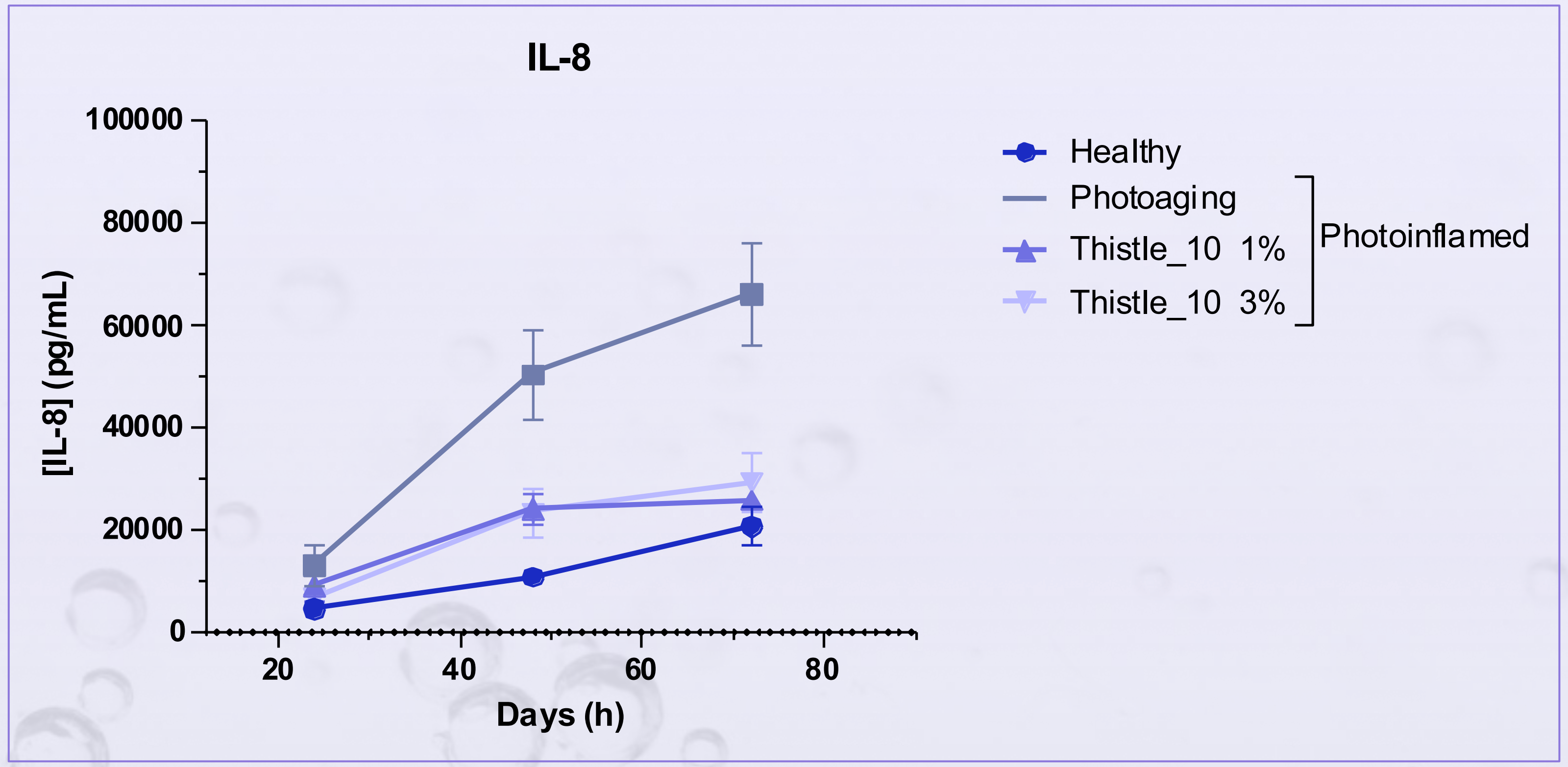
Evaluation of anti-inflammatory activity

Control of skin inflammation: Thistle_10 exerts a potent anti-inflammatory effect, significantly reducing both IL-6 and IL-8 in photoaged skin. This action is sustained over 72 hours.

•Thistle_10 at 3% maintains IL-6 levels similar to those in healthy skin, demonstrating effective control of the inflammatory response.

•Both concentrations of Thistle_10 significantly reverse the IL-8 increase induced by photoaging, with reductions greater than 50% compared to the photoaged group.





To analyze the inflammatory response associated with skin aging and the impact of Thistle10 treatment, the concentrations of the proinflammatory cytokines IL-6 and IL-8 were measured in the culture supernatant using ELISA assays. These markers reflect the chronic inflammatory phenotype of aged skin and allow the evaluation of the anti-inflammatory potential of the compound in the ex vivo model.

