Active Beauty
B-Lightyl™
The universal dark spots fader

1st Prize B-Lightyl™ PCHi 2021 Foutain Awards Whitening / Brigthening

BSB Innovation Award® 3rd Prize Cosmetics 2021 Category Most Innovative Raw Material

Crafted by blue biotechnology

Givaudan

Focus on the product

Pigmentation disorders and dark spots…it's all about communication!

Dark spots (or ageing spots, brown spots, etc.) **are one of the most important ageing concerns for consumers** globally (68% rank it in their top 3 most important signs of ageing[1]). They are the consequence of a biological process getting out of control: skin pigmentation, which results in an overproduction of melanin, the pigment responsible for the colour of our eyes, hair or skin.

This loss of control on the pigmentation process may have various causes: intrinsic ageing (resulting in senile lentigo), overexposure to UV (solar lentigo), inflammation process or wound healing (scars), amongst many others.
Up to now, the only way to fight against hyperpigmented spots was to use whitening agents or exfoliating compounds, which are often aggressive for the skin, or result in a general impact on the skin tone, as they are not specifically acting on the spots.

A new biological pathway has recently been identified[2], explaining how a **loss of communication between senescent fibroblasts and melanocytes is one of the main causes for the pigmentation disorders**. A key protein (SDF-1) is indeed playing a crucial messenger role in our skin, but its production decreases drastically in senescent conditions. This was the key Givaudan Active Beauty scientists were looking for, to offer a **new and exclusive ingredient, specifically targeting pigmentation spots**, without impacting consumers natural skin tone!

From sun power to a powerful marine extract

A macroalgae (*Himanthalia elongata*), concentrating extraordinary active compounds, was identified in our Marine Biotechnology Centre of Excellence in the pink granite Coast (Brittany, France). This brown algae, up to 2 meters long, growing close to the coast, is largely used in the food industry.

During its growth, this macroalgae uses the power of sunlight and capture CO_2 to produce their key constituents. By doing so, they participate in lowering the atmospheric carbon released by industrial activities, making it **one of the most sustainable resources to develop new cosmetic ingredients**. To preserve this sustainable aspect, the algae used as raw material are then harvested manually at low tide, by trained men and women, called "Goémoniers".

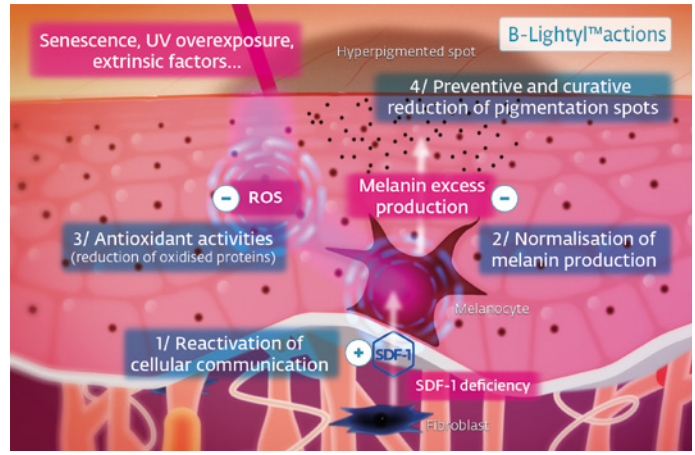
Himanthalia elongata produces many biomarkers of interest, such as polyphenols, and more specifically **phlorotannins**. These particular molecules have been identified during our screening for their **ability to reactivate the expression of SDF-1, thus taking back the control on skin pigmentation**.
By enriching the extract in those molecules of interest, our scientists gave birth to B-Lightyl™, the universal dark spots fader.

B-Lightyl™ - everyone can say goodbye to their spots!

By re-establishing **communication between fibroblasts and melanocytes** (reactivating SDF-1 production in senescent skin conditions or under over-exposure to UV), and thanks to its **antioxidant properties**, B-Lightyl™ enables to take back control on the skin pigmentation process, both in a preventive and curative way.

Three clinical tests, on nearly 100 volunteers, have highlighted that B-Lightyl™ **significantly decreases the melanin content in dark spots, while reducing their number** (up to 4 times better than placebo). Those studies were carried out on various skin ethnicities (Caucasian, Asian or African), demonstrating the **universal efficacy of the ingredient**.

