

Lubrizol

Imagined for Life. Enabled by Science.™

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v.1

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China compliant
Halal certified
Pore visibility
Moisturizing
Antioxidant
Glowing

Skin’s antioxidant defense systems for “glass skin”

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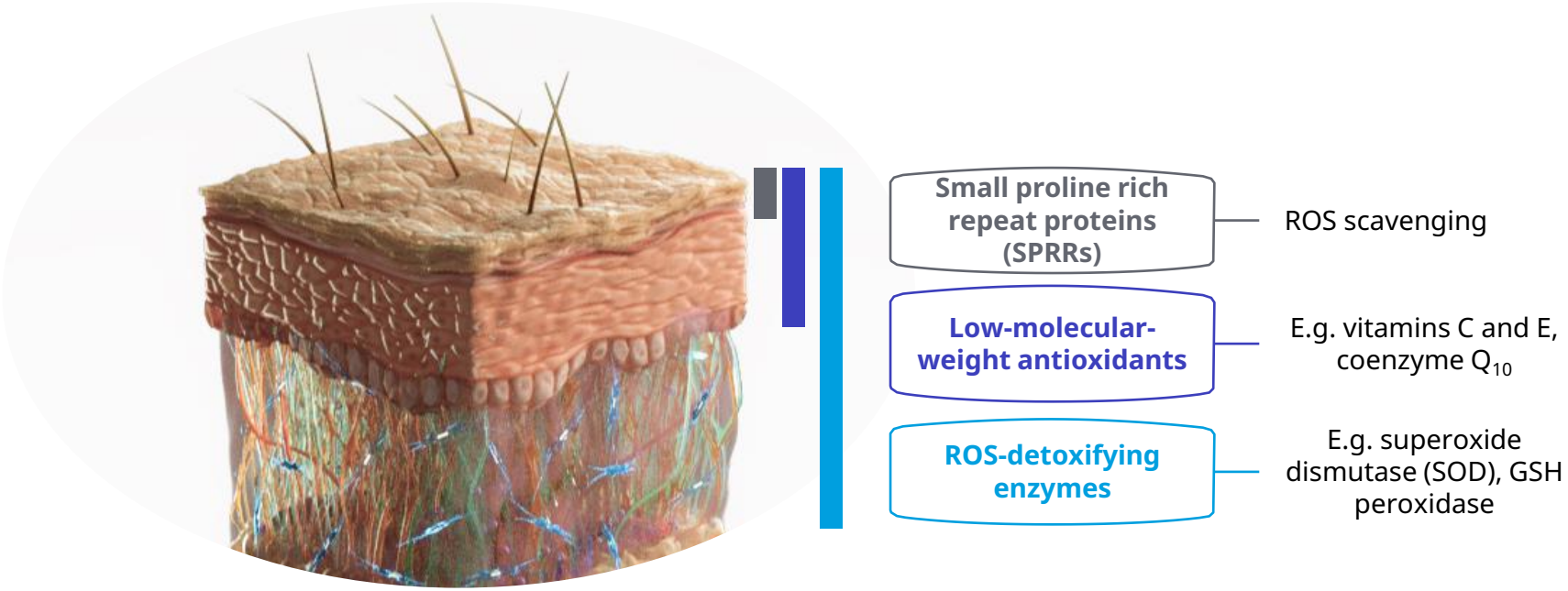
Technical data

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Traditional skin antioxidant systems

The body has developed protective mechanisms known as antioxidants that safeguard against the damaging effects of free radicals by neutralizing and reducing them.



The increased accumulation of oxidative stress and the limited capacity of skin cells to combat it highlights the need to explore supplementary antioxidants to enhance skin protection

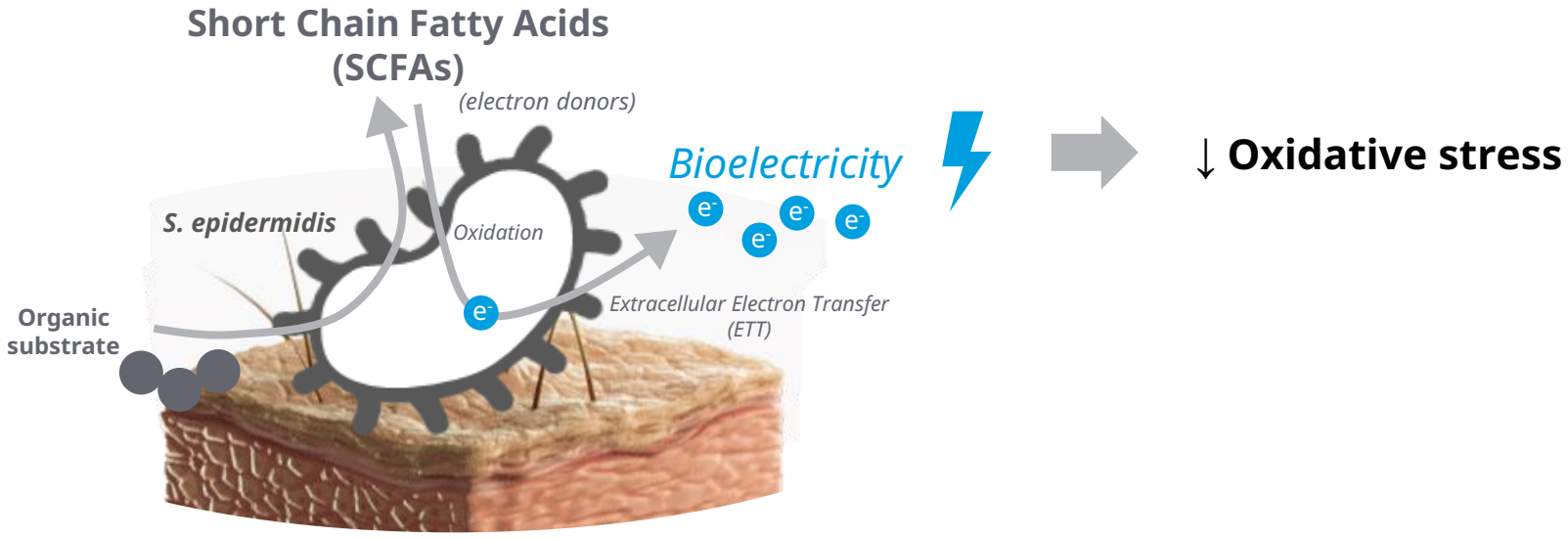
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Did you know your skin microbiome acts as an additional natural antioxidant force field?

The skin hosts specific bacteria, known as **electrogenic bacteria**, which possess the unique ability to generate electricity. Among these, ***Staphylococcus epidermidis*** is one of the most abundant electrogenic bacteria on the skin. The **bioelectricity** generated by these bacteria interacts with ROS, thereby **minimizing oxidative stress** and offering an additional layer of antioxidant defense for the skin.

How do bacteria produce bioelectricity?

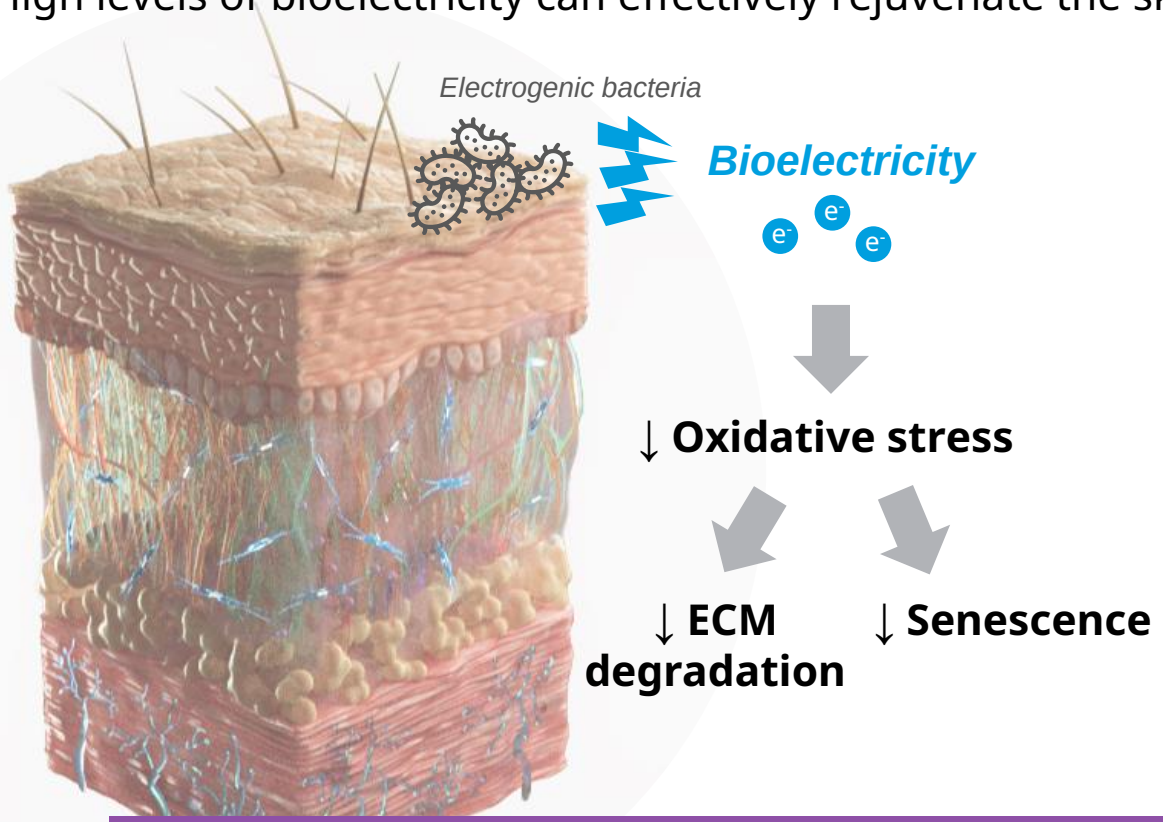


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Sparking youthful skin with the power of bioelectricity

High levels of bioelectricity can effectively rejuvenate the skin, bringing it back to a more youthful state.





Solar radiation, as well as the aging process, can reduce the bioelectricity production in the skin, while increasing oxidative stress, ECM degradation and cellular senescence

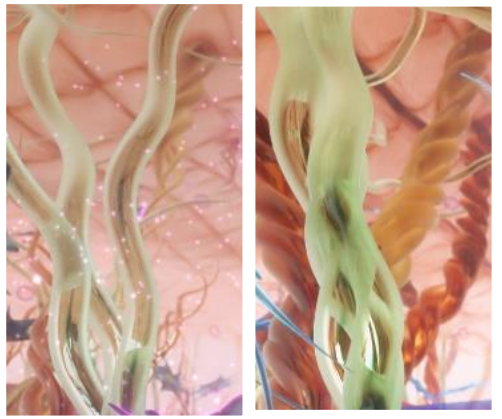
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Behind smooth, flawless, glowing skin

Collagen degradation and cellular senescence, which play a key role in determining skin appearance, are minimized with increased levels of bioelectricity.

