

Product for anti-wrinkle, anti-oxidant, anti-glycation, anti-senescence effects

Greentium

*Extract of fermented tea leaves
for anti-oxidant and well-aging*

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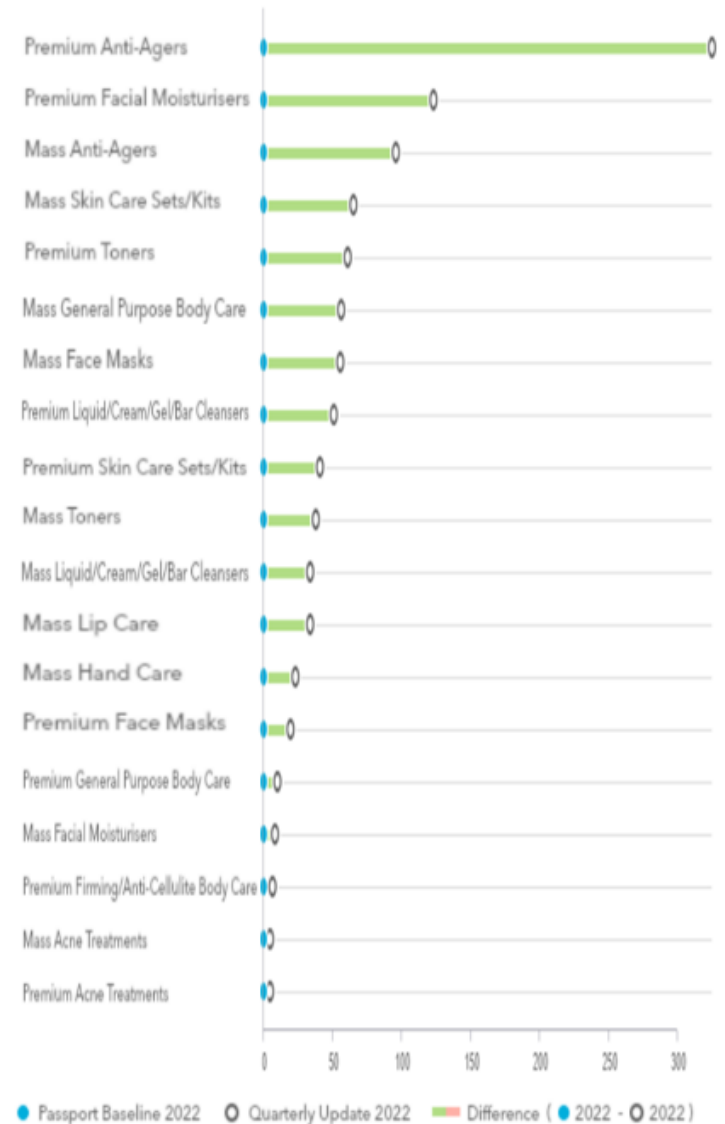
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Anti-aging Products to Slow Skin Aging

According to a survey conducted by Euromonitor report, it was found that skin care cosmetics have received more attention than color cosmetics recently in the cosmetics industry. In addition, skin care products are expected to grow further due to the attitude to becoming healthy caused by infectious diseases around the world.

Among them, anti-aging cosmetics are receiving the most attention from consumers. The biggest problem hindering women who want to look beautiful is the skin aging that occurs as they get older, and cosmetics that are advertised to slow, stop, or reverse this aging continue to appear.

Retail Value Sales, Real US\$ mn, 2022
2017 Constant Prices, 2017 Fixed Year Exchange Rate



Reference: Beauty and personal care: Quarterly statement Q3 2018 / Euromonitor report

Symptoms of Skin Aging



Well-aging

Well-aging is a new concept of lifestyle. The difference from the anti-aging concept is that, the concept of well-aging is trying to accept and adapt to the natural aging process, to take care of both the body and the mind, and eventually, to maximize the value of life.

The most common perspective that measures well-aging criteria is a biological perspective. In particular, as people get older, they experience skin aging more easily.

As a part of well-aging practices, people are trying to find the causes of skin aging to improve the skin condition and recover the natural beauty.



Well-aging and Wellness Cosmetics

Well-aging cosmetics aim to keep the skin looking its best by moisturizing the skin, removing free radicals and promoting cell turnover, and to maintain balance with the body. These products help the skin to become more radiant and hydrated by **increasing the regeneration power of the skin itself**. Instead of hiding and fighting every symptom of aging, they are **designed to enhance the appearance at any age**.

Well-aging and wellness are closely related. Wellness that keeps the skin and body healthy is necessary for harmonious and natural well-aging. These two concepts occupy an important position in the cosmetic industry.



Well-aging Concept Cosmetics

Sulwhasoo



First Care Activating Serum EX

- The perfect combination of ingredients for optimized anti-aging and hydrating benefits
- **Revitalizing the skin and naturally strengthens the skin's moisture barrier**

Farmacy



Sleep Tight Firming Night Balm

- Containing a hefty concoction of wrinkle-boosting and a skin-plumping extract ingredients
- **Reinforcing the skin's natural moisture barrier while simultaneously firming and lifting the skin, helps to create a youthful looking appearance**

Kiehl's

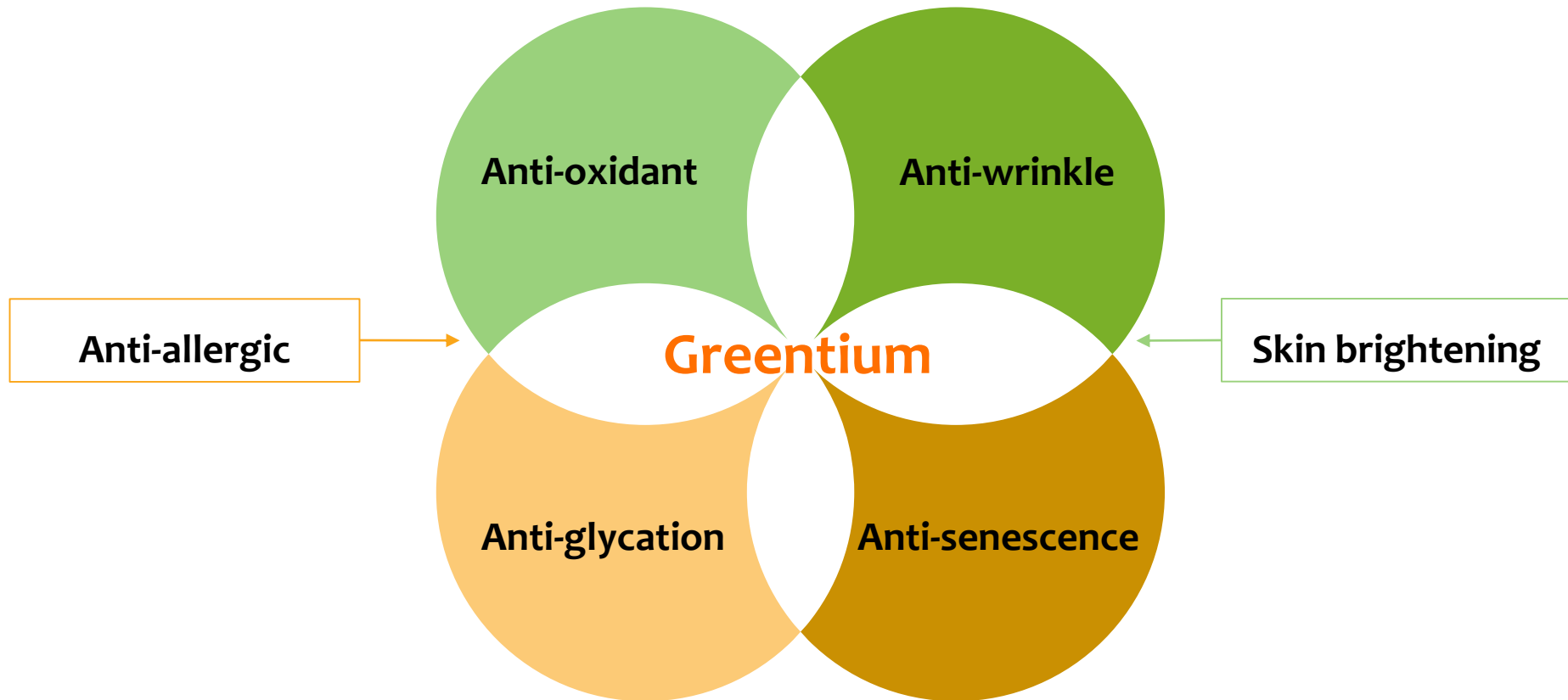


Vital Skin-Strengthening Hyaluronic Acid Super Serum

- Deeply penetrates skin to correct premature aging signs, such as fine lines, redness, and dry skin
- **Specially designed herbal complex, consists of ginseng, tulsi and schisandra berries, will regenerate facial skin**

Effects of Greentium

Greentium is a solution to skin aging problems. In line with the well-aging concept, Greentium helps to resist skin aging by increasing the skin's natural regenerative power. Greentium has anti-oxidant, anti-glycation, anti-senescence and anti-wrinkle effects, and it also provides anti-allergic and skin brightening effects.



