

Product for anti-oxidant, anti-photoaging, anti-allergic, anti-pollution effects

Seactive

*Multi functional Jeju seaweed
extract*

the garden of
naturalsolution
www.naturalsolution.co.kr



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Plant Story



Ecklonia cava, one of the edible brown algae, also known as **sea trumpet**, is a perennial and distributed in **Jeju Island** in Korea. **Phlorotannins** from *E. cava* were reported to have various biological activities, including **anti-oxidant**, **anti-inflammatory**, **radio-protective**, and **anti-diabetic** activities. **Dieckol** isolated from *E. cava* showed **skin brightening** effect.

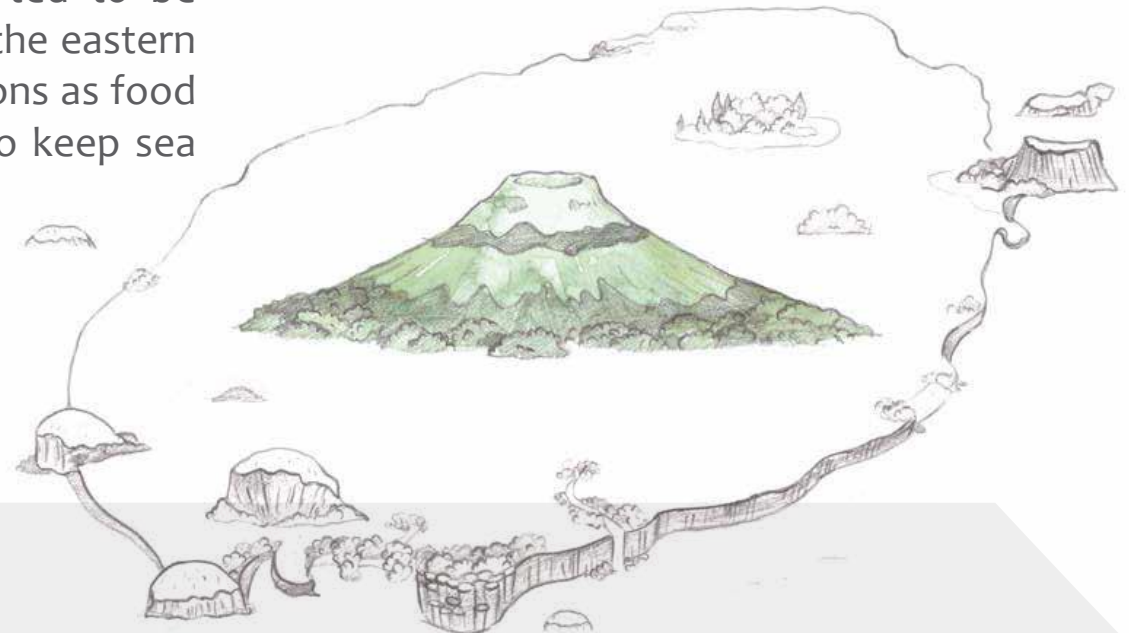
The extract of *E. cava* is reported to have **UV protective**, **anti-acne**, anti-inflammatory effects.

Main Production Region of *E. cava*

Jeju is the largest island situated in the southern coast of Korea. This island is considered as the cleanest and beautiful area in Korea. It is a volcanic island with Halla Mountain in the center created by volcanic eruptions about 2 million years ago.

Jeju volcanic island and lava tubes are designated as the first World Natural Heritage Sites in Korea. Due to its unique environment, the island has many endemic plants especially in Halla Mountain where there are about 1,800 endemic plant species as well as diverse alpine plants.

More than 750 kinds of seaweeds were reported to be found in Korea, and 70% of them are growing in the eastern coast of Jeju Island. *E. cava* has important functions as food resources to marine organisms and has a role to keep sea environment clean.



