BIOME OLÉOACTIF®

[Skin-Microbiome] care

Substantiated oil-based active ingredient concentrated by
Oléo-éco-extraction patented green process

HALLSTAR
BEAUTY

BIOME OLÉOACTIF®

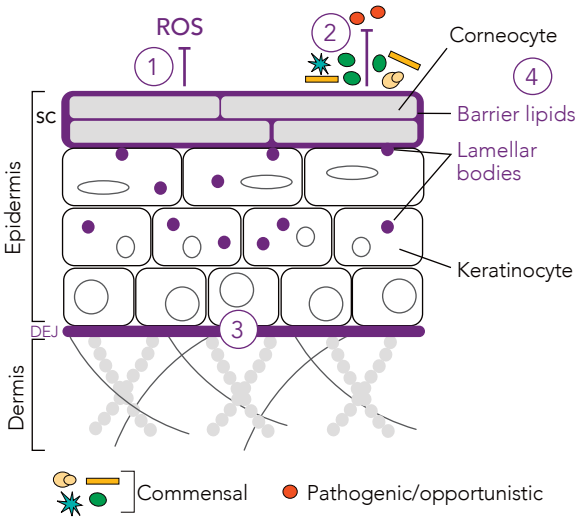
[SKIN-MICROBIOME] ACTIVE FOR A HOLISTIC BEAUTY CARE

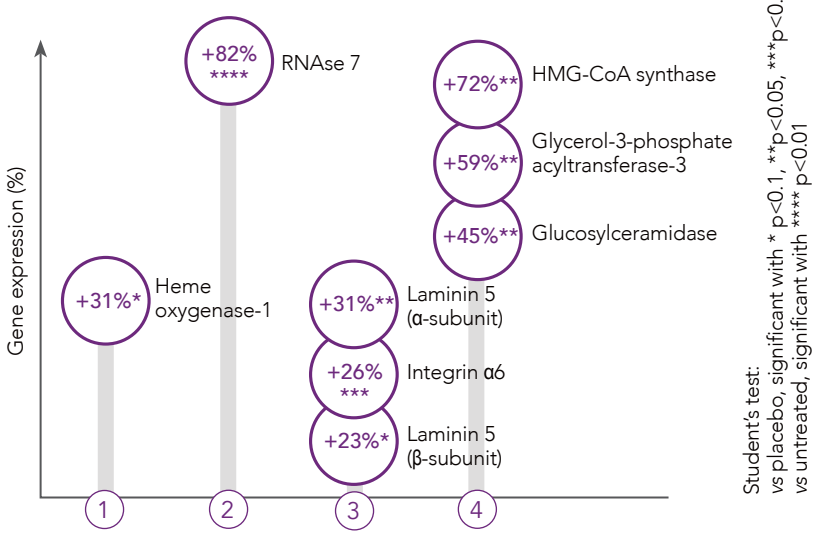
BIOME Oléoactif® is the first ingredient obtained by capturing rare lipids from a wild extremophilic microorganism, then offering them to the skin and its microbiota. Among these lipids, iso C15 fatty acid, specific to bacteria[1], is utilized in cosmetics and personal care for the first time. At the crossroads of bacterial and vegetable worlds, BIOME Oléoactif® both reinforces the integrity of the epidermal barrier and preserves the microbiota of healthy skin to prevent cutaneous discomfort and disease. Obtained through patented Oléo-éco-extraction, this active is a COSMOS-certified natural beauty enhancer complex, totally safe with proven efficacy at low dose.