Plant Story: *Camellia sinensis*



Camellia sinensis is a species of evergreen small tree in the flowering plant family Theaceae. The common name is “tea plant” since its leaves and leaf buds are used to produce tea. Tea is a rich source of amino acids, vitamin C and E, caffeine and polyphenols. The most abundant polyphenolic compounds are catechins, which have the effects of obesity and cancer prevention, anti-oxidant and anti-aging, anti-microbial, and anti-inflammatory effects.

Nontoxic Fungus - Golden Flower

Fuzhuancha is a tea using fermented leaves of the Chinese variety of *C. sinensis* var. *macrophylla*. During fermentation, a fungus called *Aspergillus chevalieri* grows inside the Fuzhuancha. A sporocyst of fungus looks like a yellow flower, so the Chinese call it **golden flower (金花, Jinhua)**, and the unique fermentation process is called **golden flower blossoming**.

Golden flower significantly increases the flavor of Fuzhuancha, so tea merchants and craftsmen had attempted to artificially grow golden flower by fermenting tea leaves. However, making Fuzhuancha was very difficult because it required adequate moisture, tricky techniques for fermentation, and a suitable climate for golden flower fungus growth.

Recently, with the development of technology, research is underway on how to ferment tea leaves to make Fuzhuancha, as well as on how to make healthy food by fermenting soybean mash using golden flower.



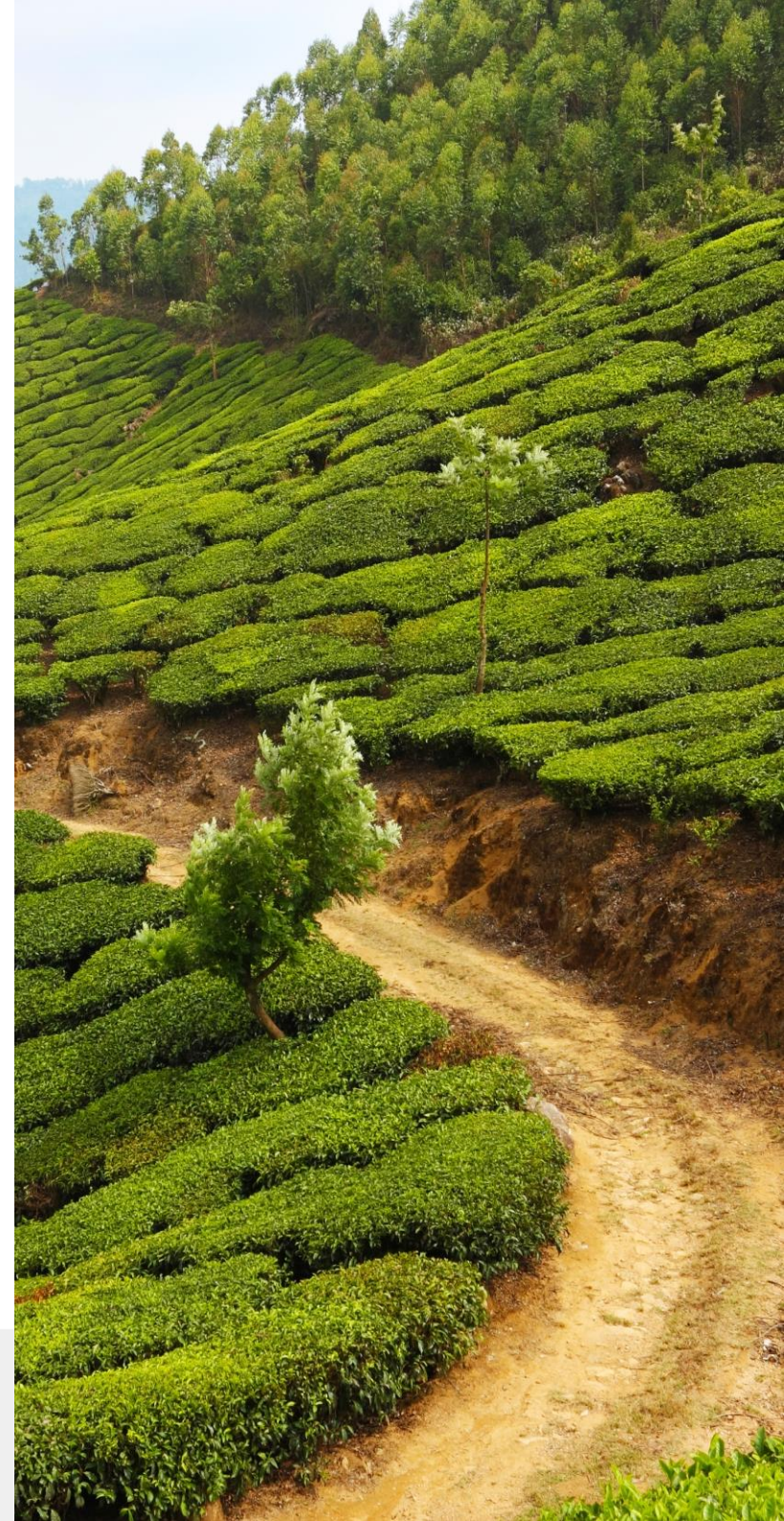
Legend of Fuzhuancha

Golden flower fungus grows best in "Fu Tian (hot summer day)," and the name of the tea became Fuzhuancha (hot summer tea).

Fuzhuancha was accidentally discovered in the 13th century when Chinese merchants were transporting tea leaves via the southern Silk road. When a trade caravan passed by a small village, they accidentally fell goods into the river. It was a hot summer rainy season, and the teas remained wet for a long time. The tea leaves were covered with tiny yellow fungus which looked like golden flowers.

Merchants felt down by the moldy tea, and gave half the teas to the folks they met in the village who were suffering from dysentery. But surprisingly, after the patients drank tea, they got well and dysentery had under control. They thought that the moldy tea was a gift from God.

The Chinese emperor heard the story, and appointed Fuzhuancha as a tribute. From then on, Chinese people began to enjoy drinking this fermented black tea.



Greentium

Golden flower fungus can improve and optimize the taste of Fuzhuancha by resolving the elder tea leaves' coarse fibers. Besides, it catalyzes the oxidation of polyphenol compounds, transforms them into substances beneficial to the human body. Recent studies indicate that Fuzhuancha and its extracts show activity in reducing hyperlipidemia and inhibiting cancer cell line growth.

Greentium is an extract of green tea leaves fermented with golden flower fungus. Greentium increases skin regeneration, and exhibits well-aging effects through anti-oxidant, anti-glycation, anti-wrinkle and skin brightening effects. It also has an anti-allergic effect, making the skin healthier.

Reference: Medicinal Chinese teas: A review of their health benefits with a focus on fermented tea, Tiffany *et al.*, HerbalGram, 2012, v94, p42-47



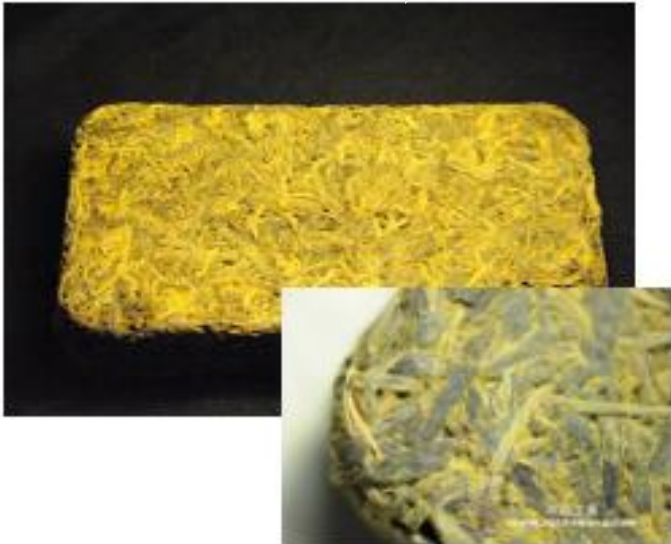
Manufacturing Process of Greentium

Golden flower
(*Aspergillus chevalieri*)
separation and
identification

Inoculation of
A. chevalieri onto
sterilized tea leaves

Solid fermentation
of tea leaves

Ultrasonic
extraction



Ultrasonic Extraction



When a raw material is soaked in an extraction solvent and irradiated with ultrasonic waves, a strong force is applied to the solvent and creates small bubbles. As ultrasonic waves are continuously applied, the bubbles gradually grow and explode, emitting waves with strong energy. The energy of this wave is strong enough to destroy the cell walls of the raw material, so the active ingredient in the raw material can be extracted. Compared with conventional methods such as high temperature solvent extraction, hazardous smoke is not generated during the extraction process, so it is **non-toxic and pollution-free for workers**. In addition, as relatively low heat is applied, there is almost no denaturation or destruction of active ingredients in raw materials. Ultrasonic extraction also shows **excellent extraction efficiency** as it improves the extractability and extraction speed.