E. cava as a Marine Guardian

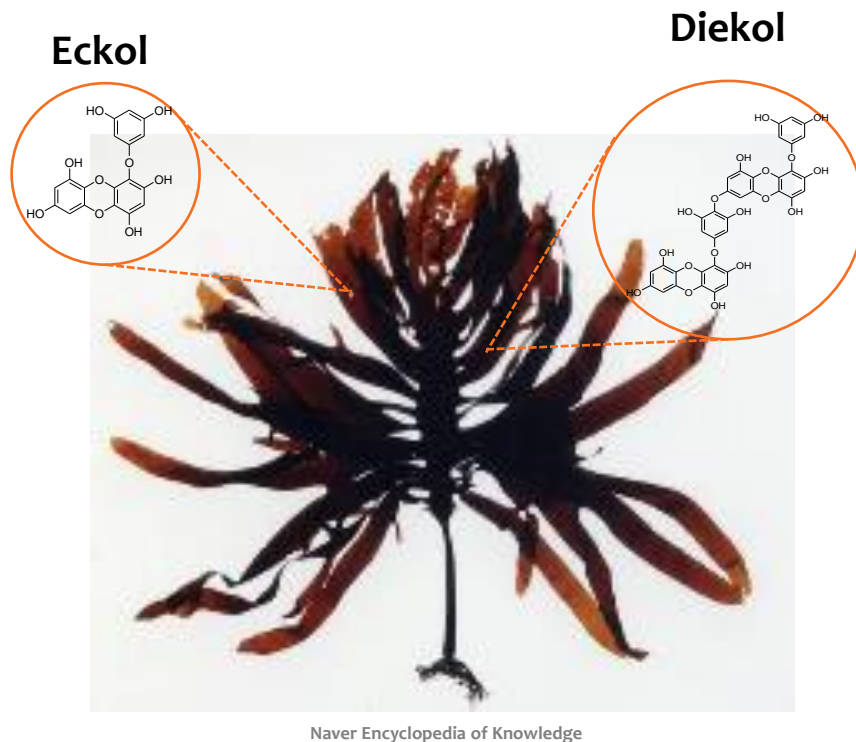
🍷 Marine Forestation



§Pics from FIRA's webpage

- 🍷 As a result of various effects, e.g., indiscriminate development, pollution, and global warming, the amount of seaweeds has been decreased, and the marine ecosystem has been adversely affected.
- 🍷 Marine calcification makes a harmful environment for seaweed to adhere, as the grave marine desertification became a global issue, FIRA (Korea Fisheries Resources Agency) launched a project named 'Marine Forests' to preserve the Korean marine environment in 2009.
- 🍷 *E. cava* was selected to be studied to reduce greenhouse gas with other seaweed, and it is also used for creating sea forest. (Chung et al., 2013; Kim et al., 2013)
- 🍷 Through these efforts, we can keep the Korean marine resources and have a beneficial influence on marine sustainability.