STRENGTHENING OF EPIDERMAL DEFENSE MECHANISMS AND PHYSICAL CUTANEOUS BARRIER

COSMETO-GENOMIC TEST IN VITRO ON SKIN

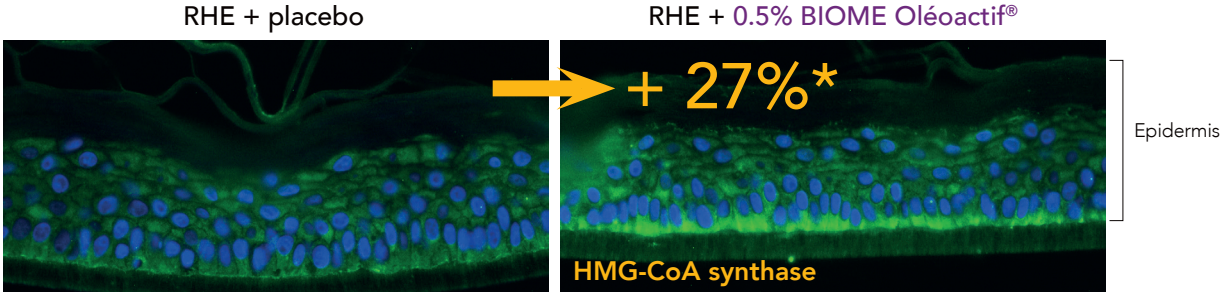
The skin is constantly exposed to extrinsic and intrinsic factors that can impair the lipid barrier and weaken cutaneous immune and antioxidant defenses. In these conditions, cutaneous water loss increases while the skin is not protected against oxidative stress and pathogens. An *in vitro* 3D model of healthy reconstructed human epidermis (RHE) is used to demonstrate that BIOME Oléoactif® is effective to boost gene expressions involved in epidermal barrier function.





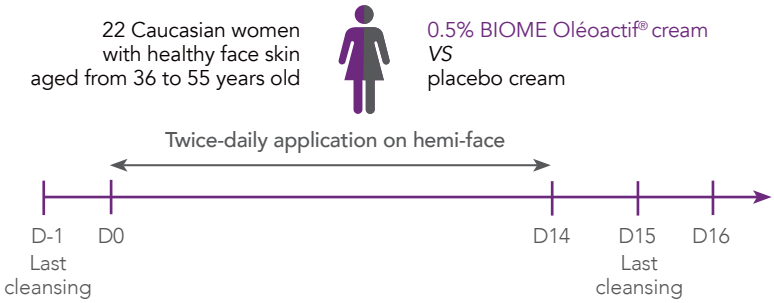
1. Keratinocyte enzyme involved in the first step of antioxidant responses against Reactive Oxygen Species (ROS)[2].
2. Antimicrobial peptide constitutively expressed by keratinocytes, potentially induced by cutaneous commensals (e.g., *Staphylococcus epidermidis*) and involved in skin immune defense system against pathogens[3].
3. Structural proteins of dermo-epidermal junction (DEJ) that acts as a mechanical support for epidermis structuring[4].
4. Keratinocyte enzymes involved in synthesis and transport (*via* lamellar bodies) of lipids composing the intercellular cement of stratum corneum (data respectively bottom to top: ceramides, free fatty acids from phospholipids, cholesterol). These lipids play an essential role in structuring and maintaining the permeability barrier of the skin[5][6].

The result is confirmed on HMG-CoA synthase at protein level thanks to an immunostaining method.