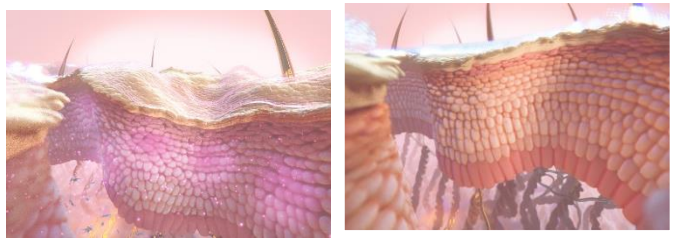
Collagen degradation



Pore reduction
Luminosity
Skin translucency
Smoothness
Youthful appearance



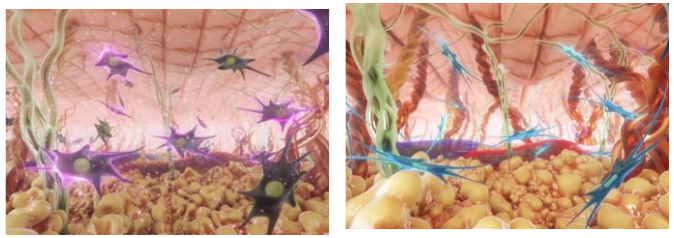
Cellular senescence



Epidermis

- ↑ cell-to-cell connections
- ↑ water transport capacity

Improved barrier function and skin hydration



Dermis

- Smaller and more active fibroblasts
- ↑ Extracellular matrix components (collagen)

Better skin firmness and elasticity
Minimized skin roughness



Poreless, smooth, hydrated and youthful skin can be achieved by minimizing cellular senescence and collagen degradation thanks to higher levels of bioelectricity in the skin

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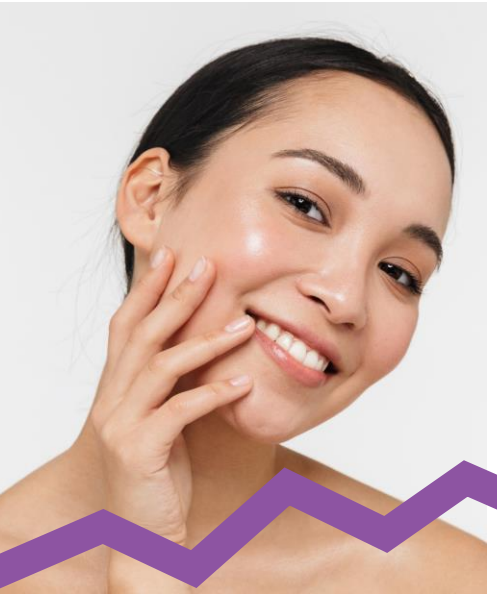
#GlassSkin:
Glowing, smooth, translucent skin

Did you know?

***Skincare** has **overtaken makeup** in the **skin-finish** conversation*

Glass skin, as the name suggests, refers to skin that is smooth, clear, flawless, dewy and glowing, which can look reflective like glass.

Glowing
Trans**L**ucent
hydr**A**ted
Smooth
poreles**S**



How can this smoothness and megawatt skin glow be achieved?

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Sources:
- Online searches: SPATE Platform. Searches in the US and UK - from Jun 2023 to July 2024 vs. June 2022 to July 2023. Predicted growth from Jun 2023 to July 2024 vs. June 2024 to July 2025
- Share of the skin finishes conversation, WGSN.

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Looking for an active ingredient able to **boost skin bioelectricity** for **smooth and flawless glowing skin**...



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Reflective glow, electrified by nature

Lectroglaze™
biotech ingredient

Biotechnological ingredient that enhances the presence of electrogenic bacteria on the skin as well as the skin's natural electricity levels, which act as an additional natural antioxidant force field. As a result, the skin appears poreless, smooth, hydrated and glowing, achieving the well-known glass skin look.

Boosting electricity levels on the skin

IN VITRO

- ✓ Inducing skin bioelectricity
- ✓ Shielding against sun damage
- ✓ Minimizing the impact of senescence

EX VIVO

- ✓ Skin rejuvenating effect

Skin that looks smooth, poreless, flawless and radiant

IN VIVO

- ✓ Reduced appearance of pores
- ✓ Flawless-looking glass skin

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“Fullbiotic” ingredient

With the goal to find an active ingredient able to harness the skin’s microbiome to boost bioelectricity levels, we were inspired by probiotic foods known to modulate the gut microbiome.



PROBIOTIC

Probiotic fermented foods

Contain beneficial bacteria that can support gut health



Lactobacillus

Isolation of live microorganisms (probiotics)

*Selection of **Lactobacillus** isolates from nearly 100 different probiotic foods*



POSTBIOTIC

Fermentation



Screening tests

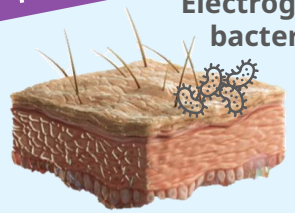
*Lactobacillus from **fermented beet** was the best candidate acting on electrogenic bacteria*

Lectroglaze™ biotech ingredient

Postbiotic ingredient

*Rich in lactic acid, peptides and the prebiotics Fructooligosaccharides (FOS) and Galactooligosaccharides (GOS)**

PREBIOTIC



Staphylococcus epidermidis boost

Skin electricity activation

Rejuvenating effect

Harnessing the “fullbiotic” potential to boost skin electrogenicity

FULLBIOTIC

- Obtained from a **probiotic** source (fermented beets)
- Considered a **postbiotic** (obtained by fermentation from a live microorganism)
- With a **prebiotic** effect, boosting *S. epidermidis* and activating its electrogenicity

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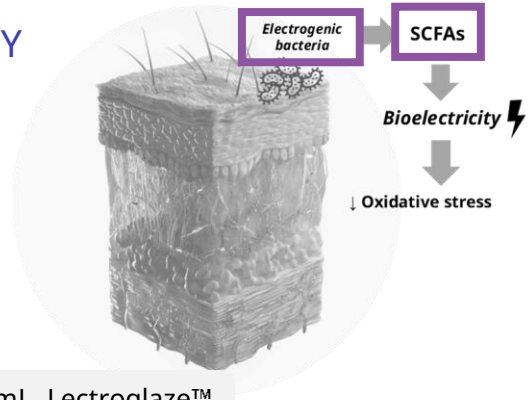
*FOS and GOS are prebiotic fibers that can serve as food for beneficial bacteria (prebiotics)

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In vitro efficacy

- Inducing skin bioelectricity
- Shielding against sun damage
- Minimizing the impact of senescence

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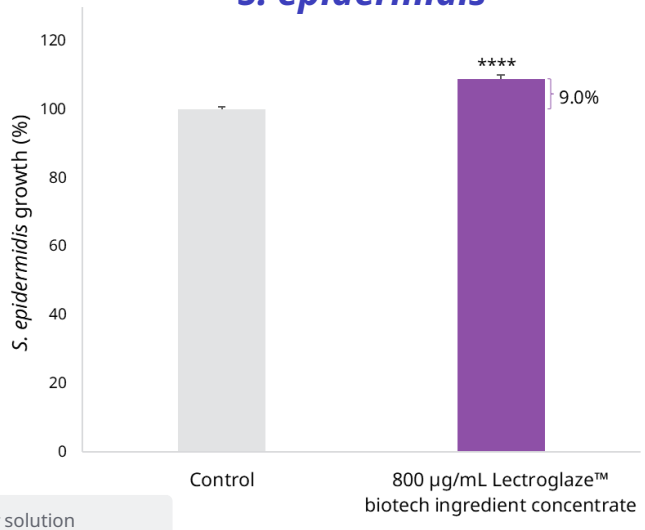
Inducing skin bioelectricity (I)

- Boosting electrogenic bacteria and short chain fatty acids (SCFAs)

A solution containing ***S. epidermidis*** was treated with 800 µg/mL Lectroglaze™ biotech ingredient concentrate for 8 hours.

***S. epidermidis* quantification** by measuring optical density.

S. epidermidis



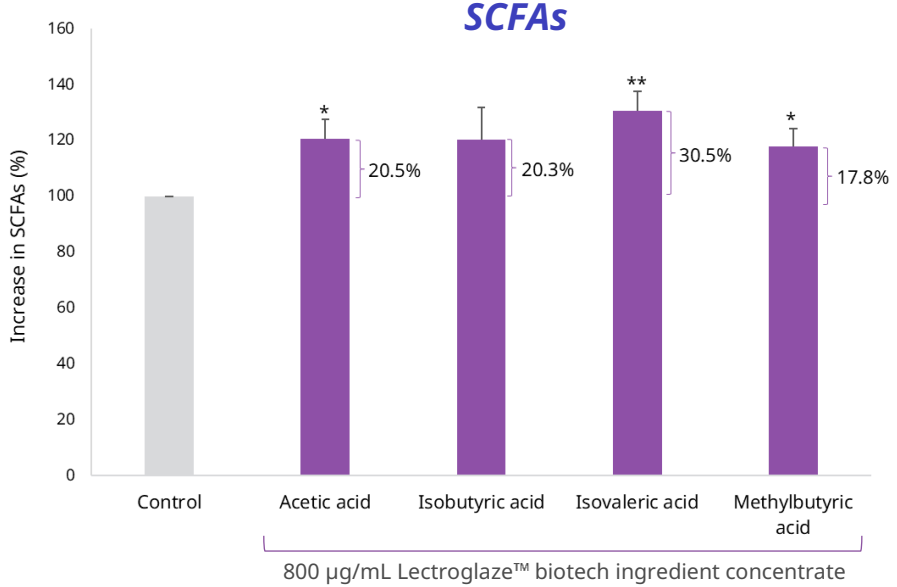
Control: *S. epidermidis* solution

****p<0.0001

A solution containing ***S. epidermidis*** was treated with 800 µg/mL Lectroglaze™ biotech ingredient concentrate for 17 hours.

SCFAs determination from the supernatants through gas chromatography (GC-FID).

SCFAs



Control: *S. epidermidis* solution

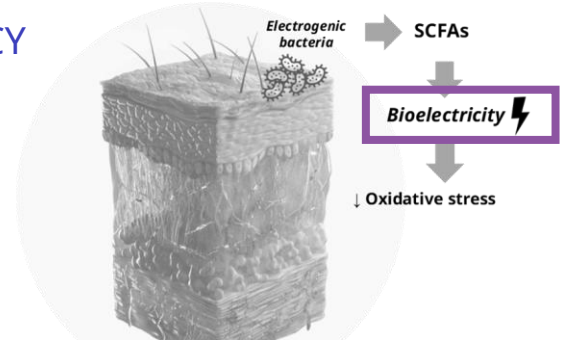
*p<0.05, **p<0.01

SCFAs, such as acetic acid, isobutyric acid, isovaleric acid and methylbutyric acid act as electron donors and are thereby able to promote the electricity production in electrogenic bacteria.