in vitro Efficacy Evaluation

❖ Anti-wrinkle Activity

Elastase Inhibition Activity

❖ Anti-glycation Effect

AGEs Synthesis Inhibition Activity

SA- β Gal Positive Cells Inhibition Activity

❖ Anti-oxidant Effect

ROS Generation Inhibition Activity

DPPH Scavenging Activity

❖ Anti-allergic Effect

β -hexosaminidase Release Inhibition Activity

Histamine Release Inhibition Activity

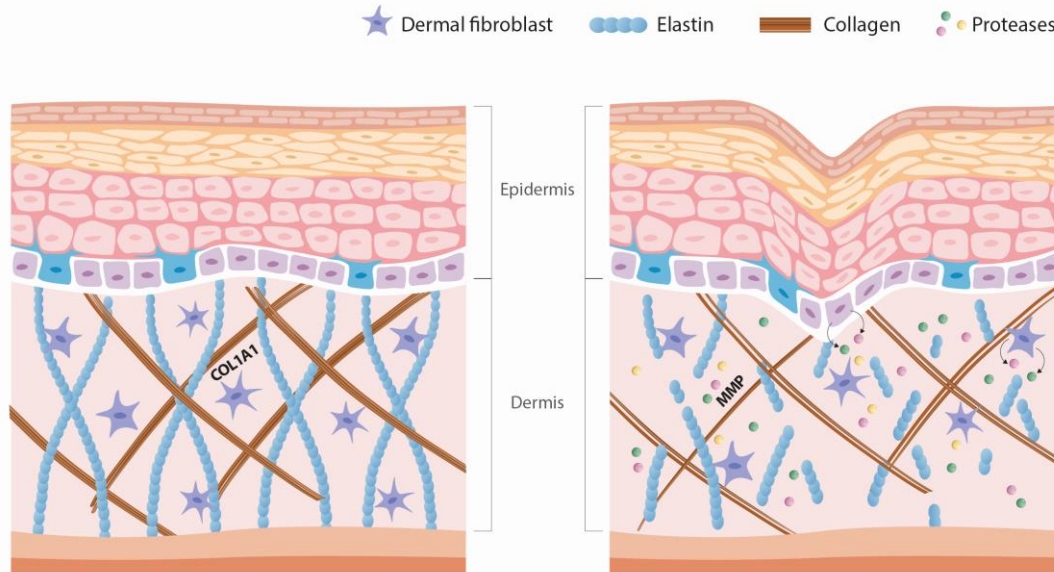
❖ Skin Brightening Effect

L-DOPA Oxidation Inhibition Activity

Melanin Synthesis Inhibition Activity



Mechanism of Wrinkle Formation



- ☑ Cross-linked collagen fibers
- ☑ Elastic ECM & COL1A1
- ☑ Functional dermal fibroblasts
- ☑ Maintenance of MMP1 & COL1A1 homeostasis

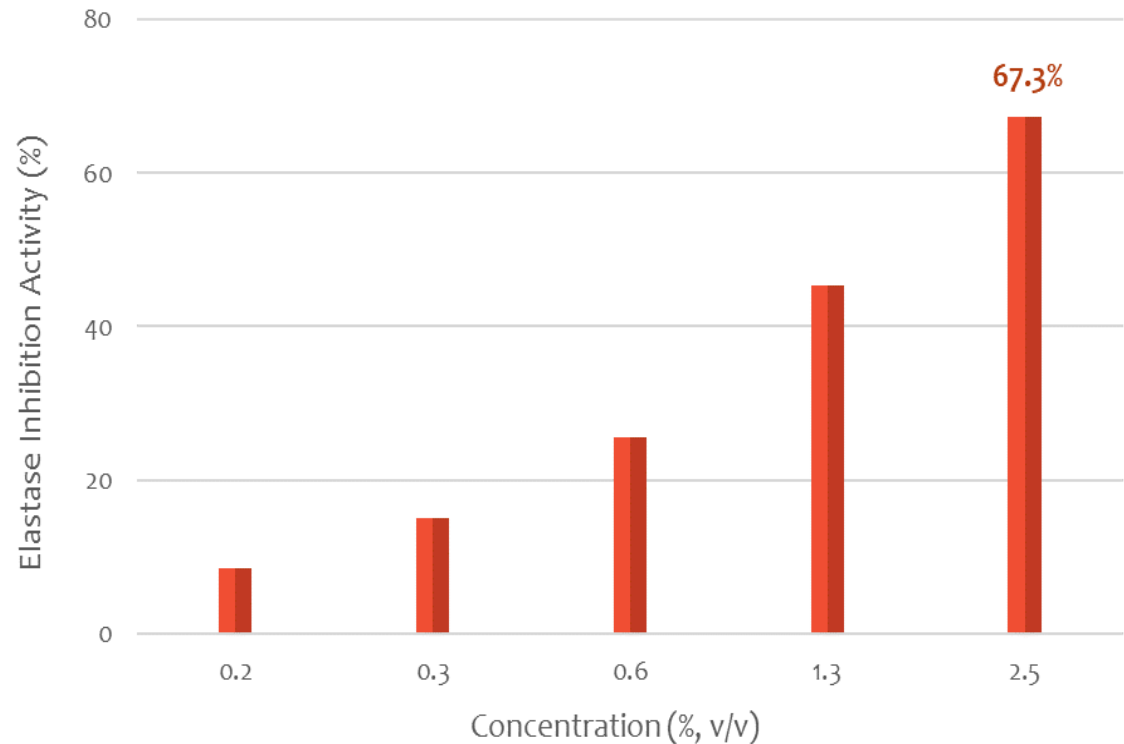


- ↓ Cross-linked collagen fibers
- ↑ Elastic fragmentation (stiff ECM)
- ↑ Production of degradative proteases (MMP1)
- ✗ Maintenance of MMP1 & COL1A1 homeostasis

The skin has two main layers, epidermis and dermis. While the epidermis works as a protective barrier and treats cell turnover, the dermis's main function is to maintain the skin's firmness and elasticity. The dermis consists of fibrous, filamentous, amorphous, and elastic tissues. Each component of the dermis affects the skin structure. Collagen maintains skin firmness, elastin provides elasticity to the skin, and hyaluronic acid keeps hydration. Elastase has a vital role in consisting of a deep skin structure with collagen fiber. Elastase breaks down a type of protein called elastin. Inhibiting elastase can suppress the wrinkle formation.