Thanks to its unique and innovative mode of action, combined to a proven clinical efficacy, **B-Lightyl™ is the perfect natural ingredient to fight against dark spots and hyperpigmentation**, no matter their cause.



1- Givaudan on line survey over 6 countries (USA, Brazil, France, UK, Korea, China), 1230 respondents (women from 18 to 50 years old), February 2019
2- Yoon JE et al. Senescent fibroblasts drive ageing pigmentation: A potential therapeutic target for senile lentigo. Theranostics. 2018 Sep 9;8(17):4620-4632

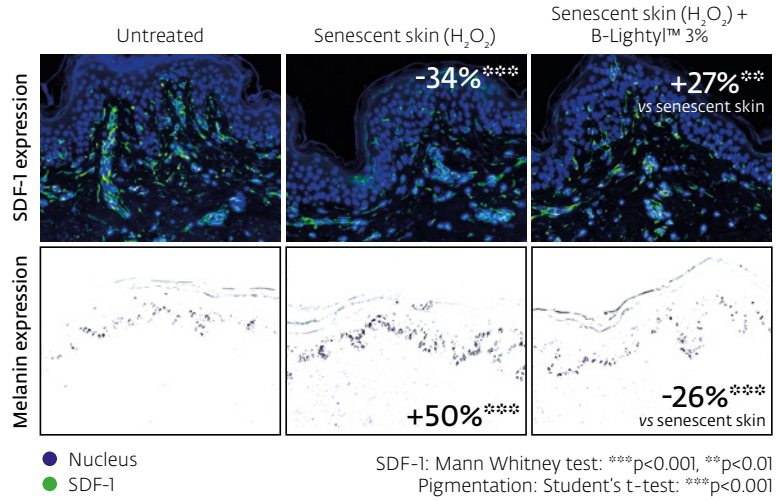
Biological activity

Acting on a new pathway (SDF-1) to avoid pigmentation disorders

1. In senescent conditions (*ex vivo*)

Senescence was daily induced for 5 days in skin explants from 3 independent donors by a systemic treatment with H_2O_2 to evaluate its impact on SDF-1 expression and on pigmentation. Explants were also daily treated or not with B-Lightyl™ at 3%. SDF-1 immunostaining was then performed to quantify its expression, as well as Fontana Masson staining on the same explants to assess the melanin content, resulting in a pigmentation index via image analysis.

Results: Senescence clearly impacts the expression of SDF-1 (down to -34%), resulting in a hyperpigmentation in the explants (+50%). B-Lightyl™ **significantly restores SDF-1** expression in senescent fibroblasts, by +27%, **resulting in a better control of the pigmentation**, down to -26%.

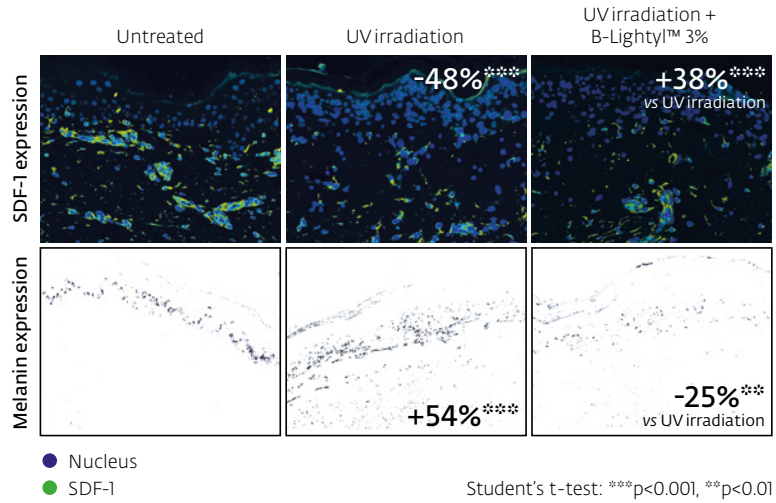


SDF-1: Mann Whitney test: ***p<0.001, **p<0.01
Pigmentation: Student's t-test: ***p<0.001

2. Under UV-exposure (*ex vivo*)

Another model was developed to evaluate the impact of UV-exposure on SDF-1 expression and its potential consequences in terms of hyperpigmentation. Skin explants from 3 independent donors were daily exposed to UV (with a representative ratio UVA/UVB=27), at 75% of MED, and topically treated or not with B-Lightyl™ at 3%. SDF-1 immunostaining was then performed to quantify its expression, as well as Fontana Masson staining on the same explants to assess the melanin content, resulting in a pigmentation index *via* image analysis.