Sea-polyphenols, Powerful Anti-oxidant

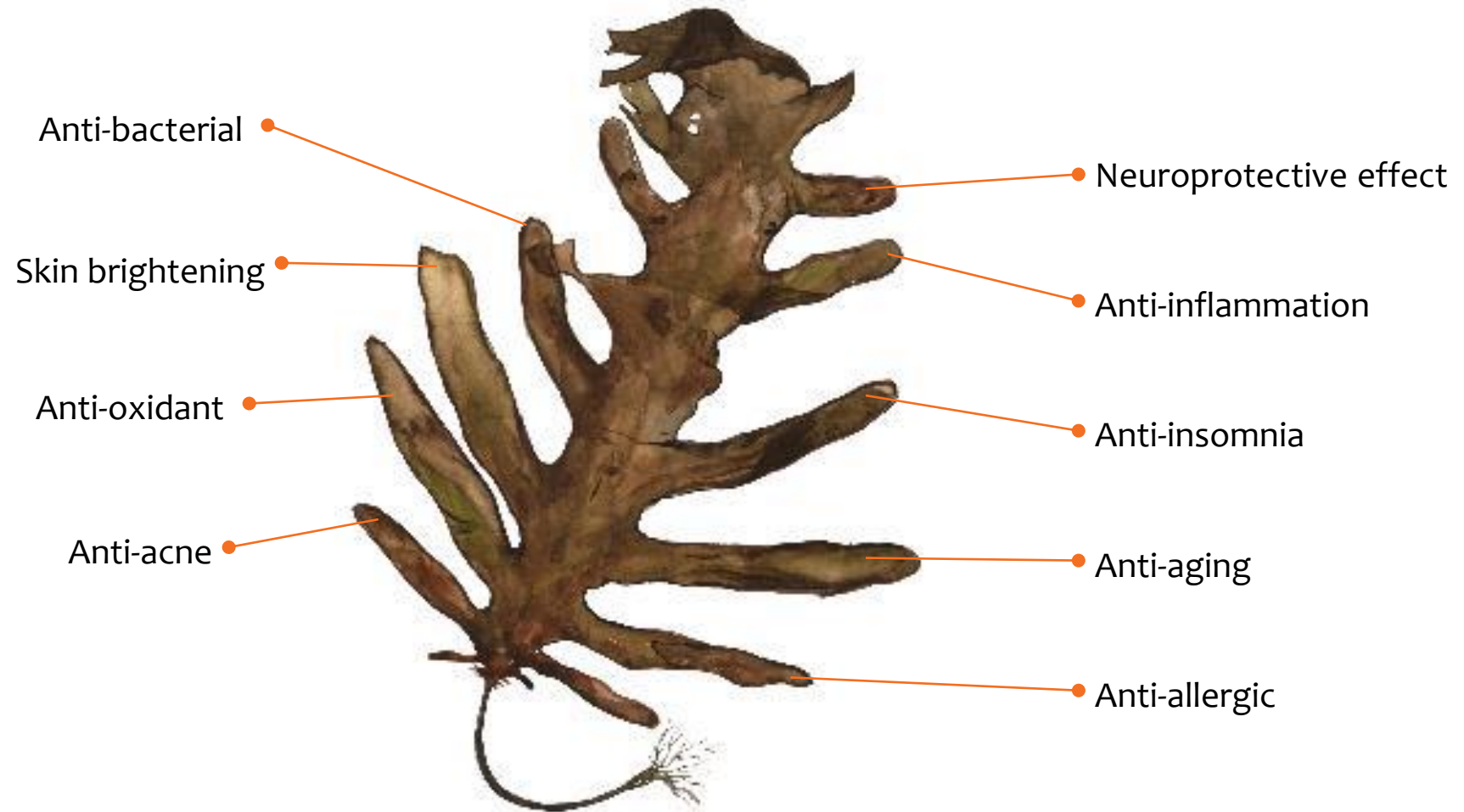


Sea-polyphenols, such as phlorotannins, are abundant in *E. cava*, which protect itself from UV radiation.

Phlorotannins are oligomers of phloroglucinol which are different from polyphenols found in the land plant and have superior anti-oxidant and anti-inflammatory effects.

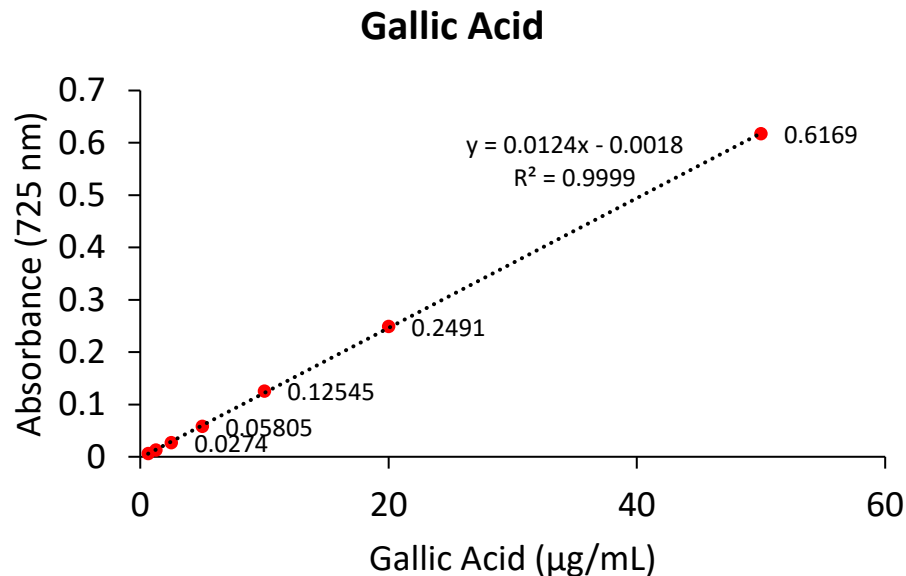
**Phlorotannins (Sea-polyphenols)
from *E. cava***

Reported Bioactivities in *E. cava*



Total Polyphenol Content

Total polyphenol contents are measured by Folin-Denis method using gallic acid as a standard compound. 0.2 N Folin's reagent and 10% sodium carbonate are mixed and reacted with Seactive(PD) for 30 min in room temperature. Color formation is detected at 725 nm.