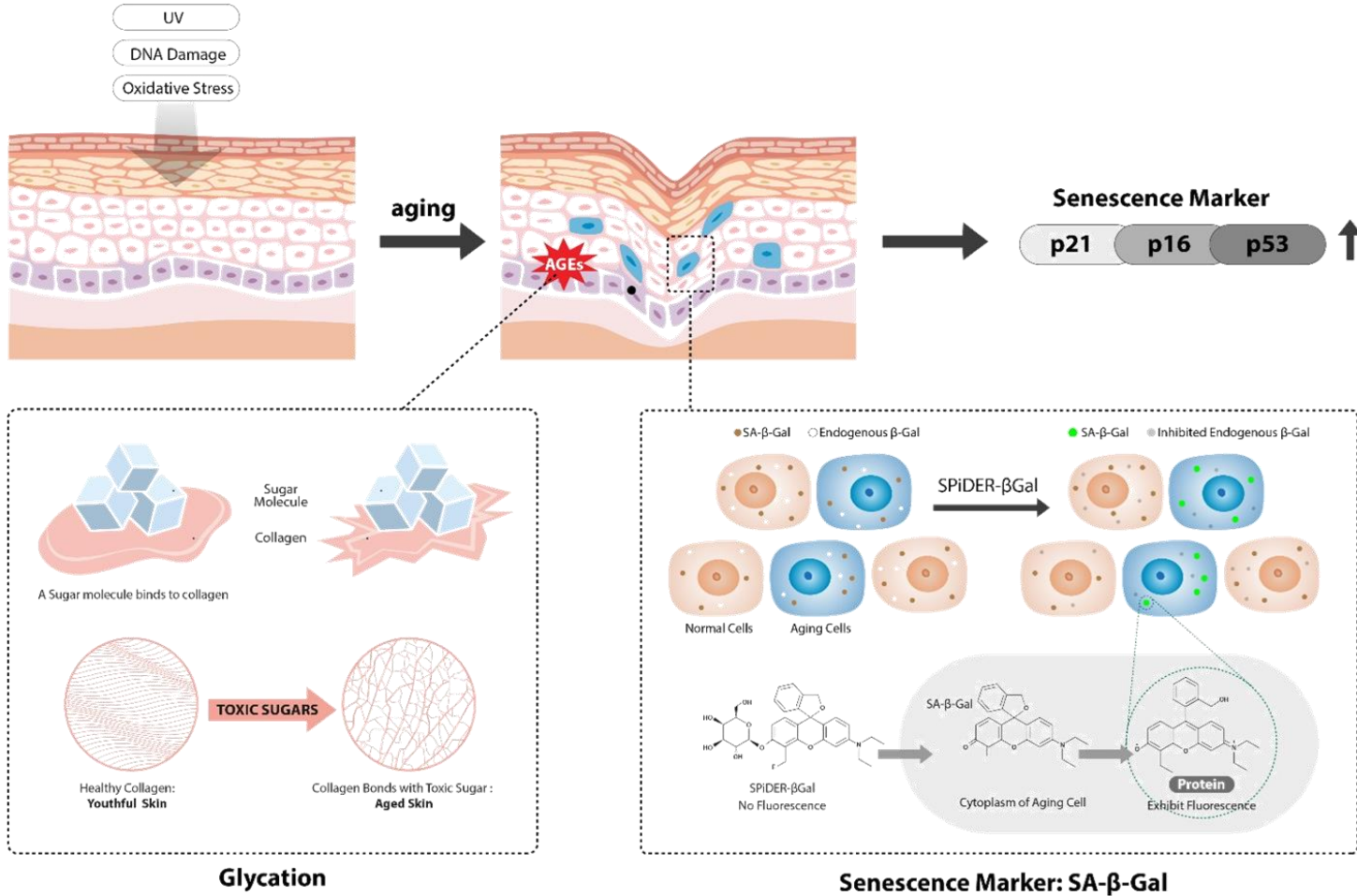
in vitro Efficacy Evaluation: Anti-wrinkle Effect

•• Elastase Inhibition Activity



The anti-wrinkle property of Greentium is identified by measuring the elastase inhibition activity. As a result, **2.5% of Greentium inhibited elastase activity by 67.3%.**

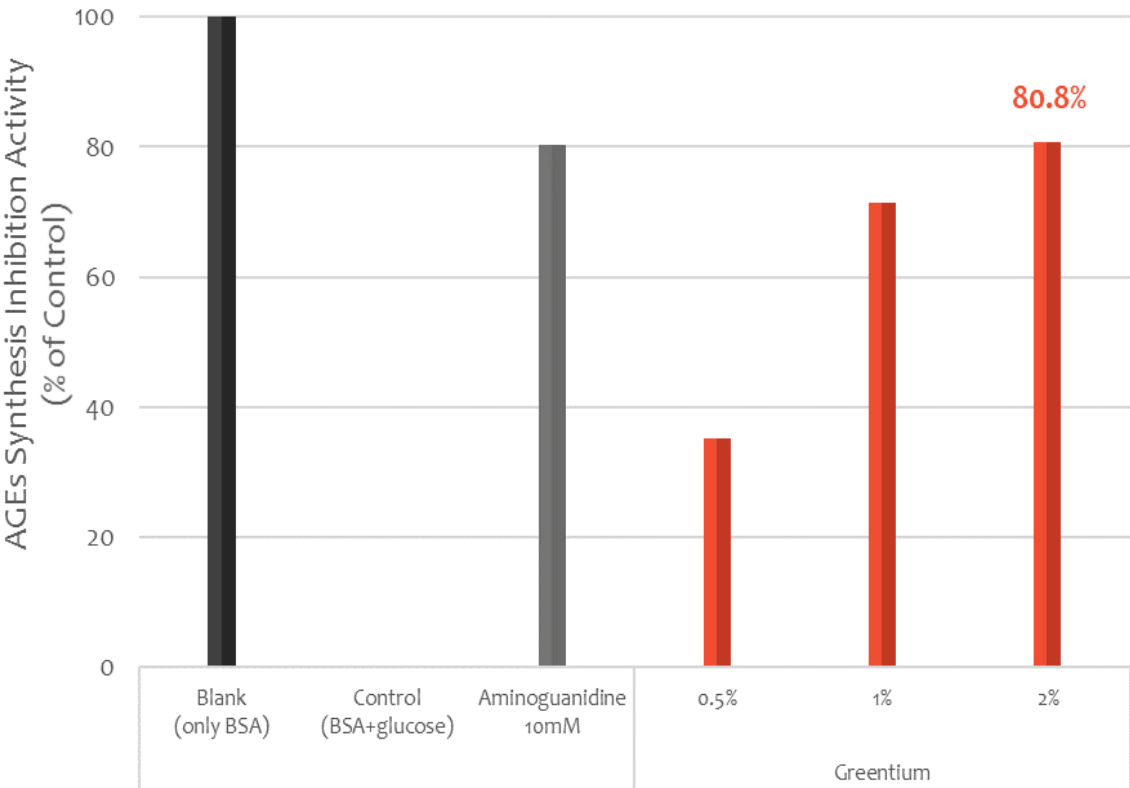
Accumulation of AGEs by Glycation Process



AGEs (Advanced Glycation End-products) are produced and accumulated in the body when excess sugar binds to protein, and they act as a negative factor on the skin. Skin browning occurs due to protein denaturation, and the skin loses its elasticity and flexibility as collagen hardens due to glycation. AGEs promote overexpression of β -galactosidase that catalyzes the hydrolysis of β -galactoside, and SA- β Gal (senescence-associated β -galactosidase) can be a biomarker of aged cells by AGEs.

in tubo Efficacy Evaluation: Anti-glycation Effect

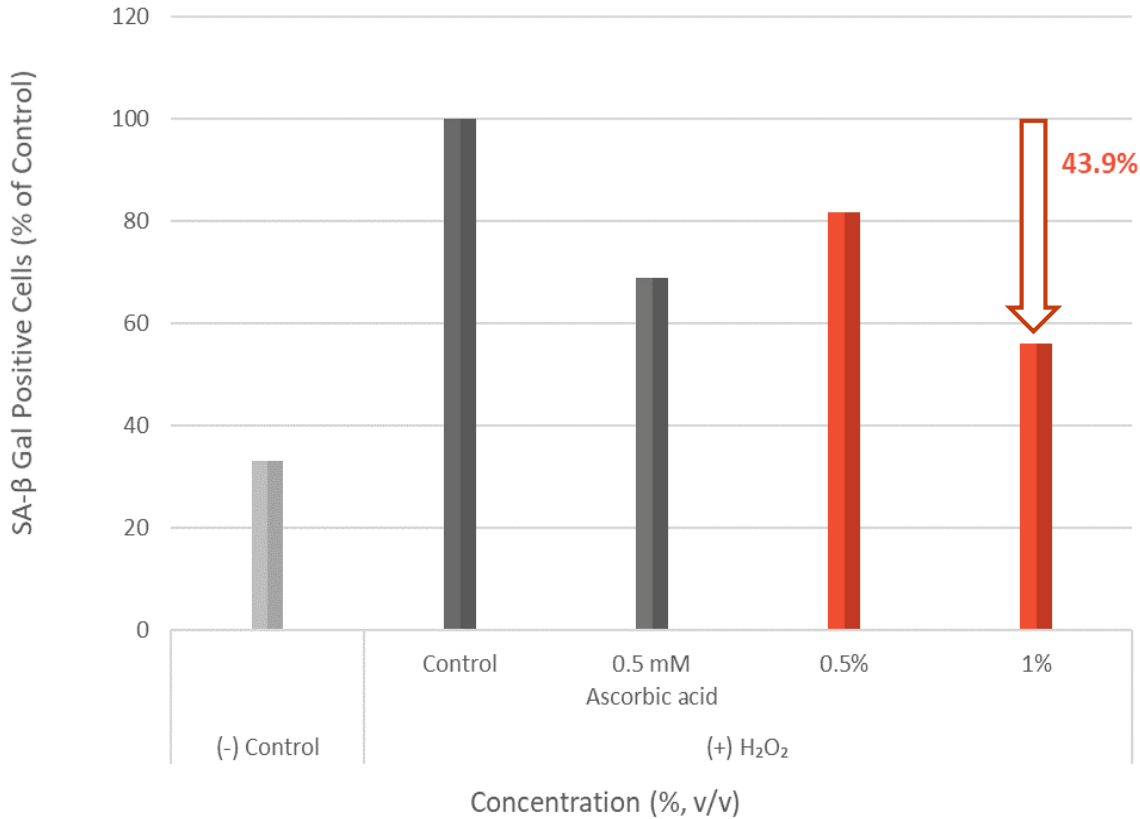
🔴🔵 AGEs Synthesis Inhibition Activity



The anti-glycation effect of Greentium was evaluated by the inhibition activity of AGEs synthesis. As a result, **2% of Greentium inhibited the synthesis of AGEs by 80.8%**, synthesized by the binding of BSA (bovine serum albumin) and glucose.