Results: UV-exposure clearly impacts the expression of SDF-1 (down to -48%), resulting in a hyperpigmentation in the explants (+54%). B-Lightyl™ **significantly restores SDF-1 expression** in UV-exposed fibroblasts, by +38%, **resulting in a better control of the pigmentation**, down to -25%.



Student's t-test: ***p<0.001, **p<0.01

3. Unique efficacy *vs* benchmark molecules (*ex vivo*)

To prove the unicity of B-Lightyl™, the same senescence model than before (H_2O_2) was applied to a pool of 2 donors' skin explants, comparing the efficacy of topical treatments with B-Lightyl™ at 3%, or 2 reference molecules: hydroquinone at 2% or phenylethyl resorcinol at 0.3%. SDF-1 expression was assessed at D5 thanks to immunostaining.

Results: B-Lightyl™ is the only active able to reactivate SDF-1 expression in senescent skin conditions.

Topical treatment applied to the skin	SDF-1 expression (*vs* senescent skin)
Hydroquinone (2%)	-23%***
Phenylethyl resorcinol (0.3%)	+4% (n.s)
B-Lightyl™ (3%)	+21%***

Mann Whitney test: ***p<0.001
n.s: not significant

Biological activity

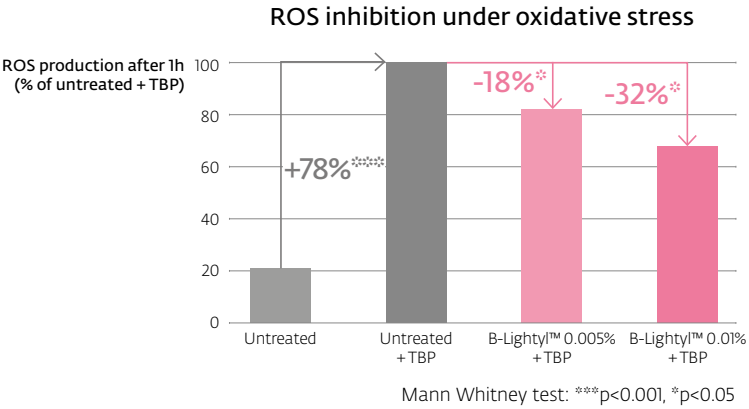
Antioxidant activity and its additional benefits on pigmentation

1. ROS inhibition under oxidative conditions (*in vitro*)

Normal human epidermal keratinocytes (NHEK) were treated with increasing concentrations of B-Lightyl™ (0.005% and 0.01%), then exposed to an oxidative stimulus (tert-Butylhydroperoxide (TBP) - 5mM).

The intracellular ROS accumulation was then evaluated using a fluorescent probe (DCFH-DA).

Results: Under oxidative stress (+78% ROS production *versus* untreated conditions), B-Lightyl™ **significantly decreases ROS accumulation** into the keratinocytes, down to -32% at 0.01%, with a dose-dependent effect.



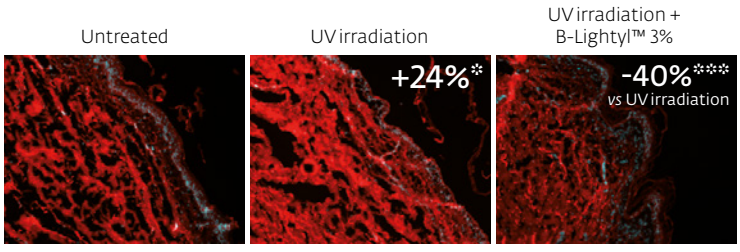
Mann Whitney test: ***p<0.001, *p<0.05

2. Reduction of oxidised proteins content (*ex vivo*)

Cryo-sections of skin explants, submitted to the same protocol of UV-exposure than before, were labeled with a specific fluorescent probe detecting carbonyl residues. Oxidised proteins content was then quantified through image analysis.