Total Polyphenol Content: 377.9 µg GAE/mL

*GAE: Gallic Acid Equivalent

*Total polyphenol contents, GAE mg/cup is equivalent 87±9 mg/cup of tea
(Ref. Antioxidant and Antiradical Activity of Coffee, Yashin et al.,
Antioxidants, 2013, 2(4), p.230-245)

in vitro Efficacy Evaluation

⦿ Anti-photoaging Effect

UVB-induced ROS Generation Inhibition Activity in Human Dermal Fibroblasts

⦿ Anti-oxidant Effect

ROS Generation Inhibition Activity / DPPH Scavenging Activity

⦿ Anti-inflammatory Effect

NO Production Inhibition Activity

⦿ Anti-allergic Effect

β -hexosaminidase Release Inhibition Activity in Basophils

⦿ Anti-wrinkle Effect

Collagen Synthesis Activity in Human Fibroblast Cells

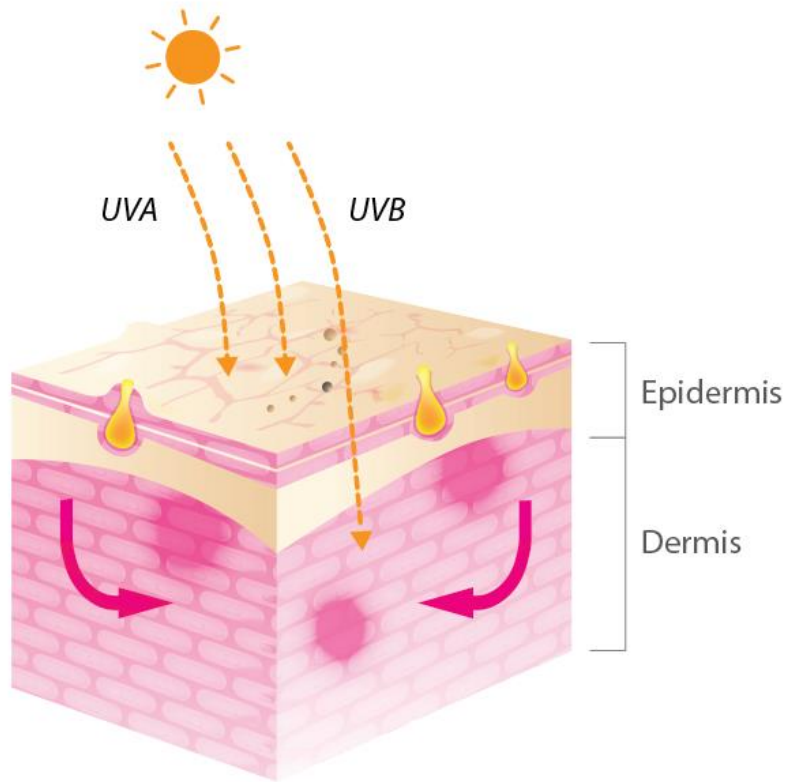
⦿ Anti-pollution Effect

Cell Proliferation Activity

Anti-apoptotic Effect



What is Photoaging?