in vitro Efficacy Evaluation: Anti-senescence Effect

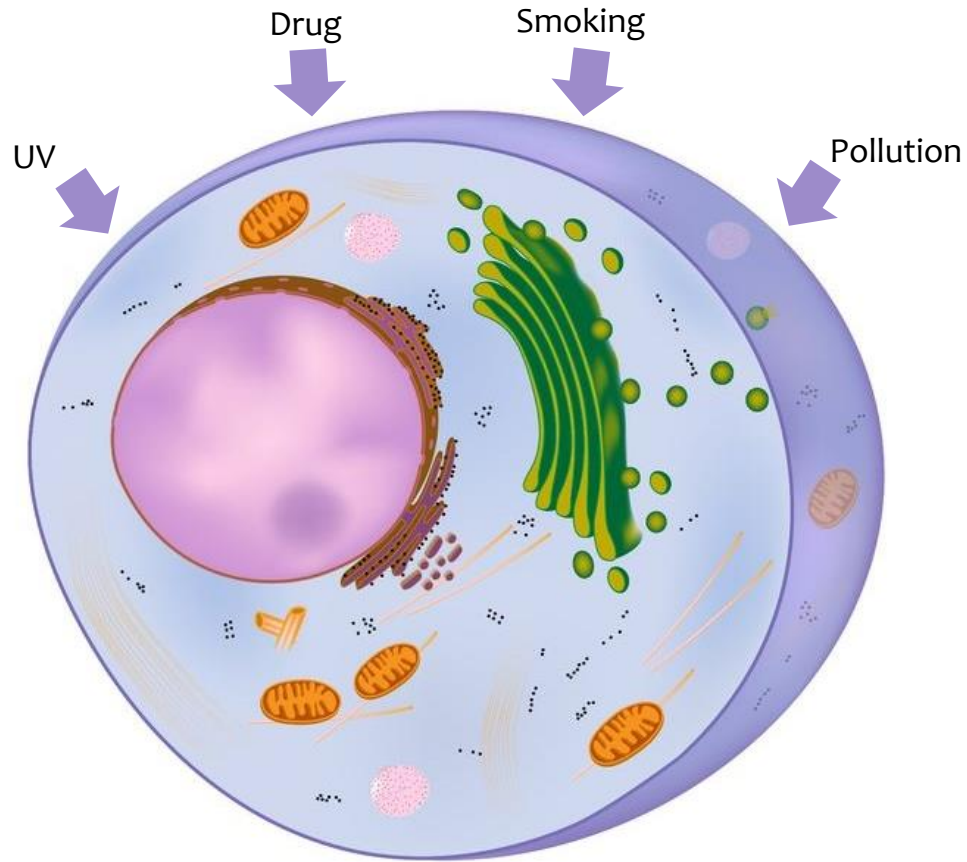
SA-β Gal Positive Cells Inhibition Activity



The anti-senescence effect of Greentium was demonstrated by measuring the overexpressed SA-β Gals from the aged cells. As a result, **1% of Greentium inhibited SA-β Gal positive cells activity by 43.9%.**

Oxidative Stress

Reactive Oxygen Species (ROS) can be increased by



Intracellular ROS may induce

- DNA damage
- Lipid peroxidation
- Amino acid oxidation: protein damage
- Oxidation of co-factors: enzyme inactivation
- Chronic inflammation