Increased levels of electrogenic bacteria and SCFAs, key to induce the production of bioelectricity in the skin

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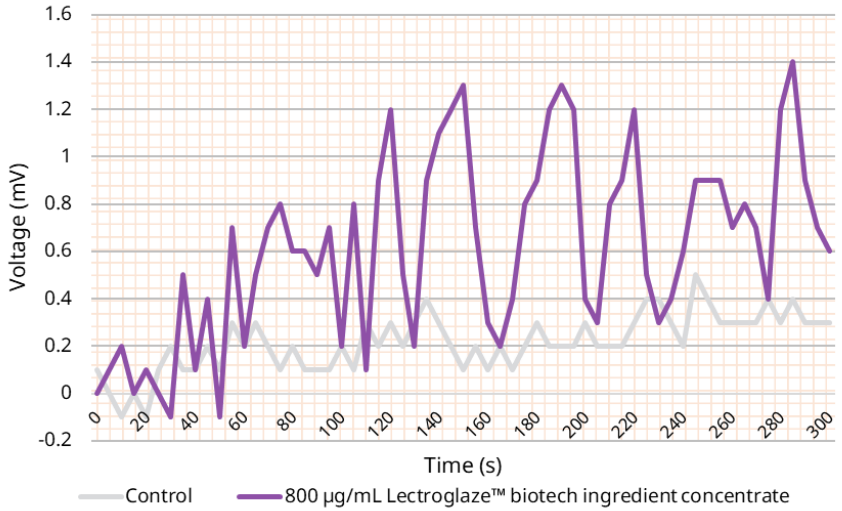


Inducing skin bioelectricity (II)

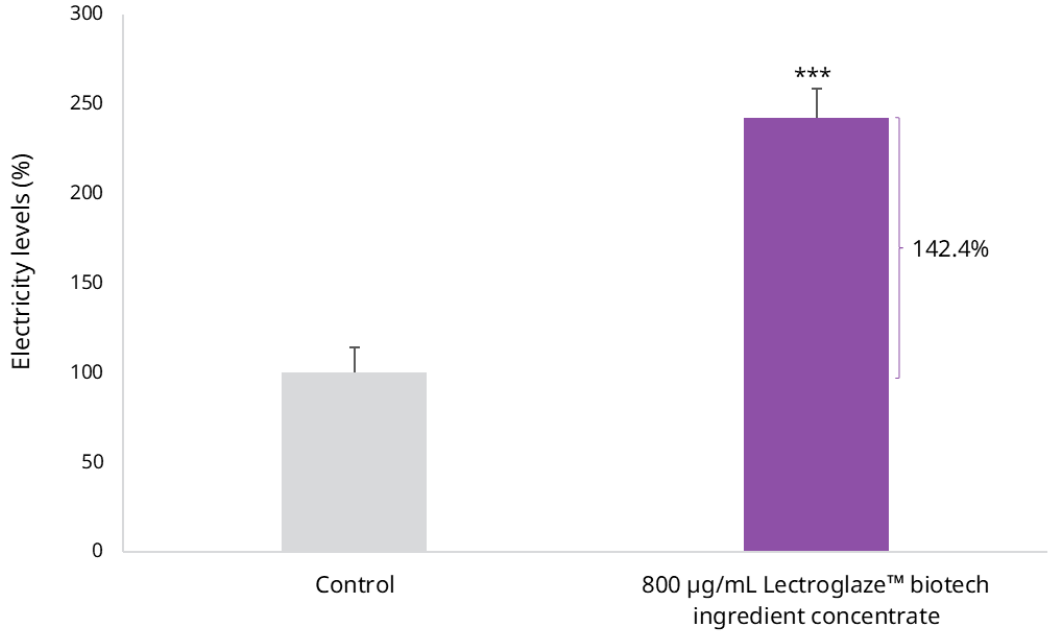
- Enhancing bioelectricity levels

Two electrodes were placed in a solution of ***S. epidermidis*** with or without 800 µg/mL Lectroglaze™ biotech ingredient concentrate.

Electricity levels (changes in voltage (mV)) were quantified by a digital multimeter. The value of highest voltage was used for quantification.



Representative image showing the changes in electricity along time.



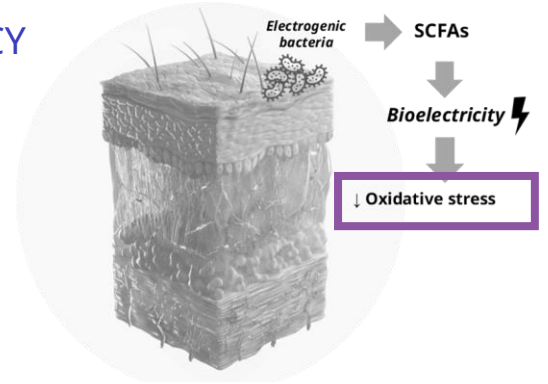
Control: *S. epidermidis* solution

***p<0.001

Higher levels of bioelectricity by boosting the electricity producing capacity of *S. epidermidis*

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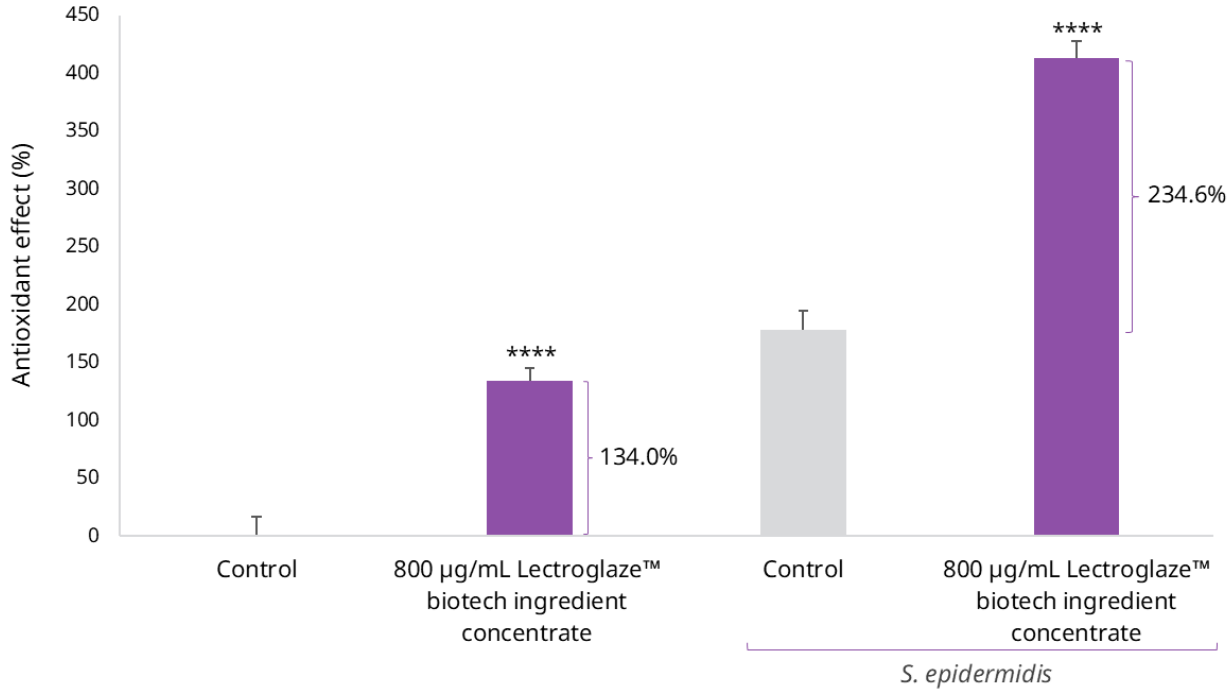
Inducing skin bioelectricity (III)

- Antioxidant effect

A solution with or without ***S. epidermidis*** was treated with 800 µg/mL Lectroglaze™ biotech ingredient concentrate for 24 hours.

Antioxidant efficacy was assessed from the supernatants through the Ferric Reducing Antioxidant Power (FRAP) method.

Enhanced antioxidant efficacy with a synergistic effect when combined with electrogenic bacteria



Control: solution without *S. epidermidis*

****p<0.0001 (vs. control)

Control: *S. epidermidis* solution

****p<0.0001 (vs. control with *S. epidermidis)*

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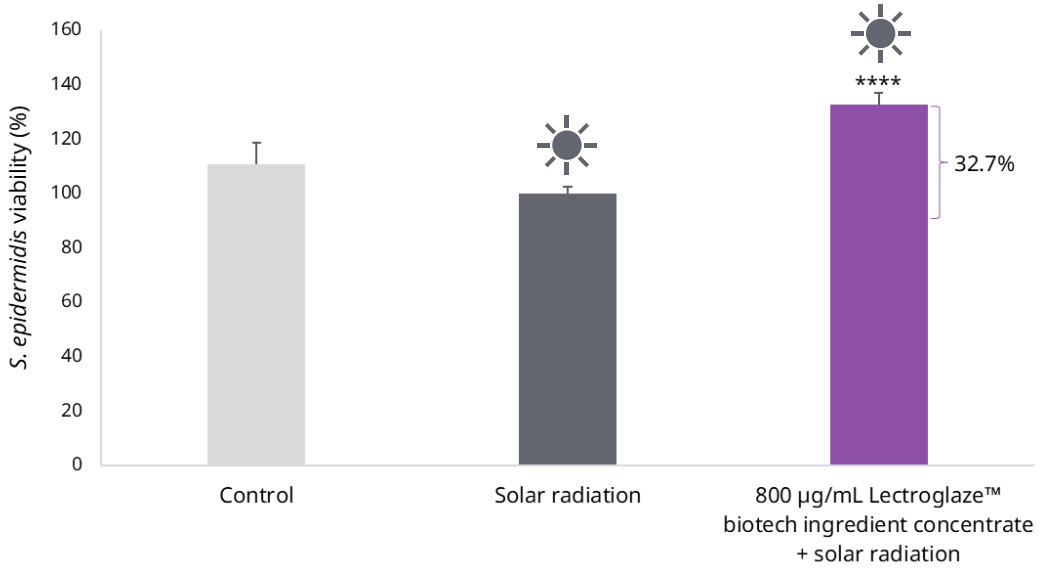
Shielding against sun damage (I)

- Boosting electrogenic bacteria



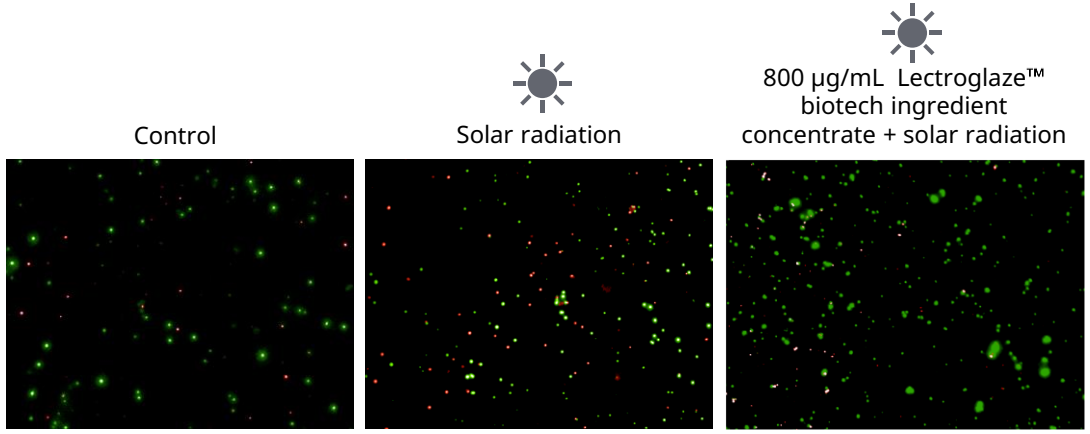
Human dermal fibroblasts co-cultured with human keratinocytes and *S. epidermidis* were treated with 800 µg/mL Lectroglaze™ biotech ingredient concentrate. Immediately after, cells were irradiated with solar radiation* for 2 hours and let recover for additional 24 hours without radiation. *S. epidermidis* was collected from the plates for quantification.