Results: A significant increase of the oxidised proteins can be observed after UV irradiation (+24%), demonstrating a loss of proteasome activity.

B-Lightyl™ **significantly decreases the oxidised proteins content**, down to -40%.



● Oxidised proteins

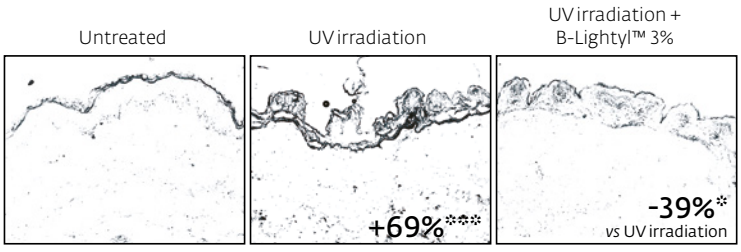
Student's t-test: ***p<0.001, *p<0.05

3. Decrease of lipofuscin accumulation (*ex vivo*)

Similar cryo-sections of skin explants were stained with a Sudan Black B solution, the specific histochemical stain for lipofuscin (an aggregate of oxidised lipids, partly responsible for pigmentation spots). Lipofuscin content was then quantified through image analysis.

Results: A significant increase of the lipofuscin content can be observed after UV irradiation (+69%).

B-Lightyl™ significantly **decreases UV-induced lipofuscin accumulation**, down to -39%.



Student's t-test: ***p<0.001, *p<0.05

Efficacy

B-Lightyl™ - Targeting pigmented spots, for all skin ethnicities

To evaluate the benefits of B-Lightyl™ against dark spots and pigmentation disorders, three clinical tests were conducted in double blind *versus* placebo, on volunteers from different skin ethnicities: Caucasian, Asian and African.

Study 1 – Caucasian skin - hands: Carried out on 20 female volunteers with Caucasian skin type, from 50 to 75 years old, selected for their pigmented ageing spots on the hands. Volunteers applied a formula containing B-Lightyl™ at 3% or a placebo (same formula without the active) on each of their hands, twice a day for 28 days.

Study 2 – Asian skin - face: Carried out on 36 female volunteers with Asian skin type, from 45 to 65 years old, selected for their pigmented ageing spots on the face. Volunteers applied a formula containing B-Lightyl™ at 3% or a placebo (same formula without the active) on hemiface, twice a day for 56 days.

Study 3 – African skin - face: Carried out on 43 female volunteers with African skin type, from 19 to 54 years old, selected for their hyperpigmentation spots on the face. Volunteers were divided into 2 groups, applying either a formula containing B-Lightyl™ at 3% or a placebo (same formula without the active) on their full face, twice a day for 56 days.

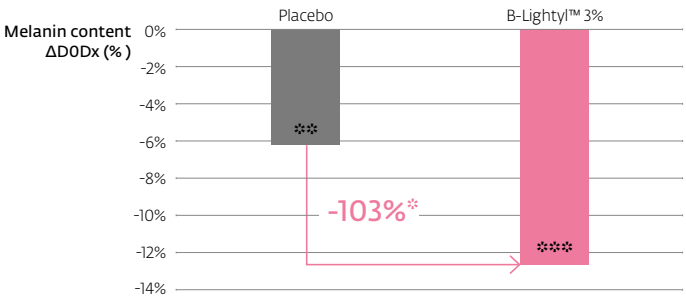
Reduction of pigmented spots on hands (Caucasian skin)

The melanin content in the dark spots of the volunteers was evaluated thanks to a Mexameter® at D0 and after 28 days of treatment.

Results: B-Lightyl™ induces **a significant reduction of the melanin content in the dark spots** of the volunteers, down to -12.6% *versus* D0 after 28 days.

This is a significant decrease by -103% *versus* placebo (more than a factor 2).