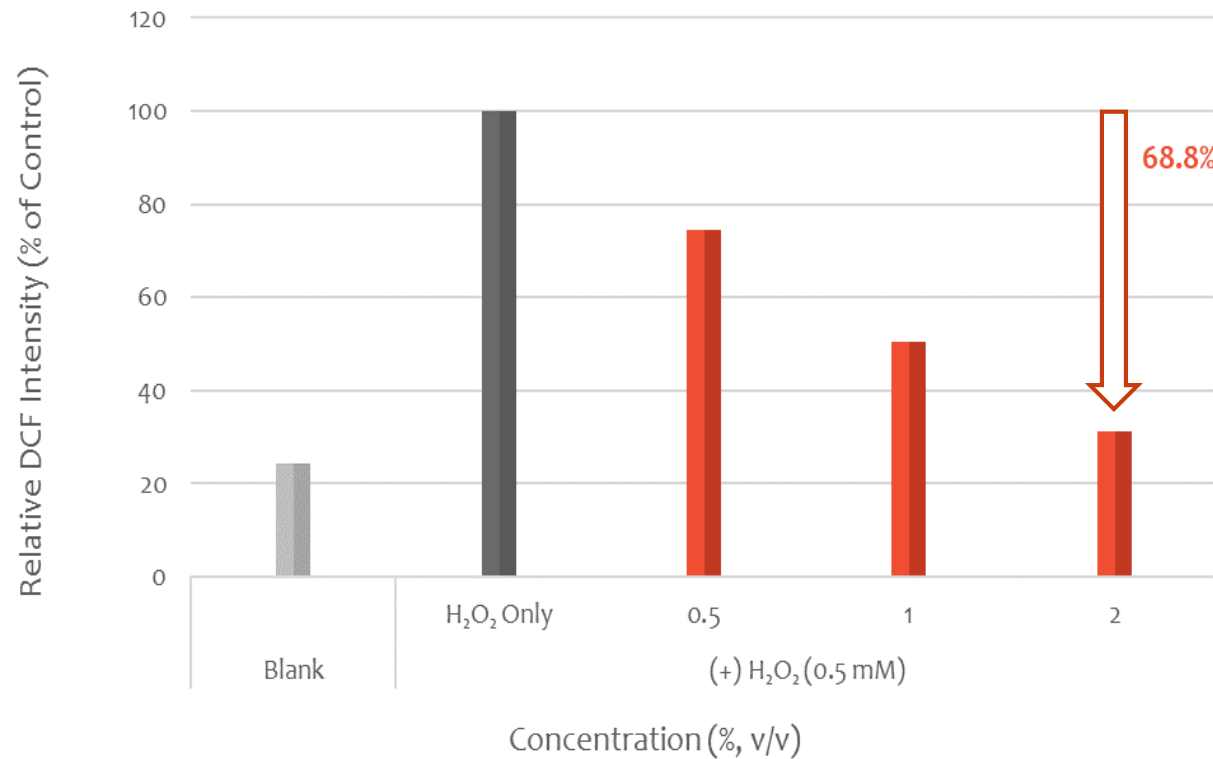
ROS



Skin Aging
Inflammation

in vitro Efficacy Evaluation: Anti-oxidant Effect

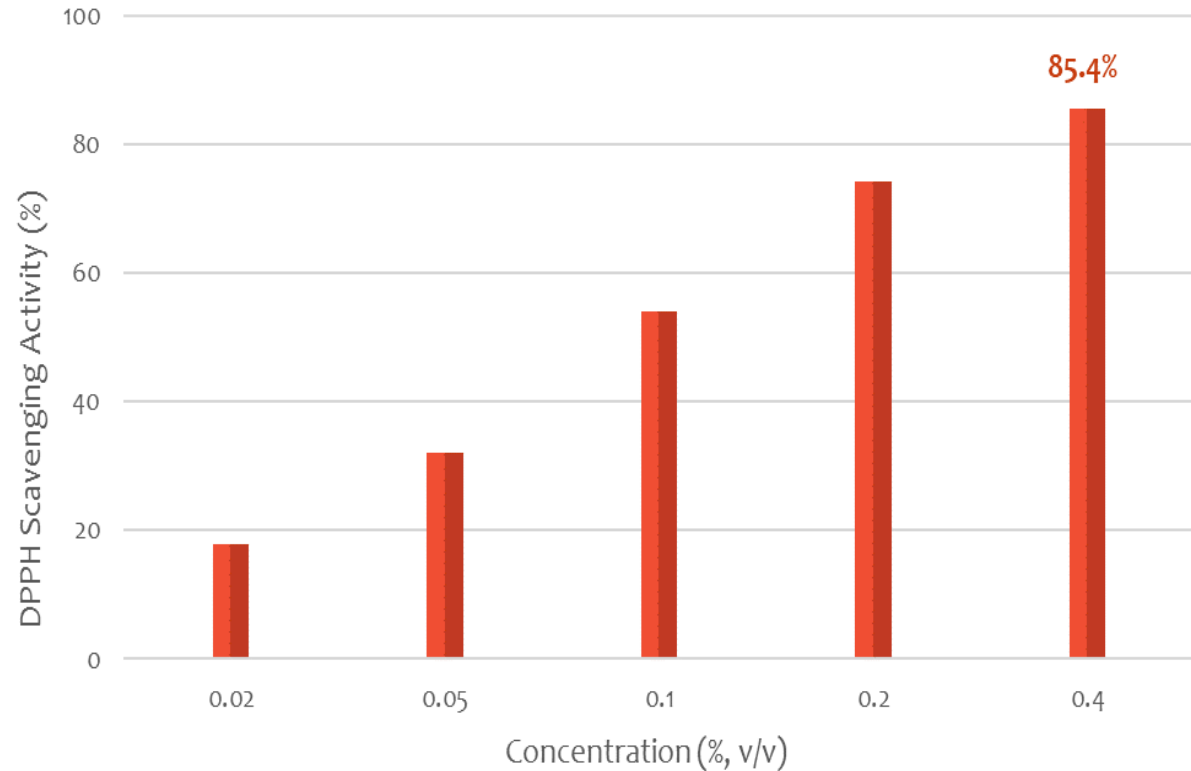
ROS Generation Inhibition Activity



Anti-oxidant property of Greentium has been identified by measuring the decrease in the ROS content produced in cells. As a result, **2% of Greentium inhibited the ROS generation by 68.8%.**

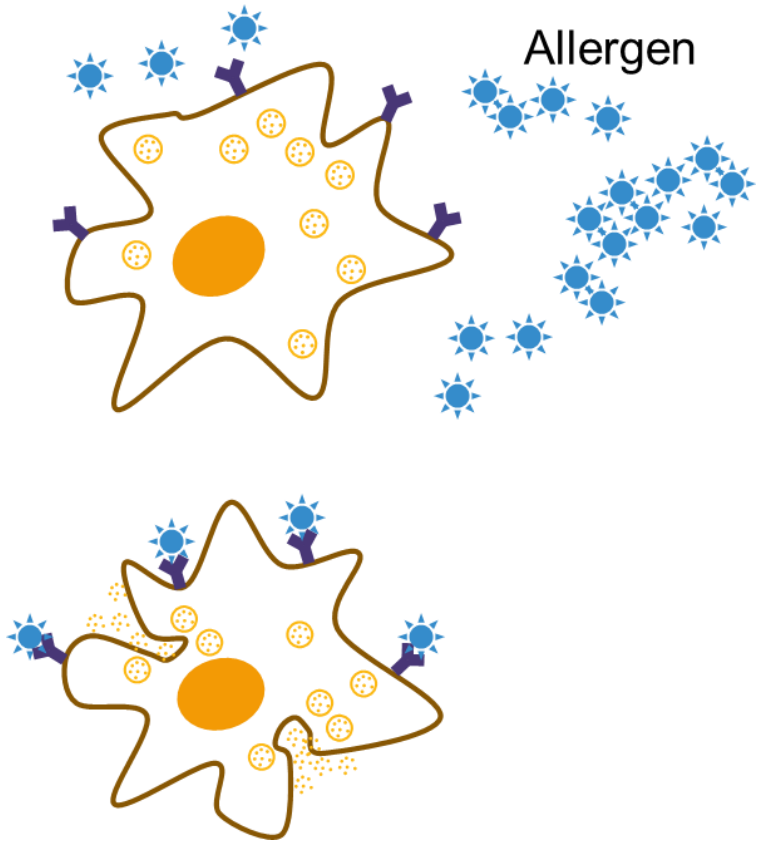
in tubo Efficacy Evaluation: Anti-oxidant Effect

•• DPPH Scavenging Activity



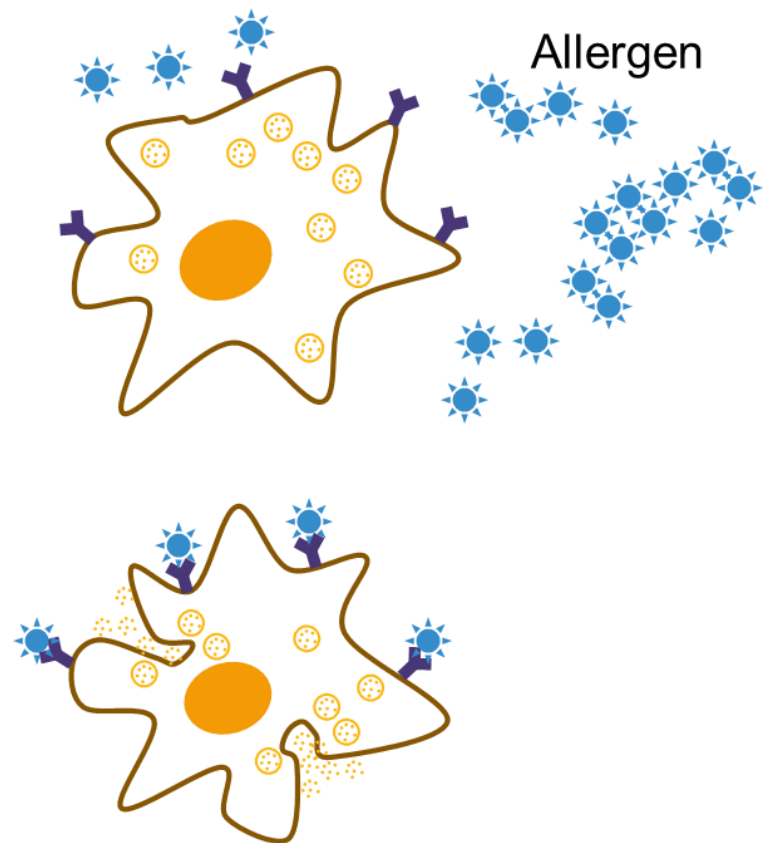
Anti-oxidant property of Greentium has been identified by measuring the DPPH scavenging activity. As a result, **0.4% of Greentium showed DPPH radical scavenging activity by 85.4%.**

Allergic Reaction: β -hexosaminidase Release



Immediate allergy is caused by a chemical mediator released from basophile and mast cells via cell degranulation due to the reaction between an immunoglobulin E (IgE) antibody, bound with the IgE receptor on the cell membrane, and an antigen. Because mast cells play essential roles in provoking the pathogenesis of allergic reactions via the degranulation process, measuring the degree of degranulation reflects the level of mast cell activation. β -hexosaminidase released by these cells during this process has been reported to be a suitable marker for determining the degree of degranulation.

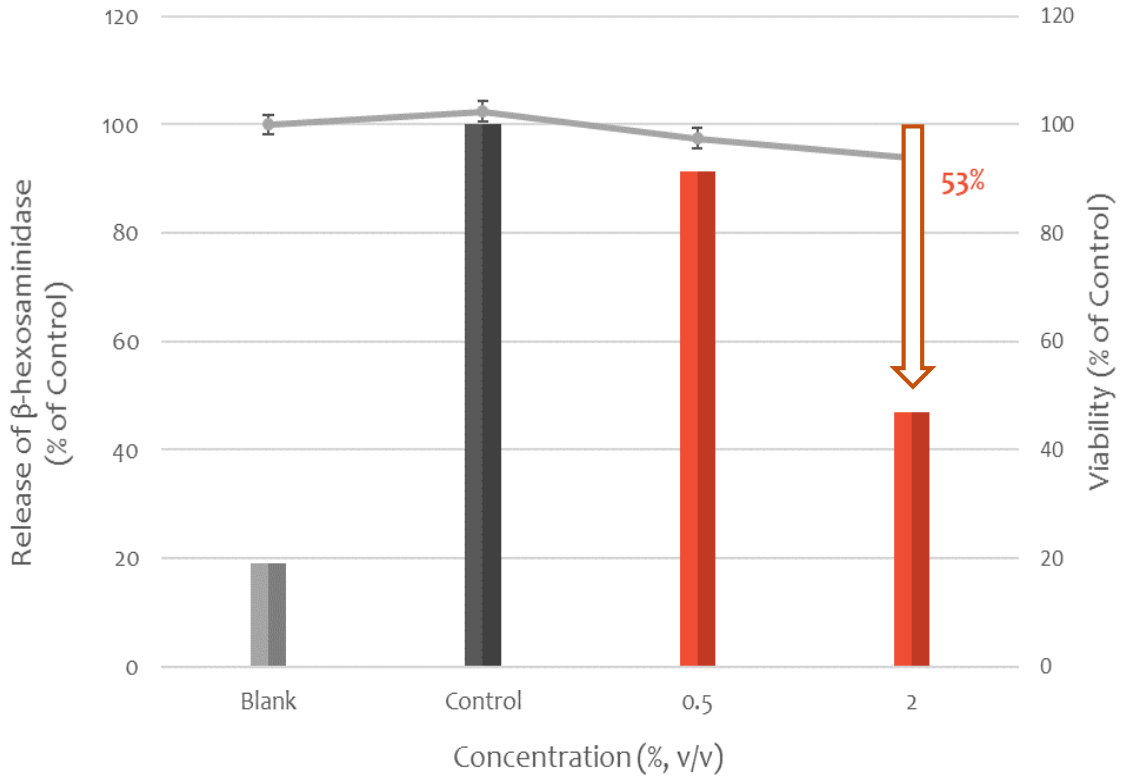
Allergic Reaction: Histamine Release



Histamine is a biogenic amine formed by the enzymatic decarboxylation of histidine. In a human organism, histamine is stored in its inactive form in mast cell and basophil granules. The physiological secretion of histamine can be initiated by a number of factors, all of which involve binding of IgE, cross-linked by antigen, to the mast cell or basophil's Fc receptors causing degranulation of these cells. Once released, histamine binds to a number of different target cell receptors causing the symptomatic effects of allergies.