ROLE ON CUTANEOUS MICROBIOME TO IMPROVE SKIN HEALTH AND BEAUTY AT 0.5% DOSE

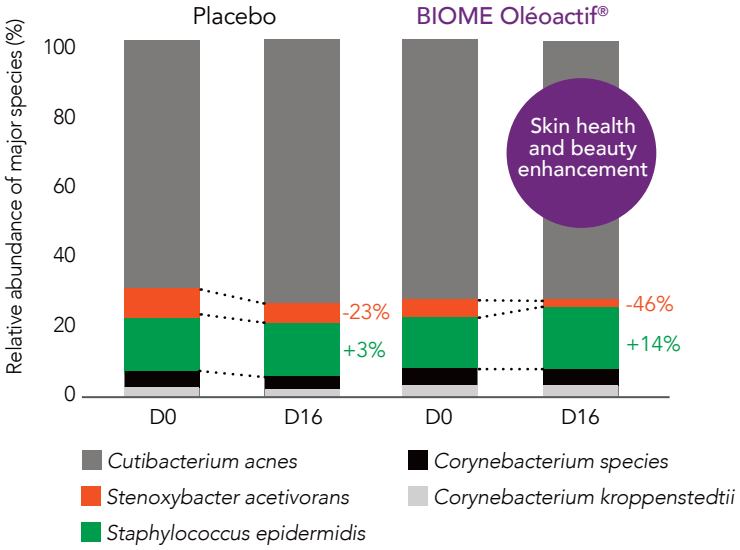
It is increasingly clear that the cutaneous microbiota makes important contributions to normal skin immune development and function. Extrinsic and intrinsic factors may influence skin disruptions by inducing dysbiosis linked to the decrease of the microbial diversity notably characterized by a loss of protective bacteria (e.g., *Staphylococcus epidermidis*) and an overgrowth of pathogenic or opportunistic microorganisms (e.g., *Staphylococcus aureus*)[7][8]. To prevent imbalanced skin conditions, experts recommend using cosmetics preserving skin microbiota ecosystem. A randomized single blind study is performed to evaluate the impact of BIOME Oléoactif® on cutaneous microbiota and skin aspect after repeated applications for 15 days.



At D0 and D16:
- Cheeks swabbing for skin microbiota analysis at phyla and species levels (16S-rDNA sequencing, metagenomic-based approach)
- Clinical scoring by a dermatologist
- Face photos (VISIA-CR®)

At D16:
- Self-evaluation questionnaire

Respect of skin microbiota



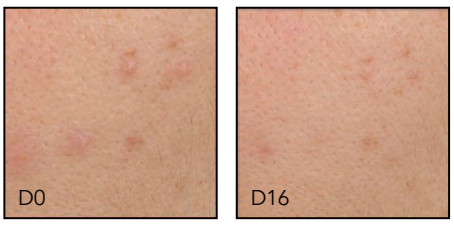
After 15 days of application, BIOME Oléoactif® preserves the bacterial diversity (Shannon index) and the microbiota global composition (Phyla level) of healthy skin.

Moreover, compared to D0 and to placebo, BIOME Oléoactif® modulates some cutaneous bacterial species related to better skin condition:
- Increase of the protective species *Staphylococcus epidermidis*
  Skin protection against pathogens and overexpressed inflammation[7][8].
- Decrease of *Stenoxybacter acetivorans*
  Better skin oxygenation[9].

Visible benefits after 15 days

- Clinical scoring by a dermatologist
  +10%* smoothness and -162%** fine lines.
  ** vs D0, significant with p<0.05 – Wilcoxon Signed-Rank test. ** vs placebo, significant with p<0.1 – Mann-Whitney test.*

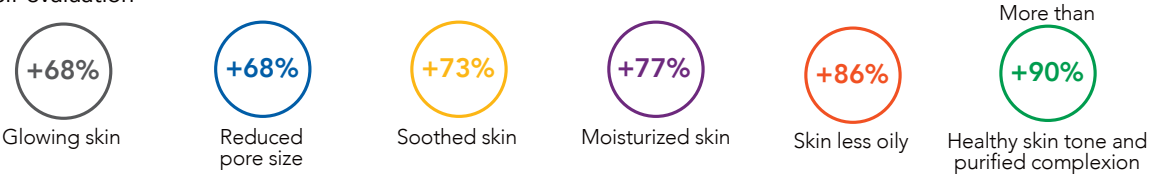
- VISIA-CR® photos



Smoother skin texture on cheek – middle aged skin (36 years old)

Reduction of visible fine lines on crow's feet and nasolabial fold - mature aged skin (50 years old)