***S. epidermidis* quantification** by measuring optical density. Visualization through a viability/cytotoxicity kit.



Control: non-treated, non-irradiated cells
Solar radiation: non-treated, irradiated cells

****p<0.0001 (vs. solar radiation)



Live *S. epidermidis* in green; Dead *S. epidermidis* in red

Boosting effect of electrogenic bacteria upon solar radiation

*solar radiation (UV+blue light+IR): 32.4-36 J/cm²

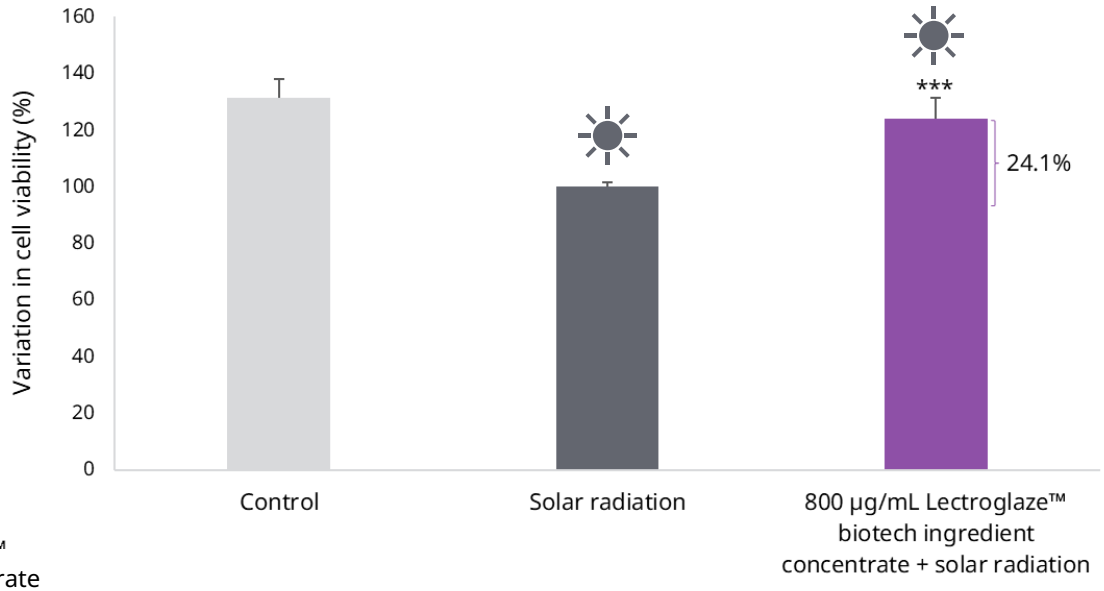
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Shielding against sun damage (II)

- Preserving cellular viability

Human dermal fibroblasts co-cultured with human keratinocytes and *S. epidermidis* were treated with 800 µg/mL Lectroglaze™ biotech ingredient concentrate. Immediately after, cells were irradiated with solar radiation* for 2 hours and let recover for additional 24 hours without radiation.

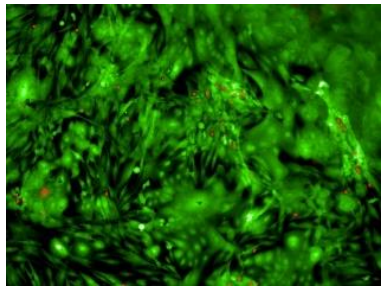
Cell viability was evaluated through a viability/ cytotoxicity kit.



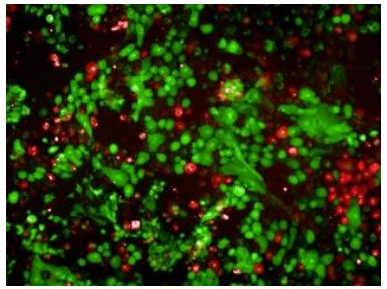
Control: non-treated, non-irradiated cells
Solar radiation: non-treated, irradiated cells

***p<0.001 (vs. solar radiation)

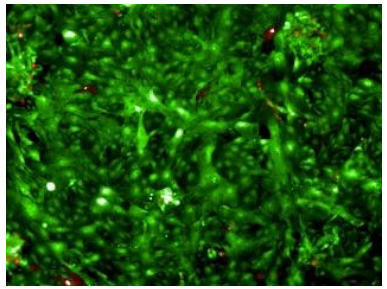
Control



Solar radiation



800 µg/mL Lectroglaze™ biotech ingredient concentrate + solar radiation



Live cells in green; Dead cells in red

Protecting skin cells from the damaging effects of solar light

*solar radiation (UV+blue light+IR): 24.3-45 J/cm²

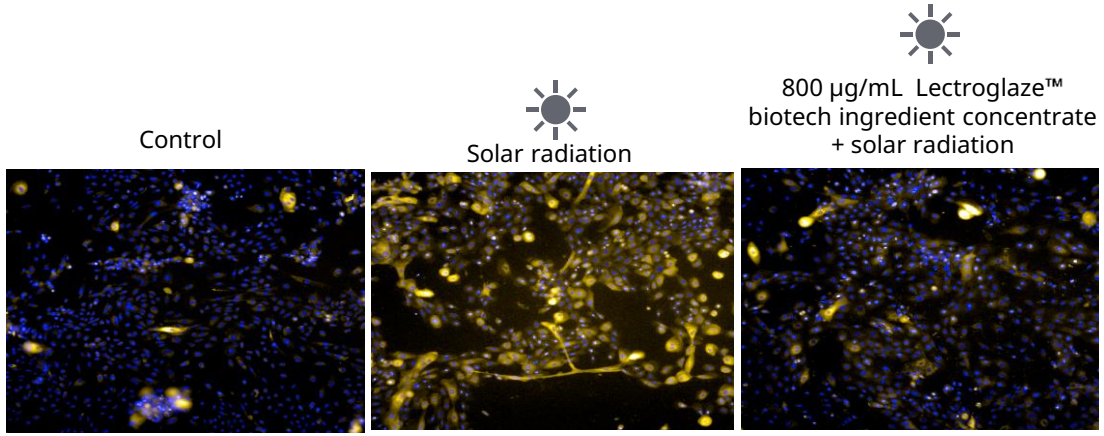
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Shielding against sun damage (III)

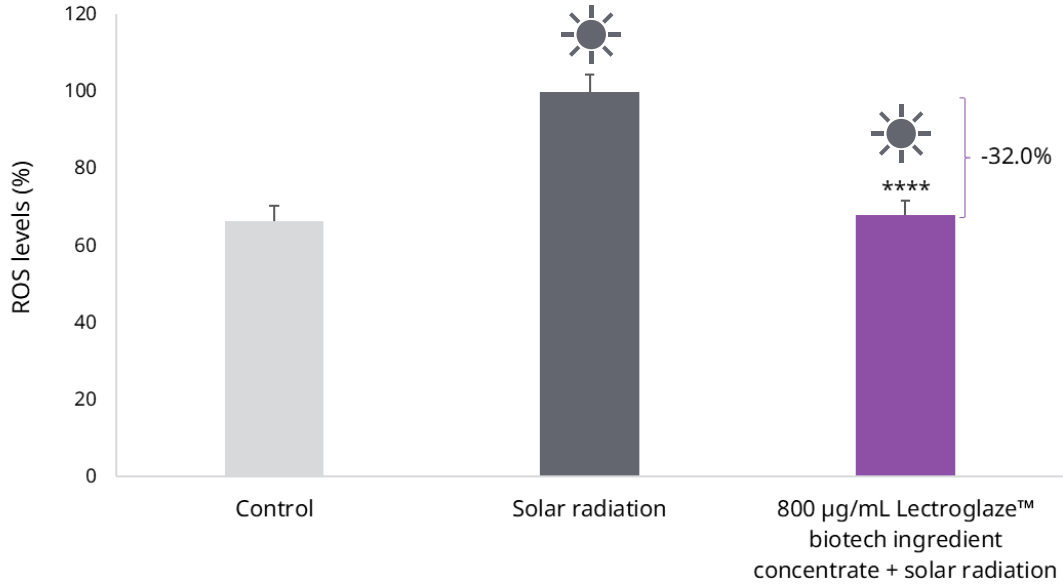
- Reducing ROS levels

Human dermal fibroblasts co-cultured with human keratinocytes and *S. epidermidis* were treated with 800 µg/mL Lectroglaze™ biotech ingredient concentrate. Immediately after, cells were irradiated with solar radiation* for 2 hours and let recover for additional 2 hours without radiation.

ROS levels were quantified using a Cellular Reactive Oxygen Species Detection Assay Kit.



ROS in yellow; cell nuclei in blue.