in vitro Efficacy Evaluation: Anti-allergic Effect

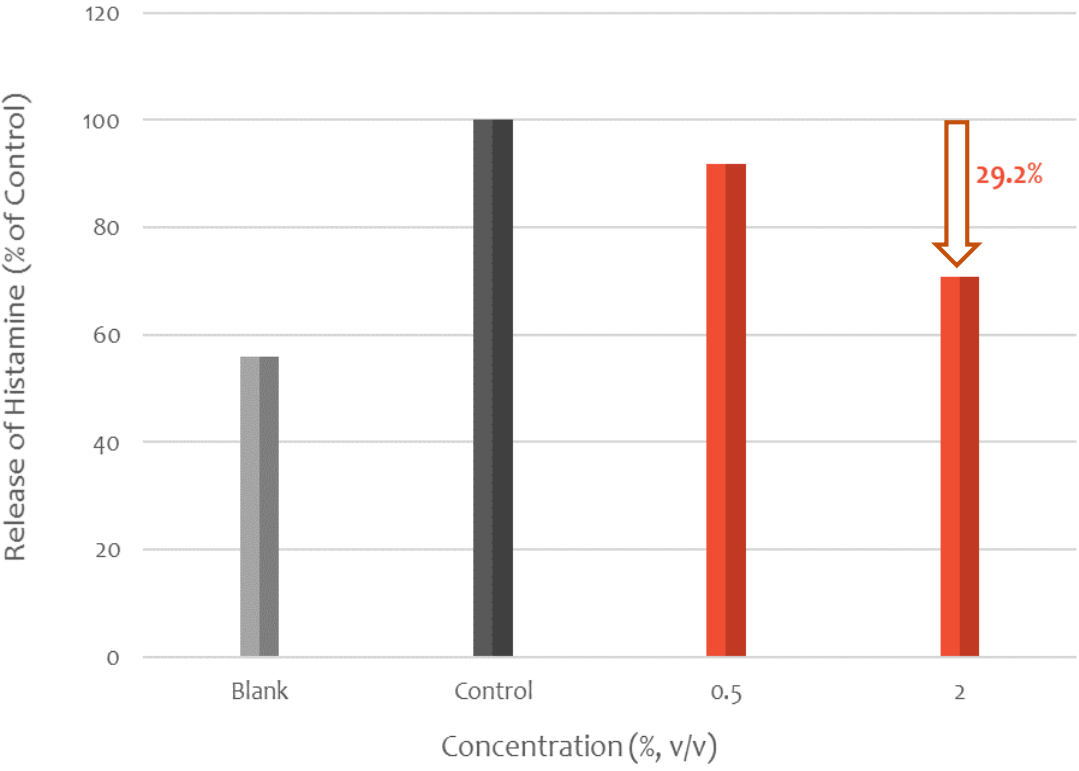
β-hexosaminidase Release Inhibition Activity



The anti-allergic property of Greentium has been identified by measuring the decrease of β-hexosaminidase release in basophils (RBL-2H3). As a result, 2% of Greentium decreased the β-hexosaminidase release by 53%.

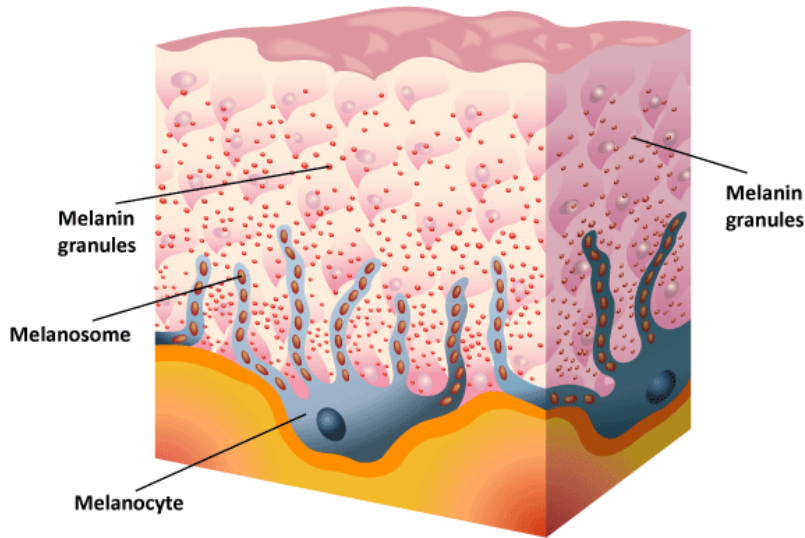
in vitro Efficacy Evaluation: Anti-allergic Effect

•• Histamine Release inhibition Activity



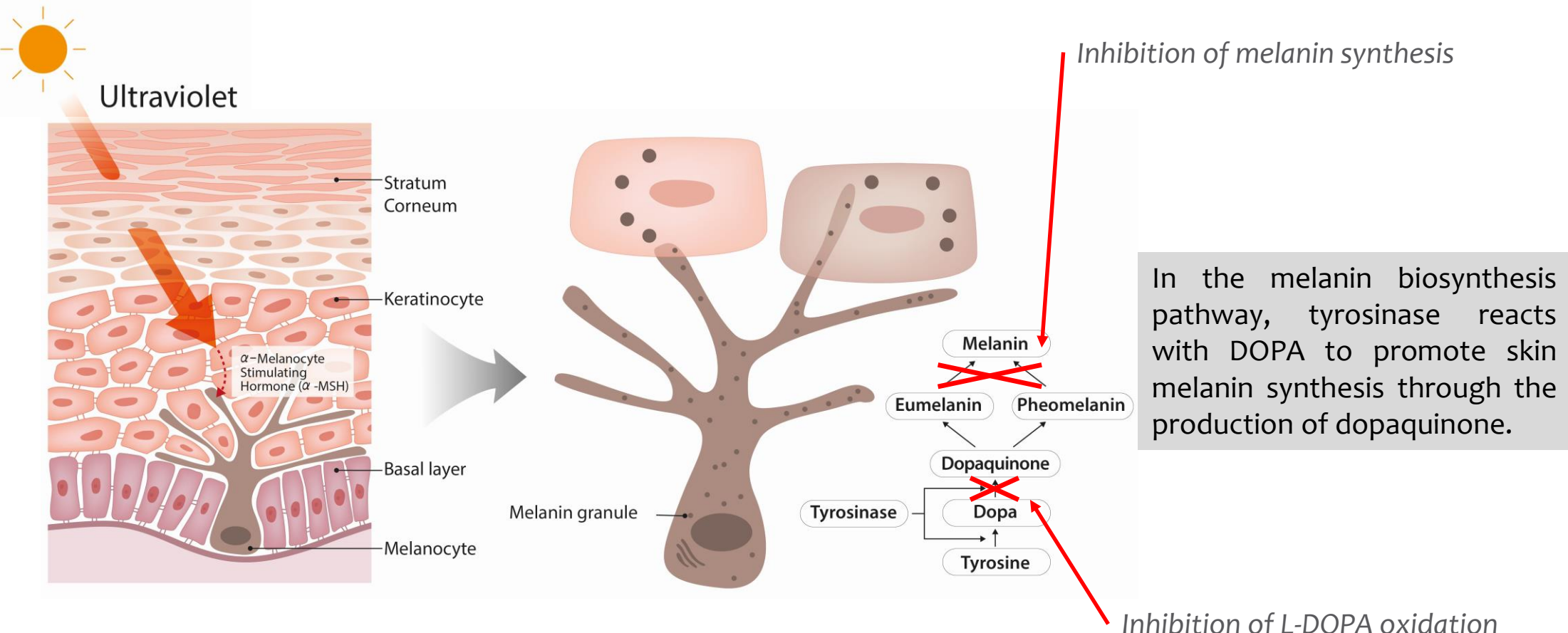
The anti-allergic property of Greentium has been identified by measuring the decrease of histamine release in basophils (RBL-2H3). As a result, **2% of Greentium decreased the histamine release by 29.2%.**