- Self-evaluation



PREBIOTIC EFFECT OF ISO C15 FATTY ACID

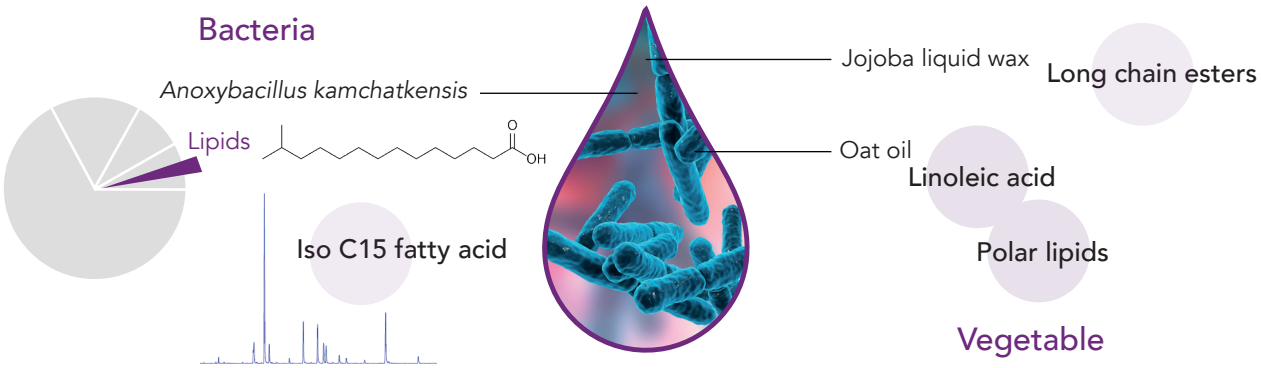
In a bacterial co-culture model and at a dose equivalent to 0.5% BIOME Oléoactif®, iso C15 fatty acid presents a prebiotic effect by encouraging the growth of the protective and regulator *Staphylococcus epidermidis* to the detriment of the other bacteria involved in potential skin discomfort or pathogenesis *(Staphylococcus hominis, Cutibacterium acnes, Staphylococcus aureus)*[7][8].

FROM VOLCANIC SOURCES TO SKIN

Bacteria are the ancestral origin of life endowed with unique adaptation systems to the environment. *Anoxybacillus kamchatkensis,* first discovered in the Valley of Geysers in Kamchatka peninsula (Russia)[10], is an extremophilic bacterium native of hot springs, locations with well-known therapeutic virtues. To create BIOME Oléoactif®, the *Anoxybacillus kamchatkensis* wild strain was isolated by Deinove from an underground thermal water source in the French volcanic region of Chaudes-Aigues. After fermentation under controlled conditions, the biomass is extracted by Hallstar Beauty's patented green process to provide its best benefits to the [skin-microbiome] ecosystem.

POST-PREBIOTIC CONCEPT WITH A UNIQUE MULTIFUNCTIONAL LIPID COMPOSITION

BIOME Oléoactif® is the first ingredient that combines a postbiotic origin with a prebiotic effect under 100% oil-based composition. Indeed, Hallstar Beauty succeeded to reach the precious lipid part of *Anoxybacillus kamchatkensis* by extracting a rare ramified fatty acid, iso C15, then providing it as a support to skin microbiota for health benefits. Iso C15 fatty acid acts in synergy with vegetable lipids from jojoba liquid wax and oat oil, conferring innovative properties to BIOME Oléoactif®[11].



TECHNICAL AND REGULATORY DATA

INCI NAME:	Simmondsia Chinensis Seed Oil (and) Avena Sativa Kernel Oil (and) Bacillus Ferment
RECOMMENDED DOSE:	0.5% - 5%
RECOMMENDED pH:	3-10
SOLUBILITY:	Liposoluble
FORMULATION:	In the fatty phase before emulsification or at the end of the formulation process or directly in anhydrous formulas.
APPLICATIONS:	[Skin-Microbiome] care, microbiome-friendly care, post-prebiotic care, skin barrier functions strengthener, beauty enhancer, prevention of imbalanced skin condition. Combinable with all cosmetic claims for a holistic system leading to healthy, protected and youthful skin. Men and women care. Suitable for all types of skin. Cleansing products, oily serums, primers, color cosmetics.

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