Control: non-treated, non-irradiated cells
Solar radiation: non-treated, irradiated cells

****p<0.0001 (vs. solar radiation)

Reduced sun-induced oxidative stress in skin cells, suggesting a photoprotective effect

*solar radiation (UV+blue light+IR): 32.4-36 J/cm²

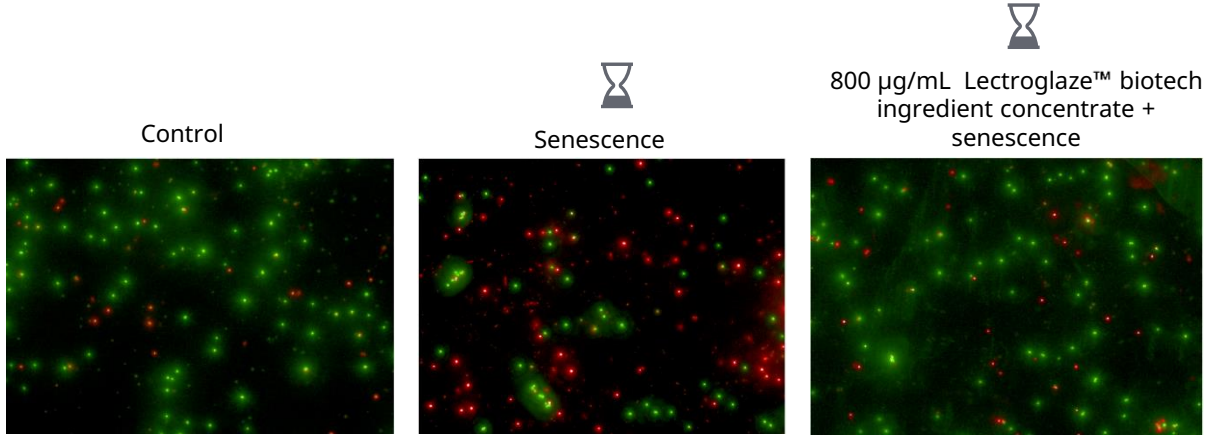
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Minimizing the impact of senescence (I)

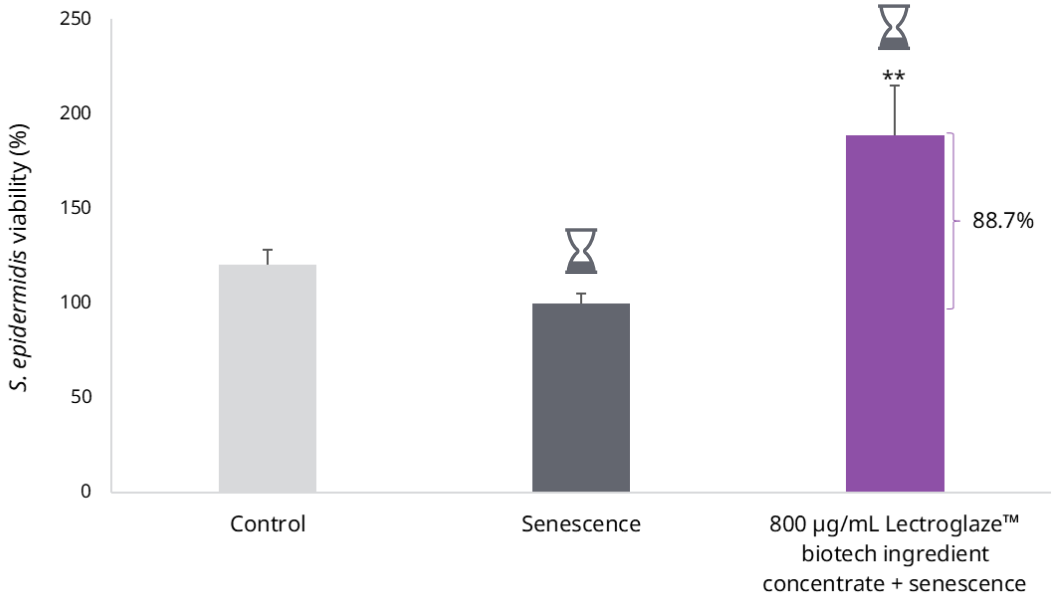
- Boosting electrogenic bacteria

Human dermal fibroblasts co-cultured with human keratinocytes and *S. epidermidis* were treated with 800 µg/mL Lectroglaze™ biotech ingredient concentrate and 50 µM H_2O_2 to induce senescence for 24 hours. *S. epidermidis* was then collected from the plates for quantification.

***S. epidermidis* quantification** by measuring optical density. Visualization through a viability/ cytotoxicity kit.



Live *S. epidermidis* in green; Dead *S. epidermidis* in red



Control: non-treated, non senescent cells
Senescence: non-treated, senescent cells

**p<0.01 (vs. senescence)

Increased electrogenic bacteria despite the age-induced senescence conditions

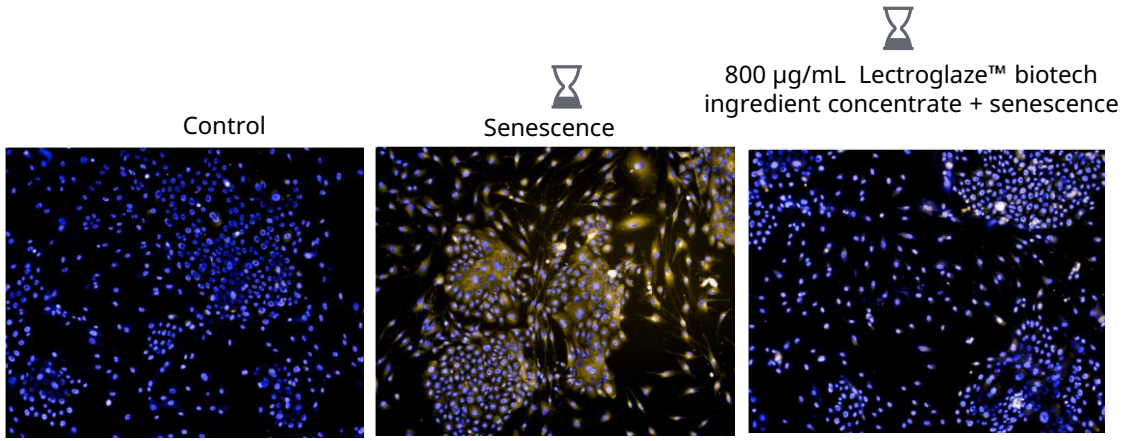
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Minimizing the impact of senescence (II)

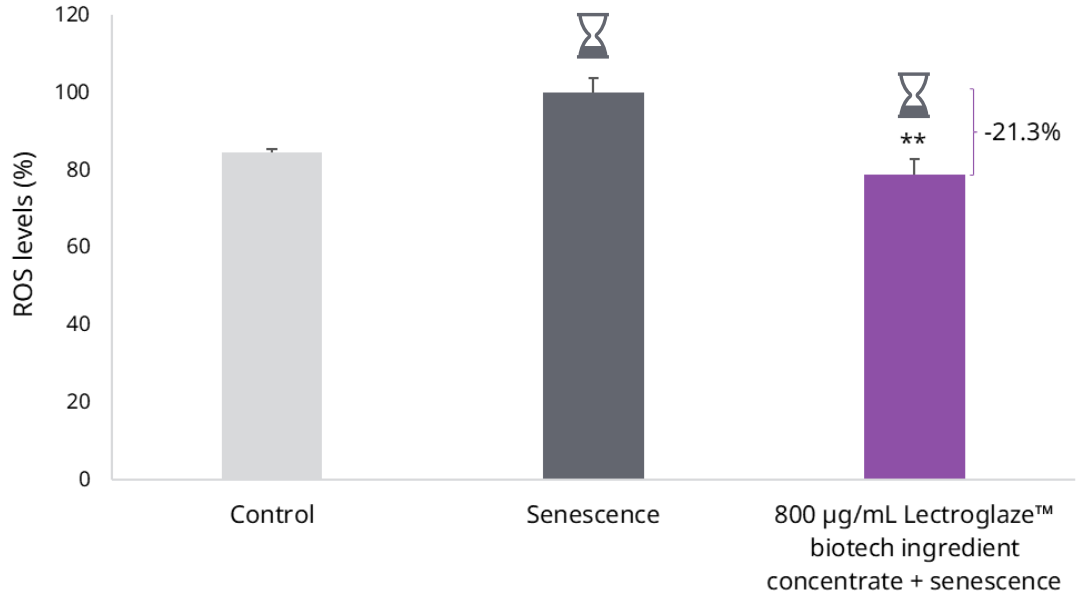
- Protecting from age-induced senescence

Human dermal fibroblasts co-cultured with human keratinocytes and *S. epidermidis* were treated with 800 µg/mL Lectroglaze™ biotech ingredient concentrate and 50 µM H_2O_2 to induce senescence for 2 hours.

ROS levels were quantified using a Cellular Reactive Oxygen Species Detection Assay Kit.



ROS in yellow; cell nuclei in blue.



Control: non-treated, non senescent cells
Senescence: non-treated, senescent cells

**p<0.01 (vs. senescence)

Minimized senescence-induced oxidative stress in skin cells

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Ex vivo efficacy

- Skin rejuvenating effect

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Skin rejuvenating effect (I)

- Boosting electrogenic bacteria and minimizing senescence

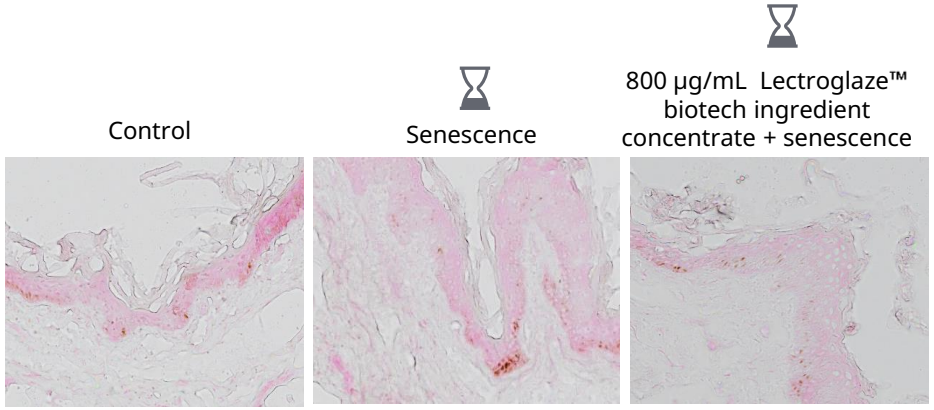
Senescence was induced in **skin biopsies exposed to *S. epidermidis*** by the treatment with 2 mM H_2O_2 for 2 hours. Then, biopsies were treated with 800 µg/mL Lectroglaze™ biotech ingredient concentrate for 24 hours. Both treatments were repeated daily for a total of 3 days. Measurements were performed 24 hours after the last treatment.

***S. epidermidis* quantification** by qPCR.

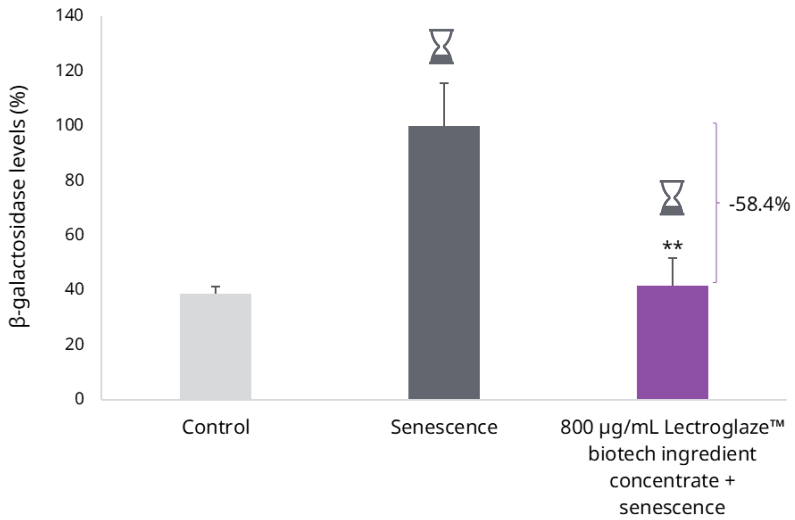
β-Galactosidase was assessed through immunohistochemical staining.