UV radiation causes skin aging



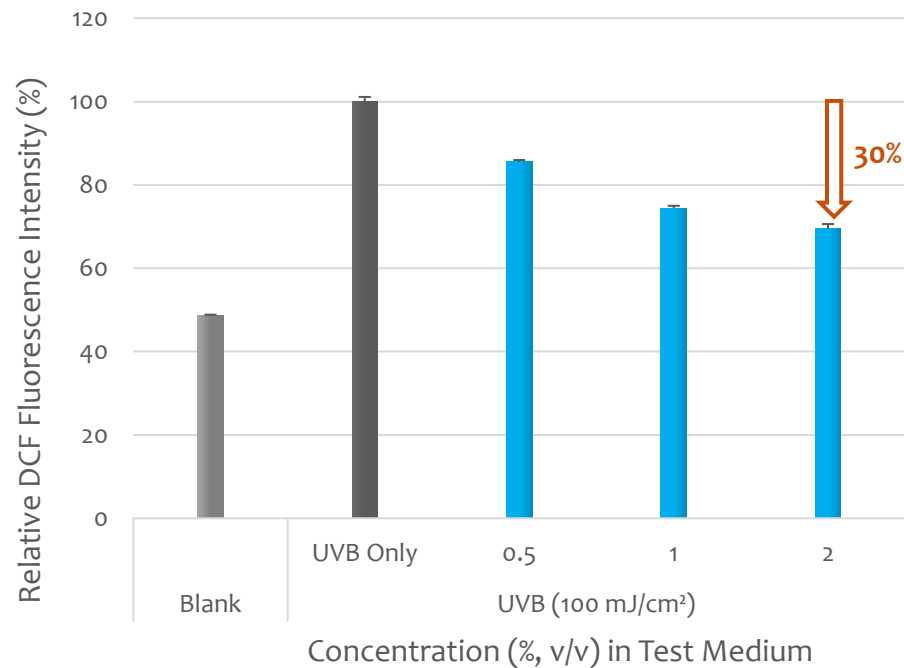
Free radicals ↑



Photodamage
(Inflammation, wrinkle,
and pigmentation)

in vitro Efficacy Evaluation: Anti-photoaging Effect

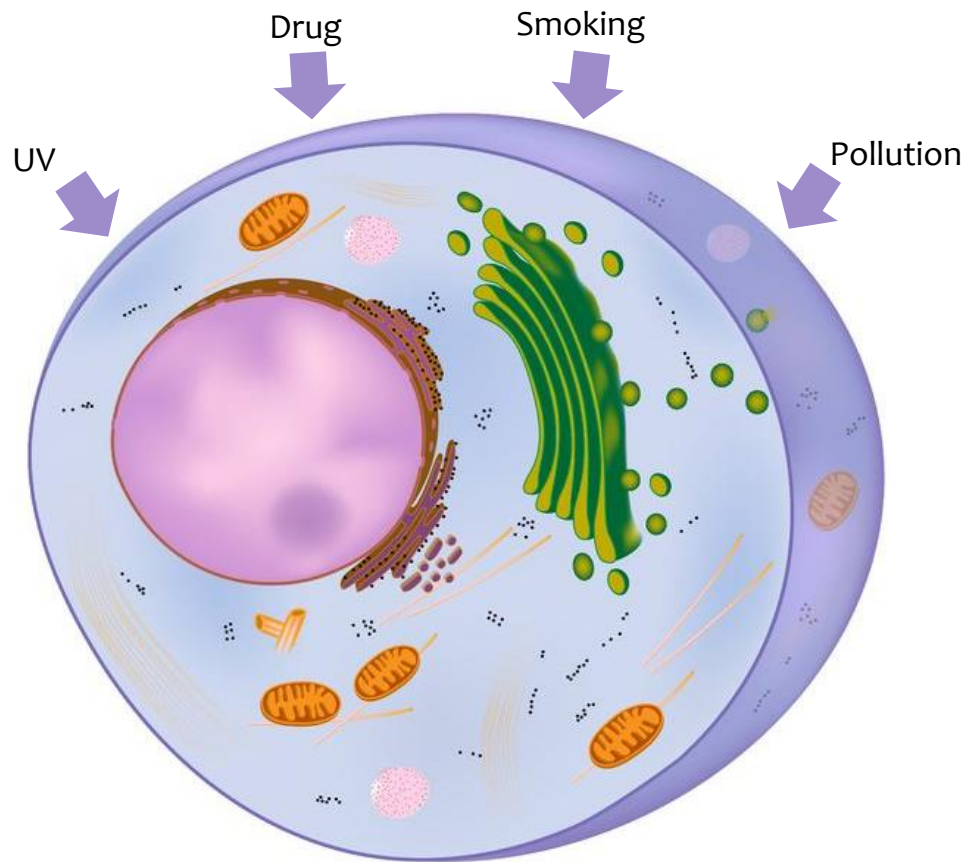
UVB-induced ROS Generation Inhibition Activity in Human Dermal Fibroblasts



Seactive significantly reduced **ROS generation** caused by UVB-irradiation in human dermal fibroblasts, neonatal (HDFn) (100 mJ/cm²) in a dose-dependent manner. As a result, **2% of Seactive** shows the **30% of anti-photoaging effect**.