🛡️ **Summary:**

Benefits of Thistle_10 for Reactive or Sensitive Skin

Thistle_10 is the perfect ally for sensitive or reactive skin: it soothes, protects, strengthens, and rejuvenates—ensuring healthier, more resilient, and discomfort-free skin.

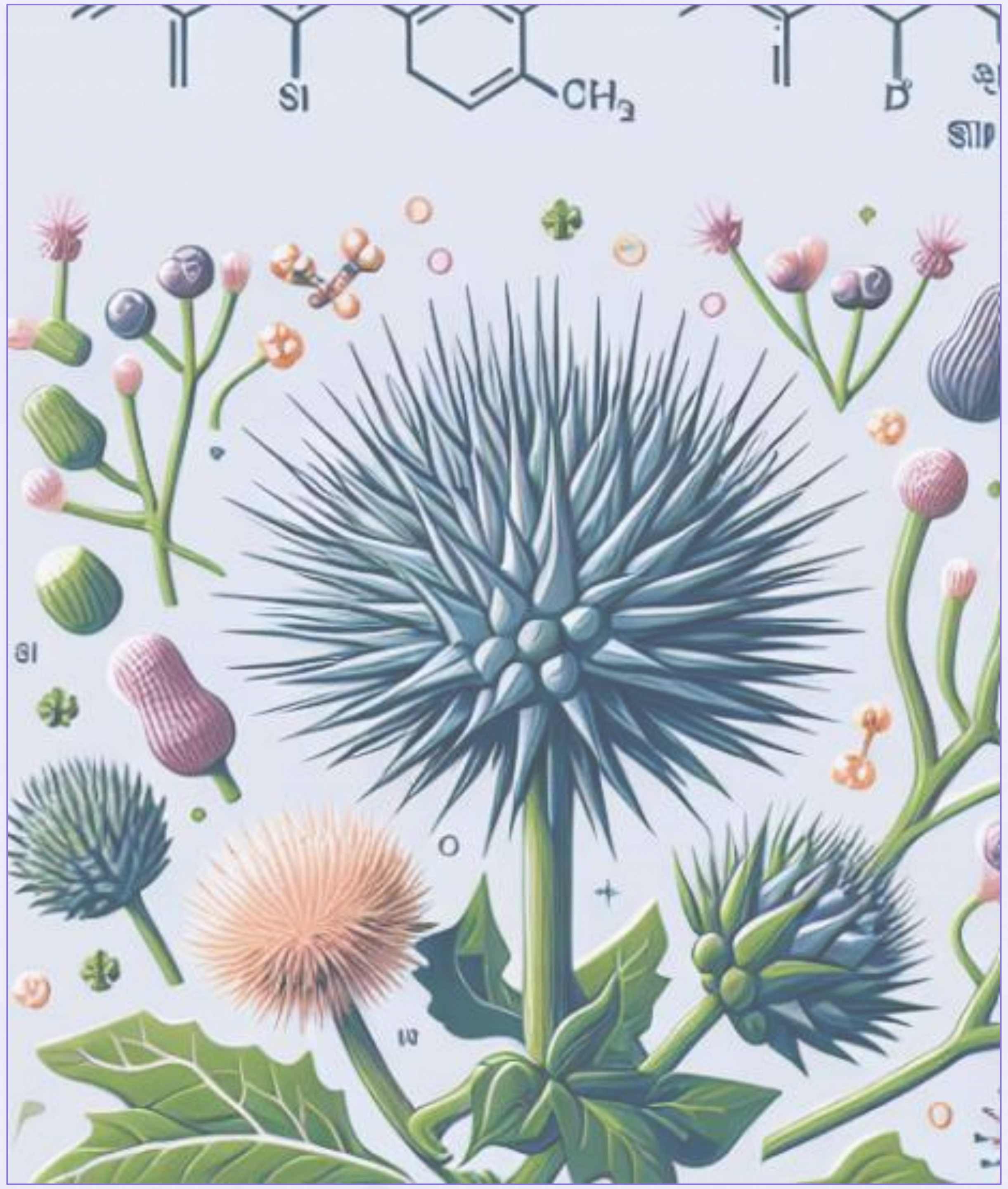
🌸Immediate relief and reduced irritation: Thistle_10 has been proven to lower inflammatory markers, helping to soothe reactive skin and reduce redness and discomfort.