Skin Pigmentation



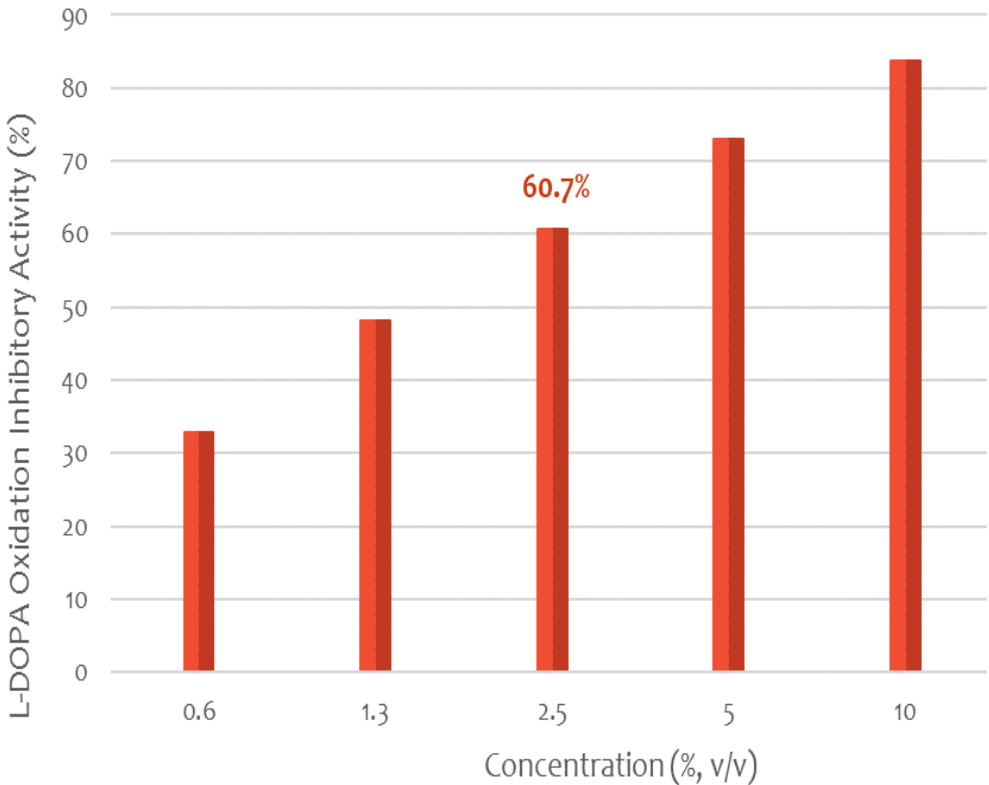
Melanin plays an important role in protecting human skin from the harmful effects of solar ultraviolet (UV) radiation and in scavenging toxic drugs and chemicals. Melanin is synthesized in melanocytes located at the dermal/epidermal border. Skin pigmentation problems, such as melasma, freckles, age spots and dark spots, are caused by the abnormal accumulation of melanin in keratinocytes.

Skin Brightening Action



in *tubo* Efficacy Evaluation: Skin Brightening Effect

🍷 L-DOPA Oxidation Inhibition Activity

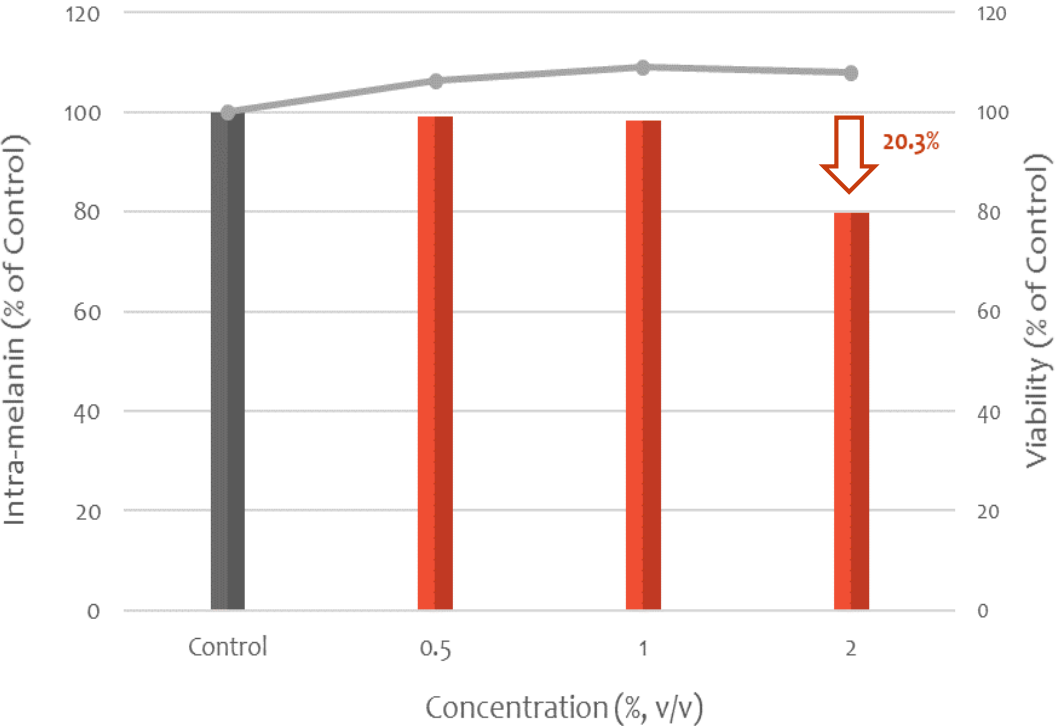


Skin brightening property of Greentium has been identified by measuring the L-DOPA oxidation inhibition activity.

In the process of melanin production, L-DOPA is oxidized into L-dopaquinone. Therefore the melanin production can be impeded by inhibiting the oxidation of L-DOPA. As a result, **2.5% of Greentium inhibited L-DOPA oxidation by 60.7%.**

in vitro Efficacy Evaluation: Skin Brightening Effect

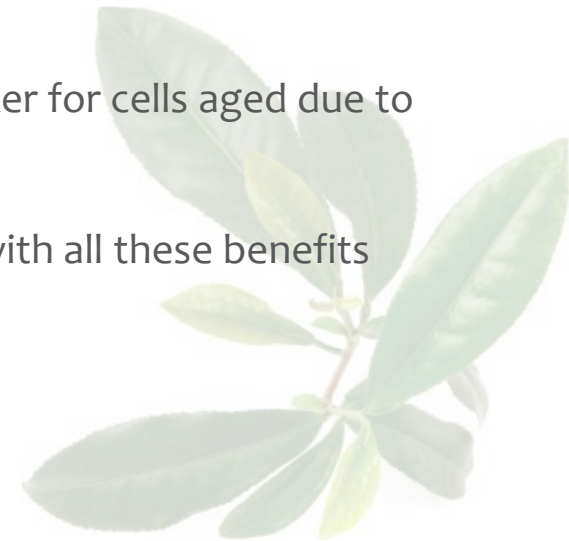
●● Melanin Synthesis Inhibition Activity



Skin brightening property of Greentium has been identified by measuring the decrease in melanin production in B16-F1 melanoma cells. As a result, **2% of Greentium inhibited melanin synthesis activity by 20.3%.**

Marketing Points

- ❖ Extract of green tea leaf fermented with yellow fungus called golden flower
- ❖ Noticeable anti-oxidant and skin brightening effects
- ❖ Considerable anti-wrinkle effect with the potential to enhance skin elasticity by inhibiting the activity of elastase
- ❖ Remarkable anti-glycation effect with inhibition of AGEs synthesis, which is the cause of skin browning and decrease in skin flexibility
- ❖ Decreases in overexpression of senescence-associated β -galactosidase, a marker for cells aged due to AGEs
- ❖ Greentium for well-aging, providing the regeneration power to the skin itself with all these benefits



Product Information

- ⦿ Product Name: Greentium, Greentium(GPD)
- ⦿ INCI Name: Aspergillus/Camellia Sinensis Leaf Ferment Extract
- ⦿ Dosage: 1–3%
- ⦿ Formulation: Add to the formulation when the temperature is lower than 55°C. Recommended to add after the cooling process.
- ⦿ Storage: Avoid direct light or UV.
Keep it in a dry area at room temperature.

Go for
Nature, Go with
NaturalSolution!

"We are always upgrading to serve you better"