Oxidative Stress

Reactive Oxygen Species (ROS) can be increased by



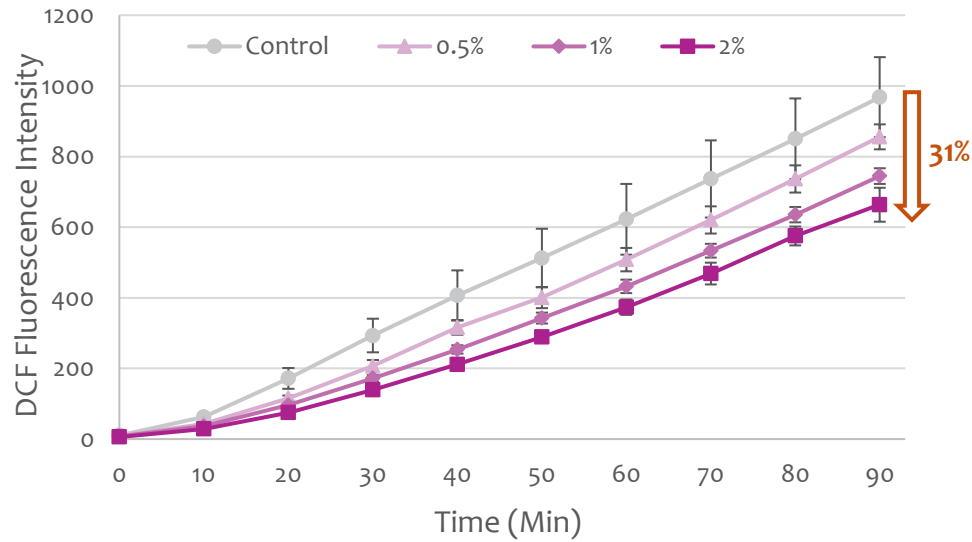
Intracellular ROS may induce

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

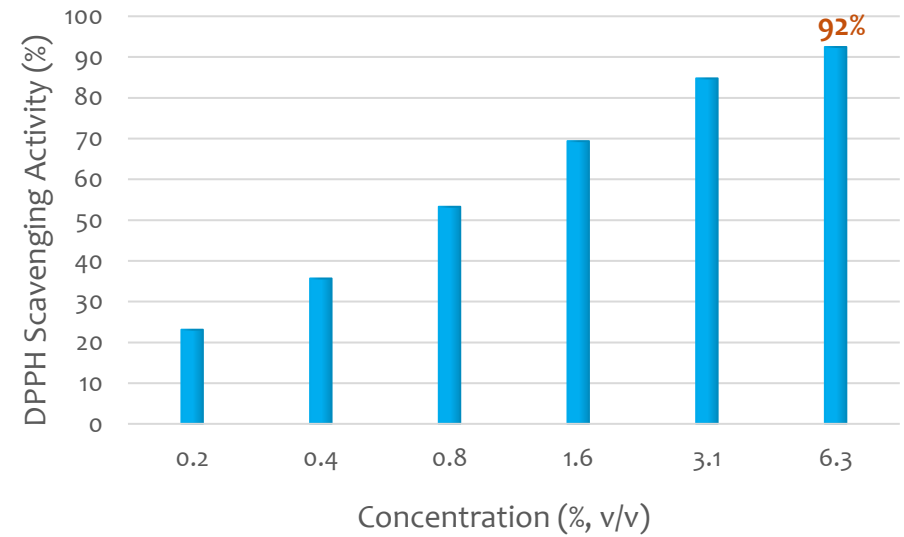