99.4%*** *increase in S. epidermidis under senescent conditions.*

***p<0.001 (*vs.* senescence)



Senescent cells in brown; epidermis in pink.



Control: non-treated, non senescent skin biopsy
Senescence: non-treated, senescent skin biopsy

**p<0.01 (vs. senescence)

Preventing electrogenic bacteria loss due to senescent conditions

Minimizing skin senescence for a skin rejuvenating effect

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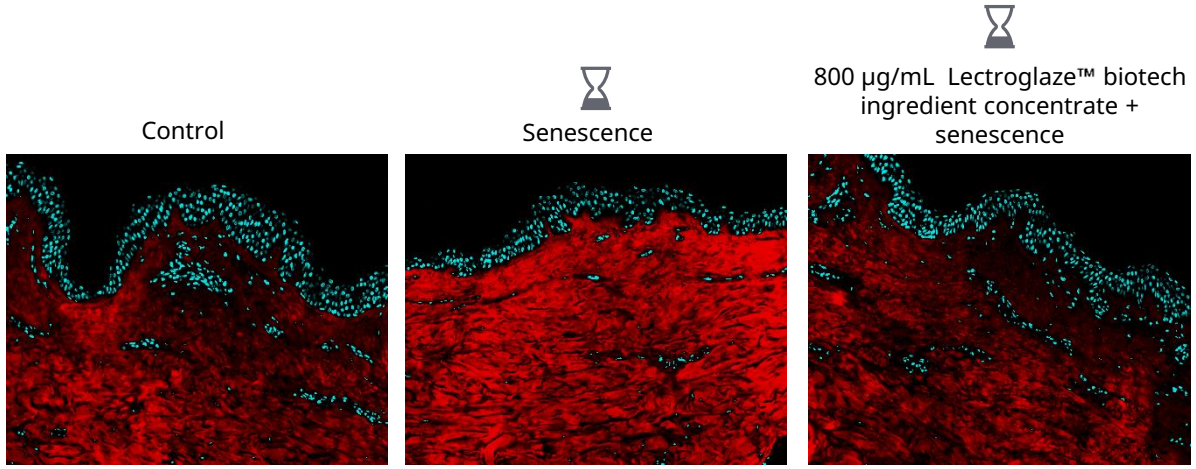
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Skin rejuvenating effect (II)

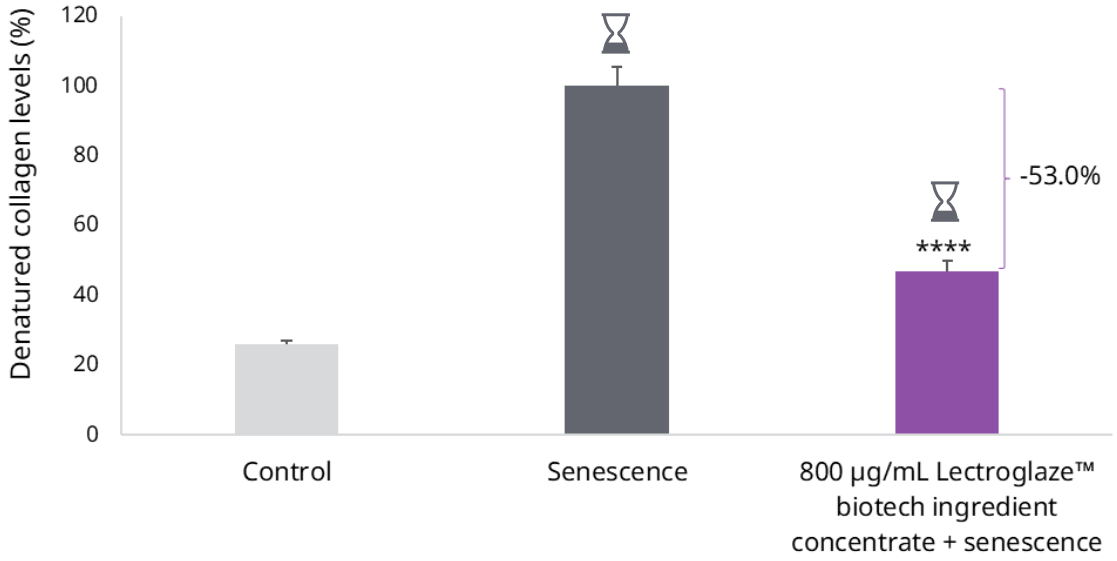
- Reducing collagen degradation

Senescence was induced in **skin biopsies exposed to *S. epidermidis*** by the treatment with 2 mM H_2O_2 for 2 hours. Then, biopsies were treated with 800 µg/mL Lectroglaze™ biotech ingredient concentrate for 24 hours. Treatments were repeated daily for a total of 3 days. Measurements were performed 24 hours after the last treatment.

Denatured collagen was assessed through immunofluorescence staining.



Denatured collagen in red; cell nuclei in blue.



Control: non-treated, non senescent skin biopsy
Senescence: non-treated, senescent skin biopsy

****p<0.0001 (vs. senescence)

Minimized age-induced collagen degradation for a rejuvenating effect

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In vivo efficacy

- Reduced appearance of pores
- Flawless-looking glass skin

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Lubrizol Beauty Research Institutes

Allowing to conduct multicentric, multiethnic clinical studies

Barcelona center





Opened in **2018**

Shanghai center





Opened in **2024**

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Reduced appearance of pores (I)



161 female and male volunteers from Spain and China
Phototypes II to III, 19-61 years old



Cream with 2% Lectroglaze™ biotech ingredient or placebo cream, whole face
Twice a day
28 days



Total pores
Age-related pores

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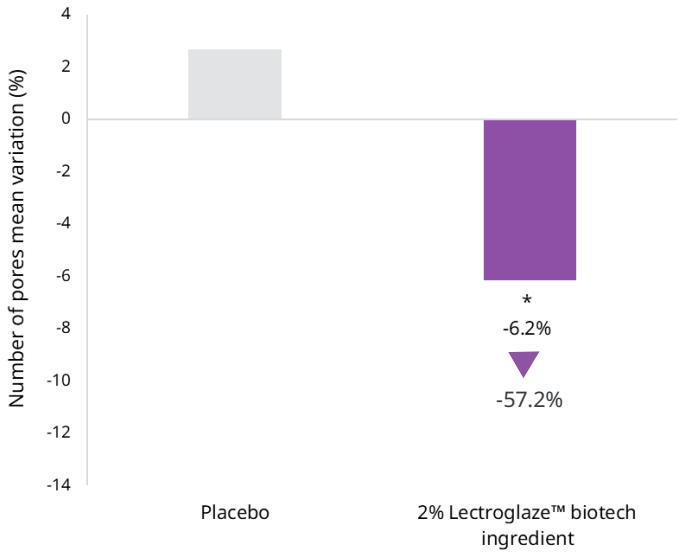
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Reduced appearance of pores (II)

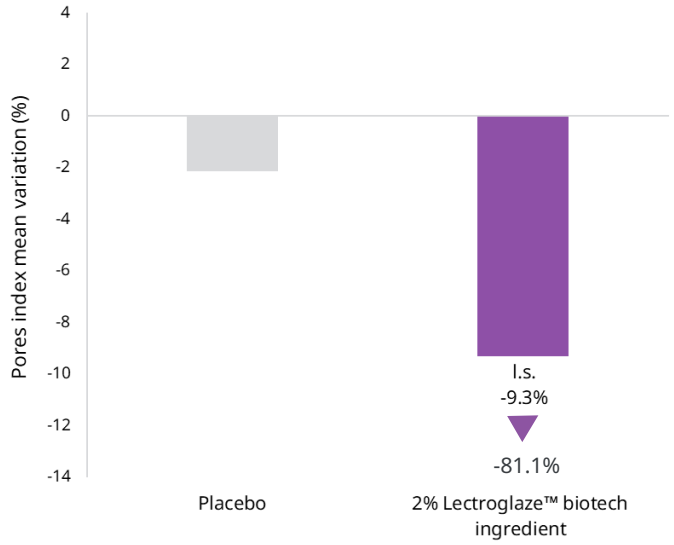
- Total pores

The number of total pores and the pores index were evaluated on a selected region of interest on the cheek area with a 3D imaging system.

Number of pores



Pore index



vs initial time: *p<0.05

vs placebo: *p<0.05

vs initial time: l.s. p<0.1

▼ maximum decrease observed among volunteers

Significant decrease in the appearance of pores for smoother skin

0 days | 28 days



Female volunteer 19 from Spain, 23 years old

0 days | 28 days



Female volunteer 135 from China, 51 years old

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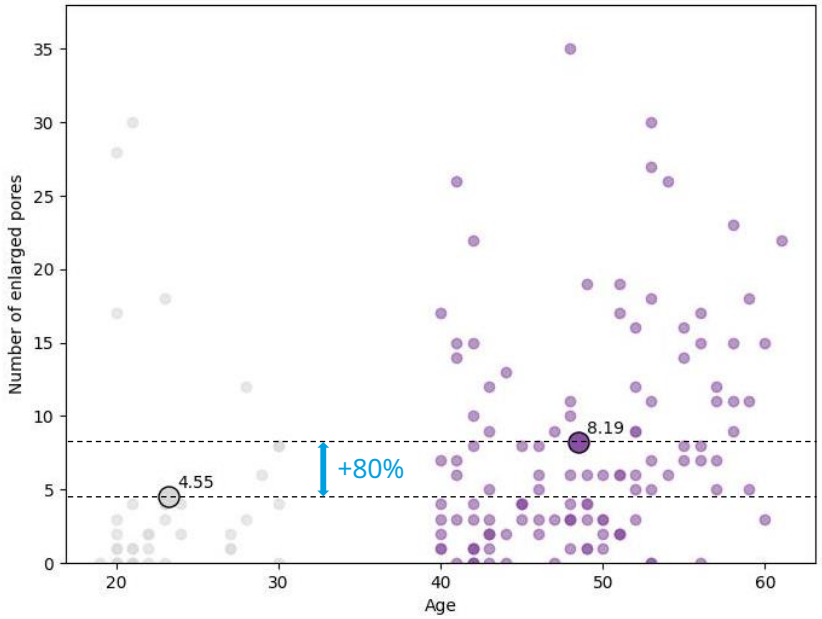
Reduced appearance of pores (III)

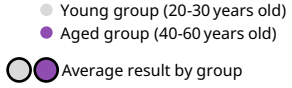
- Age-related pores - 3D imaging processing data analysis

Did you know?