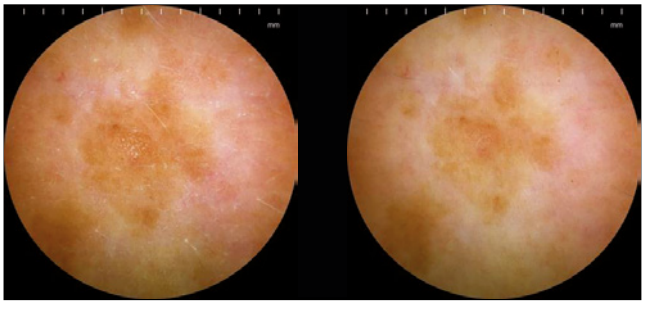
Reduction of pigmented spots on Caucasian hands (28 days)



Student's t-test: ***p<0.001, **p<0.01, *p<0.5

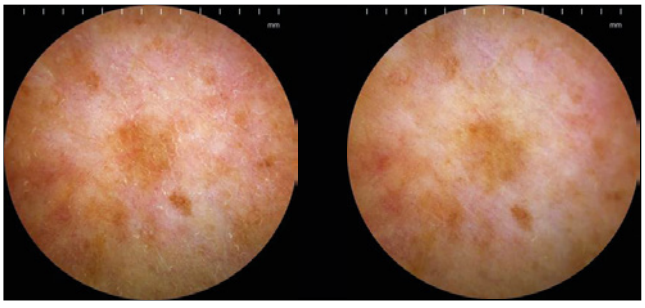
Illustrative pictures (DermScope®) of volunteers using B-Lightyl™ at 3%

Volunteer GP185 - 62 years old



D0 D28

Volunteer GP176 - 64 years old



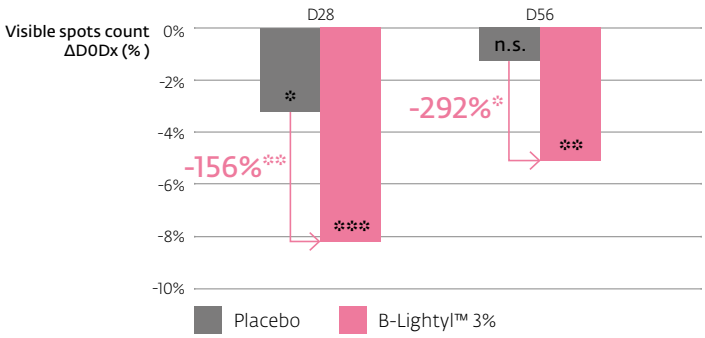
D0 D28

Efficacy

Reduction of pigmented spots on faces (Asian skin)

The number of visible spots on the face of the volunteers was evaluated using VISIA® CR2.0 at D0 and after 28 and 56 days of treatment.

Reduction of visible spots on Asian faces

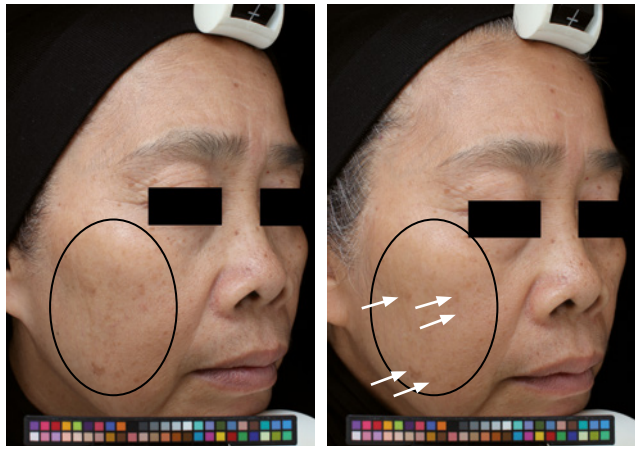


Student's t-test: ***p<0.001, **p<0.01, *p<0.5

Results: B-Lightyl™ induces **a significant reduction of the number of visible spots** on the faces of the volunteers, down to -156% and -292% *versus* placebo, respectively after 28 and 56 days.