in vitro Efficacy Evaluation: Anti-oxidant Effect

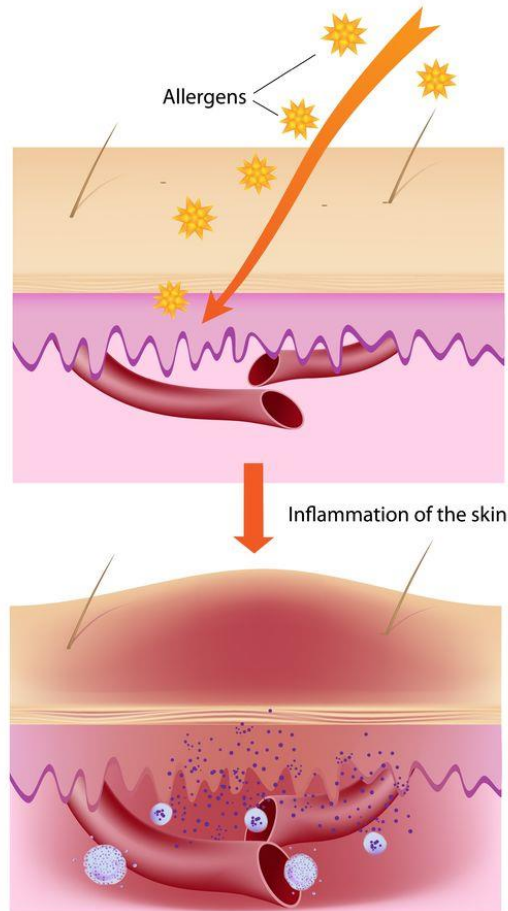
ROS Generation Inhibition Activity



DPPH Scavenging Activity

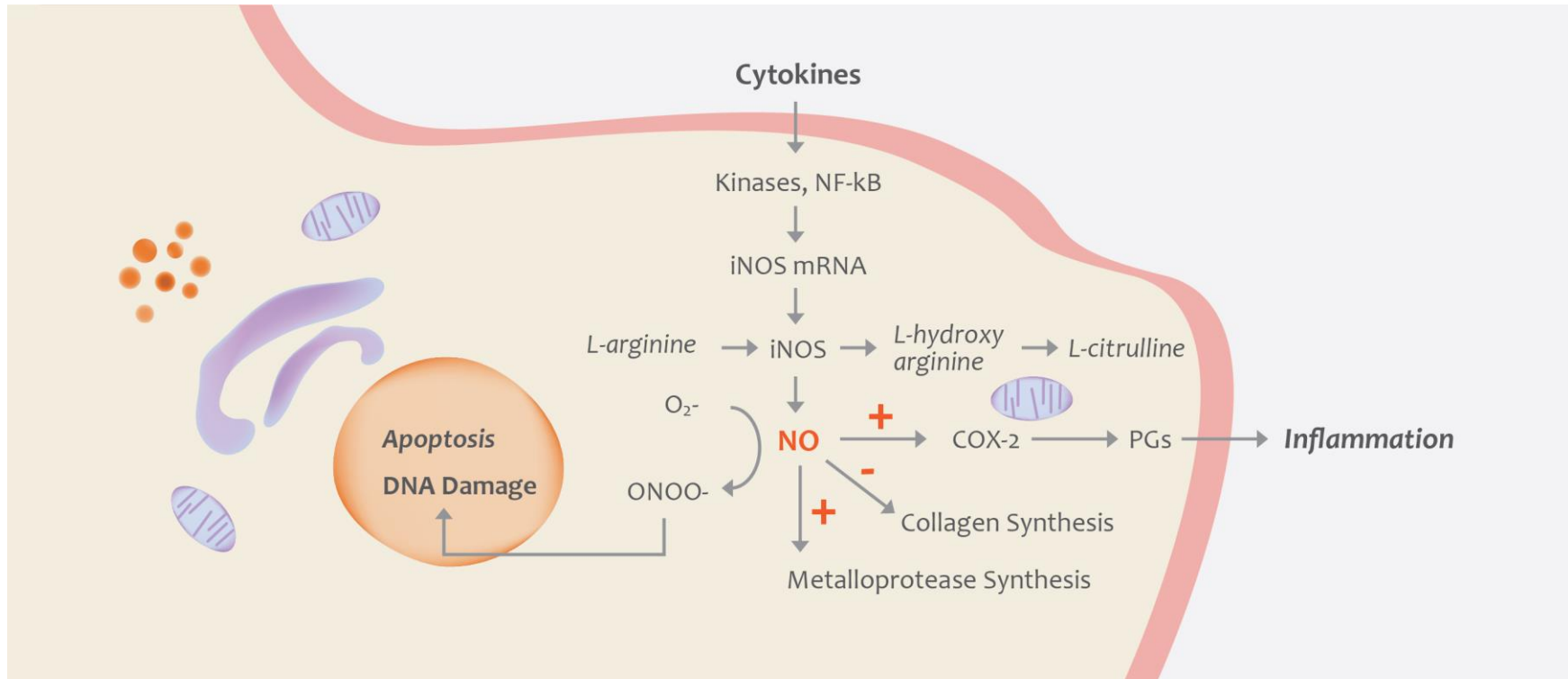


What is Skin Inflammation?