***With age**, pores change in shape and become **enlarged and elongated**. This is mainly caused by the reduced skin firmness and elasticity due to aging.*

Number of enlarged pores by age group at initial time



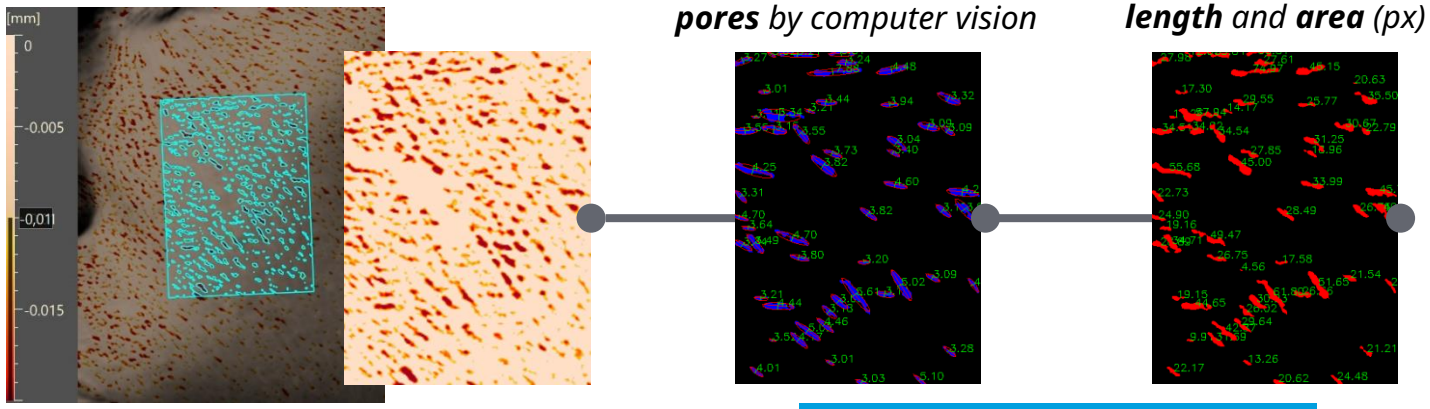


The length and area of **age-related pores** were analyzed through a **computer vision** approach.

*Selection of **all pores** in a region of interest*

*Extraction of **elongated pores** by computer vision*

*Quantification of pore **length** and **area** (px)*



3D imaging processing data analysis of elongated pores performed by **Lubrizol's proprietary computer vision techniques**

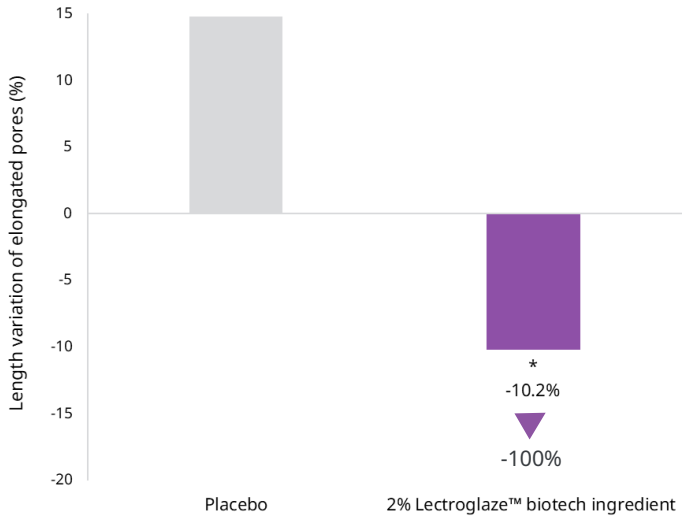
Both pore size and density of visible pores increase with age, leading to higher visibility of age-related enlarged pores

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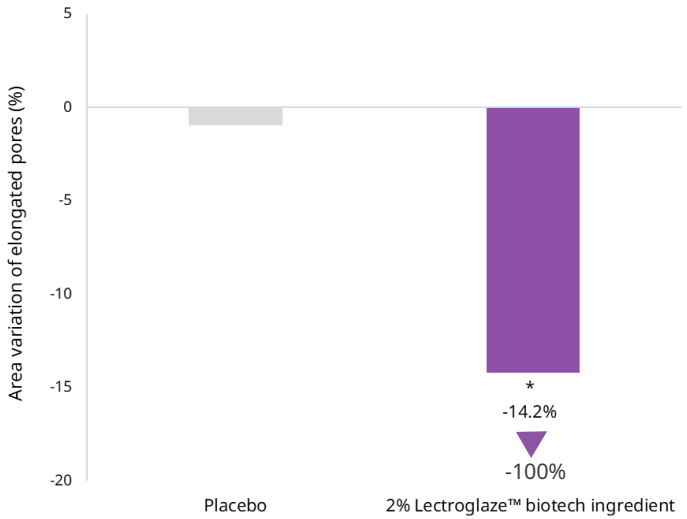
Reduced appearance of pores (IV)

- Age-related pores - 3D imaging processing data analysis

Elongated pores length



Elongated pores area

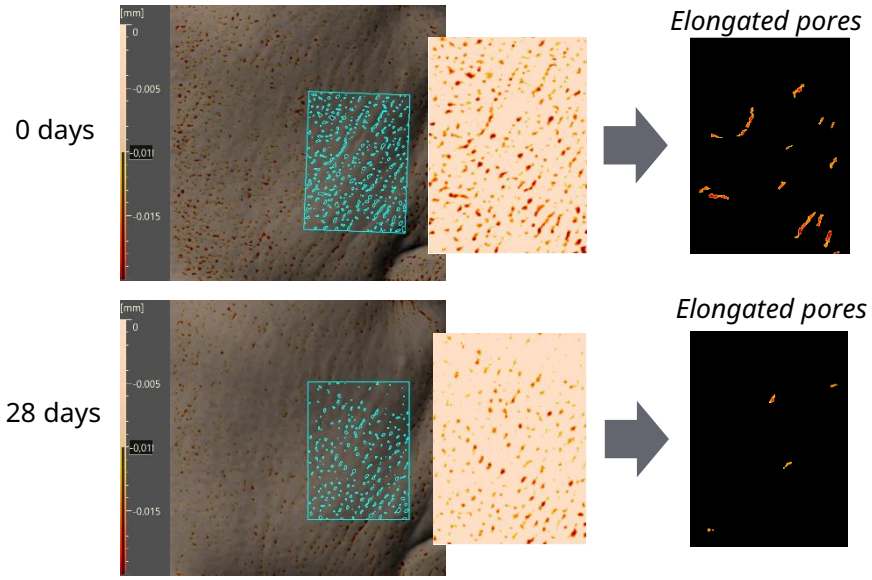


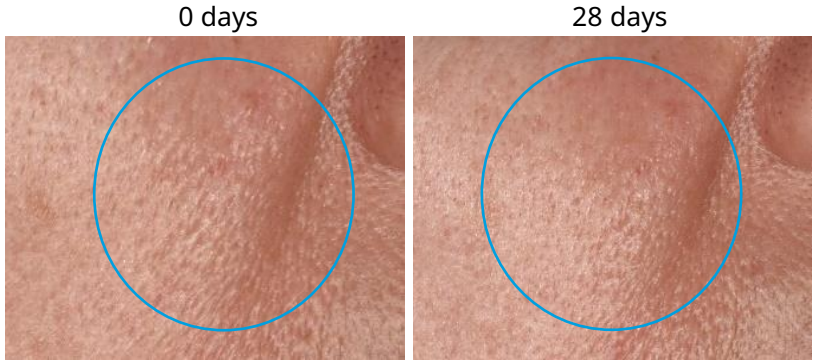
vs initial time: *p<0.05

vs placebo: *p<0.05

▼ maximum decrease observed among volunteers

vs initial time: *p<0.05





Female volunteer 49 from Spain, 58 years old

Reduced appearance of age-related pores for a younger-looking complexion

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Flawless-looking glass skin (I)



95 female and male volunteers from Spain, phototypes II to III
19-61 years old



Cream with 2% Lectroglaze™ biotech ingredient or placebo cream, whole face
Twice a day
28 days



Luminosity
Translucency
Hydration
Anisotropy

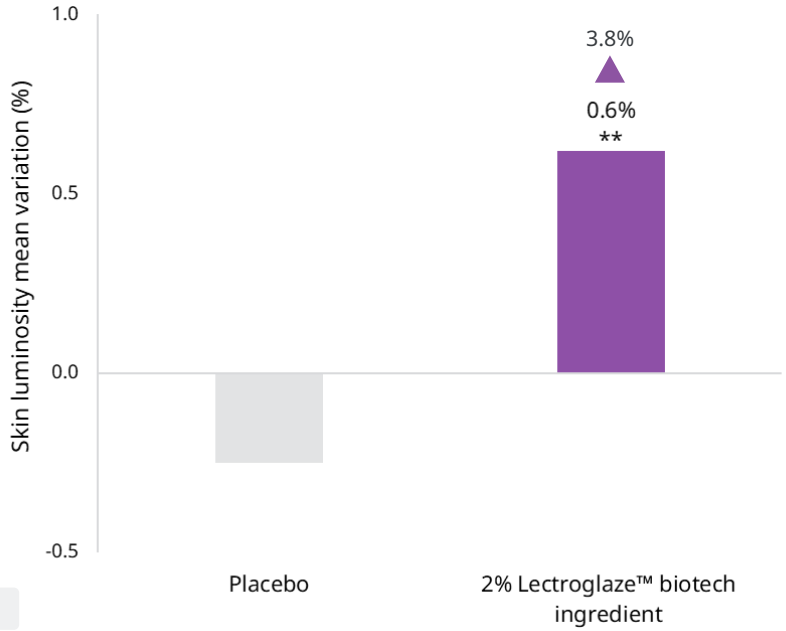
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Flawless-looking glass skin (II)

- Skin glow

The **luminosity** of the skin was evaluated on the cheek through the **L* parameter** in the cieLab color scale using a multi-spectral imaging system.



vs initial time: **p<0.01

vs placebo: **p<0.01

▲ maximum increase observed among volunteers



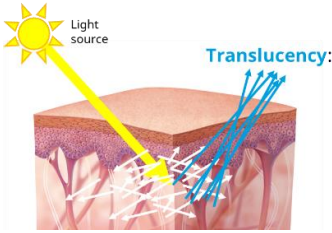
Female volunteer 96, 48 years old

More radiant and luminous complexion

Lubrizol

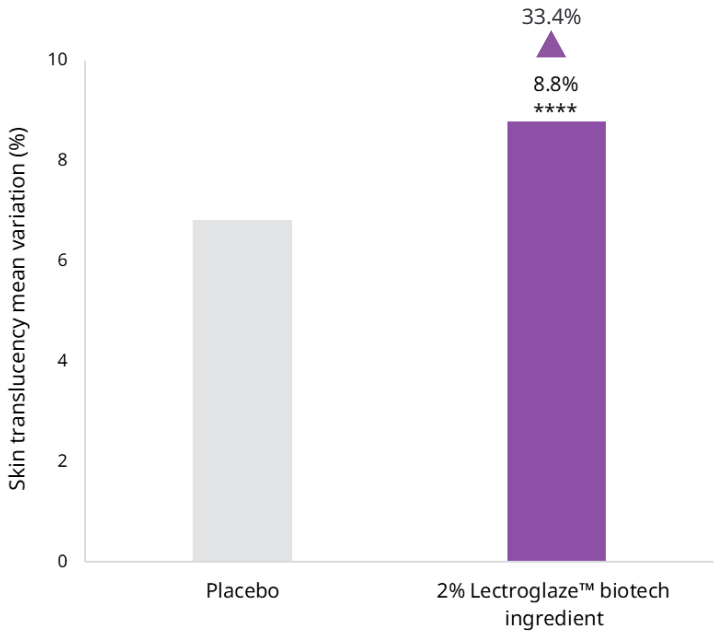
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Flawless-looking glass skin (III)



- Skin translucency

The **translucency** of the skin was evaluated on the cheek by measuring the diffuse light scattered within the skin through a translucencymeter.