Illustrative pictures (VISIA®), B-Lightyl™ at 3%

Volunteer 27 - 53 years old



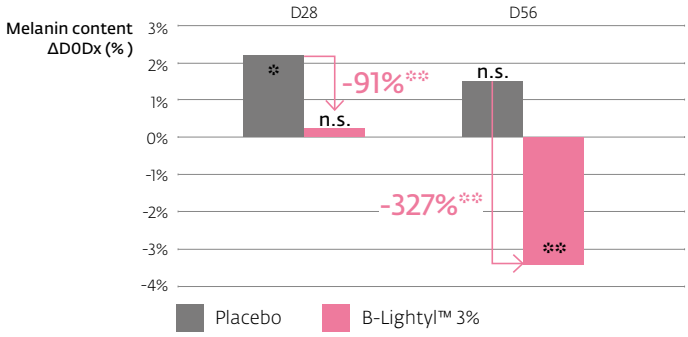
D0 D56

Reduction of hyperpigmentation disorders on faces (African skin)

As African skin is very rich in melanin (potent UV protector), it usually shows less ageing spots due to UV exposure or senescence than other skin types. However, it is prone to hyperpigmentation disorders which can be related, for instance, to an over production of melanin during wound healing. Therefore, for this clinical test, volunteers were selected for their hyperpigmentation disorders on the faces, no matter their age (19 to 54 years old).

The melanin content in the dark spots of the volunteers was then evaluated thanks to a Mexameter® at D0 and after 28 and 56 days of treatment.

Reduction of pigment spots on African faces

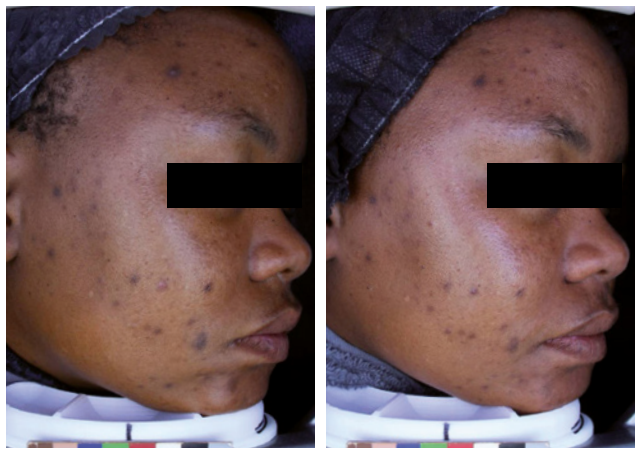


Student's t-test *vs* D0, Mann Whitney *vs* placebo: **p<0.01, *p<0.5

Results: B-Lightyl™ induces **a significant reduction of the melanin content in the hyperpigmented spots** of the volunteers, down to -91% and -327% versus placebo, respectively after 28 and 56 days.

Illustrative pictures (VISIA®), B-Lightyl™ at 3%

Volunteer 07 - 29 years old



D0 D56

Summary

Technical information

INCI:	Glycerin (and) Water (and) Ascorbic Acid (and) Himanthalia Elongata Extract
Origin:	Blue biotechnology
Preservation:	Preservative free
Appearance:	Pale yellow liquid
Solubility:	Water soluble
Dosage:	3%
Processing:	Can be added in the water phase at the end of the formulation process, below 40°C and at a pH between 3 and 5.

Claims

Claims:	SDF-1 reactivation, dark spots removal, protection against solar lentigo, protection against senile lentigo, antioxidant, smart tone unifier, for a clear and illuminated skin, hyperpigmentation corrector, fading spots without altering natural skin tone.
Applications:	Universal dark spots removal, age spots corrector, sun spots remover, skin tone unifier serum, skin tone perfector, anti-dark spots cream, true skin tone revealer, dark spots fader, hyperpigmented spots reductor.

Givaudan Active Beauty Sales Offices

Europe

Givaudan France SAS
19-23 rue de la Voie des Bans
FR-95100 Argenteuil (France)

Givaudan UK Ltd
Magna House
76-80 Church Street
Staines, TW18 4XR (United Kingdom)

Naturex SA
250 rue Pierre Bayle - BP 81218
84911 Avignon Cedex 9 (France)

North America

Givaudan Fragrances Corp.
40 W - 57th Street - Floor 17
NY 10019 - New York (United States)

Asia Pacific

Givaudan Singapore Pte Ltd
1 Pioneer Turn
627576 Singapore (Singapore)

Givaudan Shanghai Ltd
298 Li Shi Zhen Road
Pudong Zhang Jiang High Tech Park
201203 Shanghai (China)

Latin America

Givaudan do Brasil Ltda
Av. Engº Billings - 2185, Edificio 31,
1ºAndar - Jaguaré
05321-010 São Paulo - SP (Brazil)

global.cosmetic@givaudan.com

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