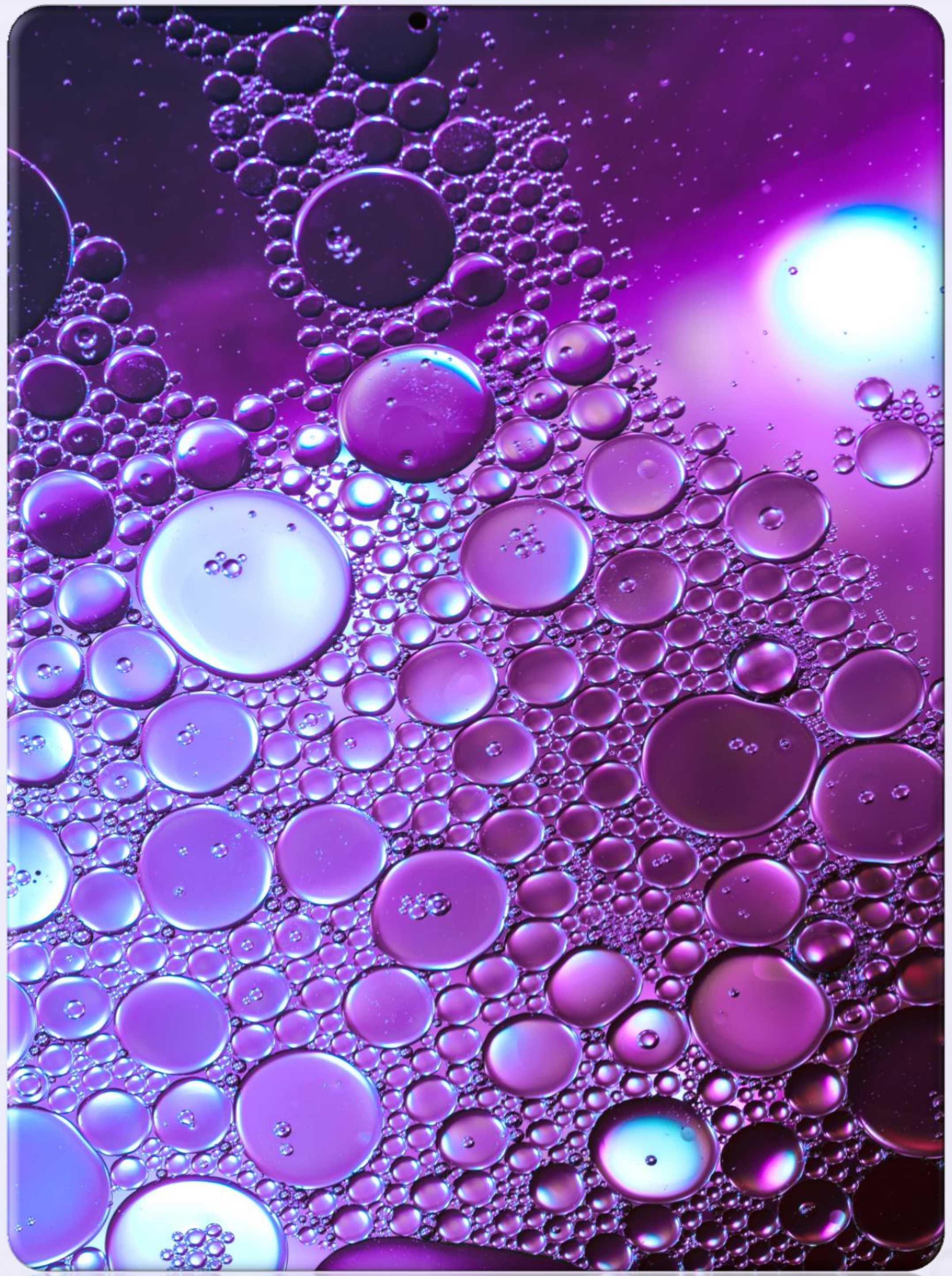
🌸Strengthens the skin barrier: Its antioxidant and anti-inflammatory action protects sensitive skin against external aggressors such as pollution, UV rays, and climate changes, helping prevent flare-ups and reactions.

🌸Deep hydration and repair: Promotes the recovery of elasticity and moisture—two essential needs for sensitive skin prone to dryness and tightness.

🌸Prevention of Premature Aging: By reducing oxidative stress and restoring collagen and elastin, Thistle_10 helps maintain youthful, firm, and resilient skin—even in the most delicate types.

🌸Tolerance and Softness: Its bioactive profile makes it ideal for facial care routines in easily irritated or sensitized skin, delivering comfort and softness from the very first application.





Thistle_10: C2CM_10

Application:

Thistle-10 is a versatile, high-efficacy ingredient ideal for creams, serums, masks, boosters, and soothing products. It is especially suited for anti-aging care, antioxidant protection, and relief for sensitive or reactive skin.

Recommended dosage:

1% - 3%

Formulation tips:

Añadir a granel durante la fase final del proceso de producción, asegurándose de que la temperatura no supere los 40 °C.
Mantener bajo agitación hasta obtener una mezcla homogénea.

Active % (p/p):

Silibin at ≥ 4,5%

INCI name

INCI name: Propylene Glycol, Silybum Marianum Fruit Extract.
CAS: 57-55-6, 84604-20-6

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