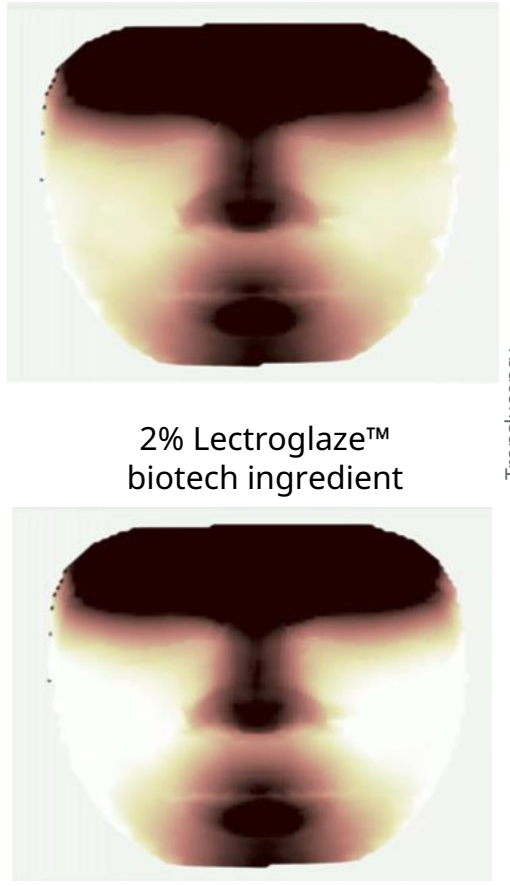
vs initial time: ****p<0.0001

▲ maximum increase observed among volunteers



Female volunteer 19, 23 years old

Skin translucency 3D map
(average results of all volunteers)



Higher translucency for a glow from within effect

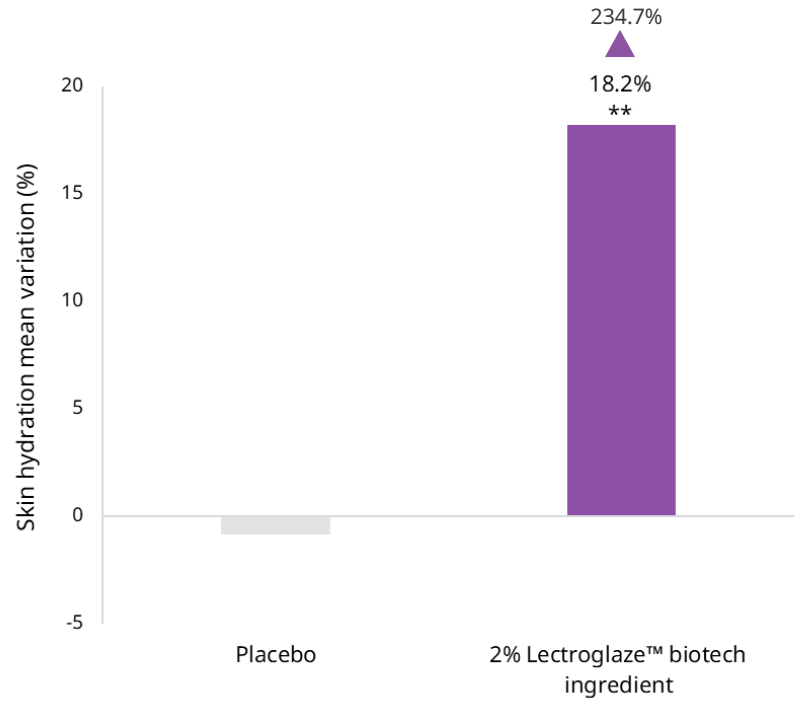
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Flawless-looking glass skin (IV)

- Hydration

Skin hydration was measured through corneometry.



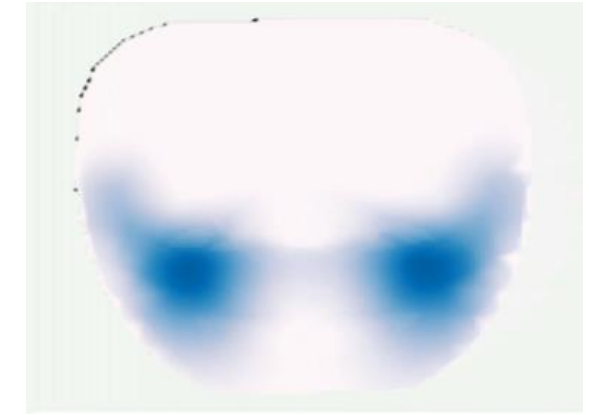
vs initial time: **p<0.01

vs placebo: *p<0.05

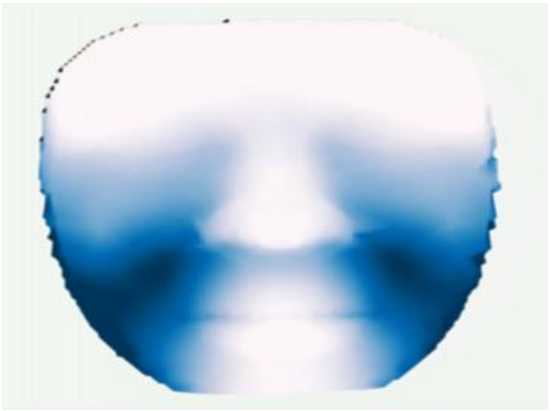
▲ maximum increase observed among volunteers

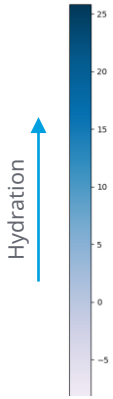
Skin hydration 3D map
(average results of all volunteers)

Placebo



2% Lectroglaze™
biotech ingredient





Significant increase of skin hydration for dewy skin

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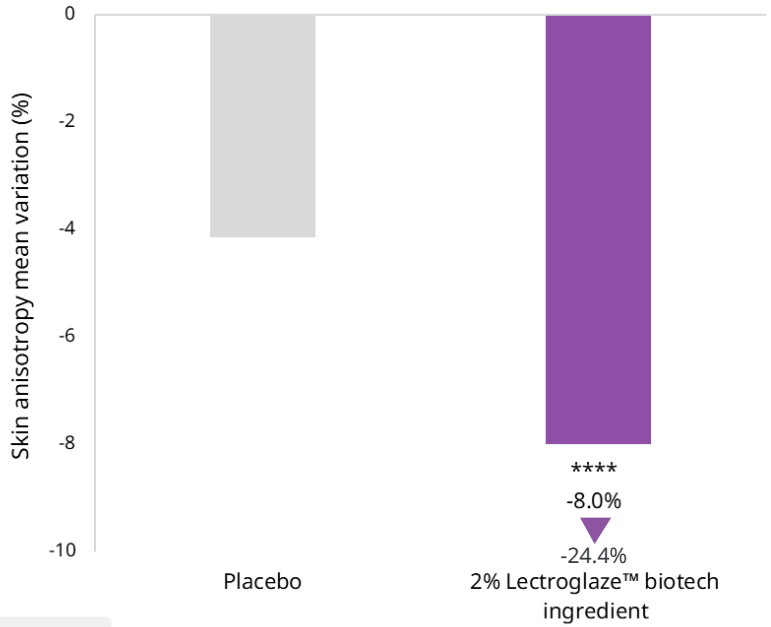
Flawless-looking glass skin (V)

- Smoothness

Skin anisotropy was evaluated on the cheek by means of a 2D imaging system.

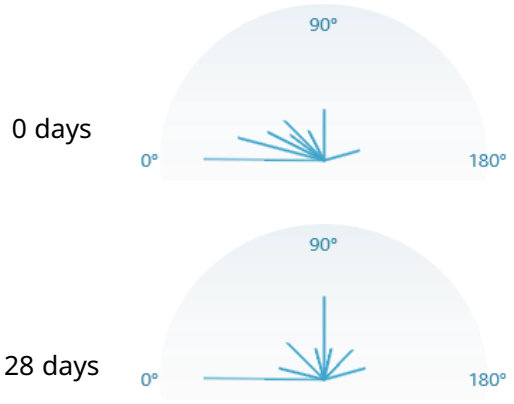
ANISOTROPY: orientation of superficial lines in one same direction.

Younger skin has lower anisotropy, meaning that all the superficial lines have different orientations (are evenly distributed). With time, lines become oriented in a certain direction, altering skin's biomechanical properties.



vs initial time: ****p<0.0001

▼ maximum decrease observed among volunteers



Female volunteer 28, 54 years old



Female volunteer 96, 48 years old

Improved directionality of superficial lines for smoother skin

Lubrizol

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Glass skin look

0 days



28 days



Female volunteer 59, 19 years old

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Conclusions

Glowing
Trans**L**ucent
hydr**A**ted
Smooth
poreles**S**

IN VITRO & *EX VIVO* EFFICACY

Shielding against sun damage

- ↑ electrogenic bacteria 32.7%
- ↑ cell viability 24.1%
- ↓ ROS -32.0%
- 9.0% ↑ electrogenic bacteria
- ↑ SCFAs
- 142.4% ↑ bioelectricity levels
- 234.6% Antioxidant effect

Minimizing the impact of senescence

- ↑ electrogenic bacteria 88.7%
- ↓ senescent cells -37.6%
- ↓ ROS -21.3%
- ↓ collagen degradation -53.0%

IN VIVO EFFICACY

Total pores

- -6.2% ↓ number of pores
- -9.3% ↓ pore index

Age-related pores

- -10.2% ↓ Elongated pores length
- -14.2% ↓ Elongated pores area



Glass skin appearance

- ↑ luminosity 0.6%
- ↑ translucency 8.8%
- ↑ hydration 18.2%
- ↓ anisotropy -8.0%

3D imaging processing data analysis of elongated pores performed by **Lubrizol's proprietary computer vision techniques**

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