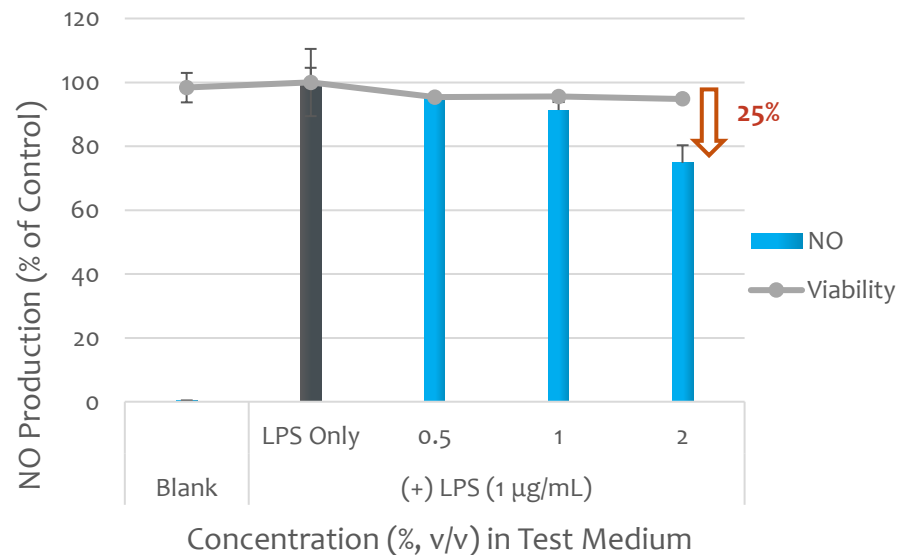
Inflammation is part of the complex immunological responses to a wide range of harmful stimuli including skin injury, tissue necrosis, infection, and irritants. The immune system is responsible for protecting our body from the harmful stimuli and of maintaining homeostasis. Like any other part of the body, the skin can be involved in immune responses. Inflammation in the skin often causes a rash to form. It's a response from the immune system to conditions such as bacterial/viral/fungal infections, allergic reactions, heat, and sunlight. The symptoms of skin inflammation are rash, skin redness, blisters or pimples, warmth, and thickening of the skin in the affected area.

Inflammation Mechanism



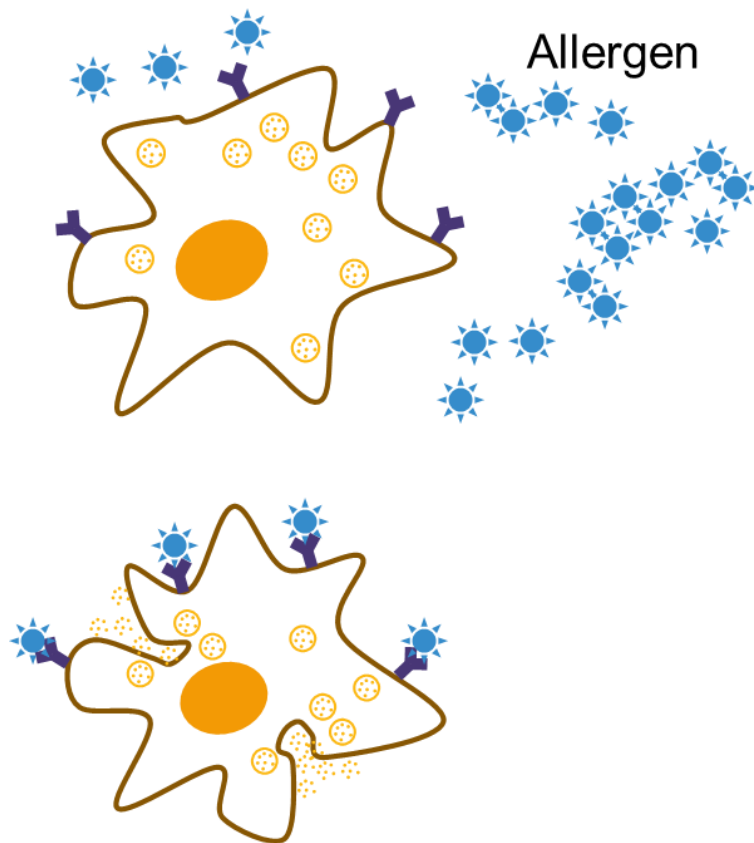
in vitro Efficacy Evaluation: Anti-inflammatory Effect

●● Inhibition of NO Production in RAW 264.7 cells



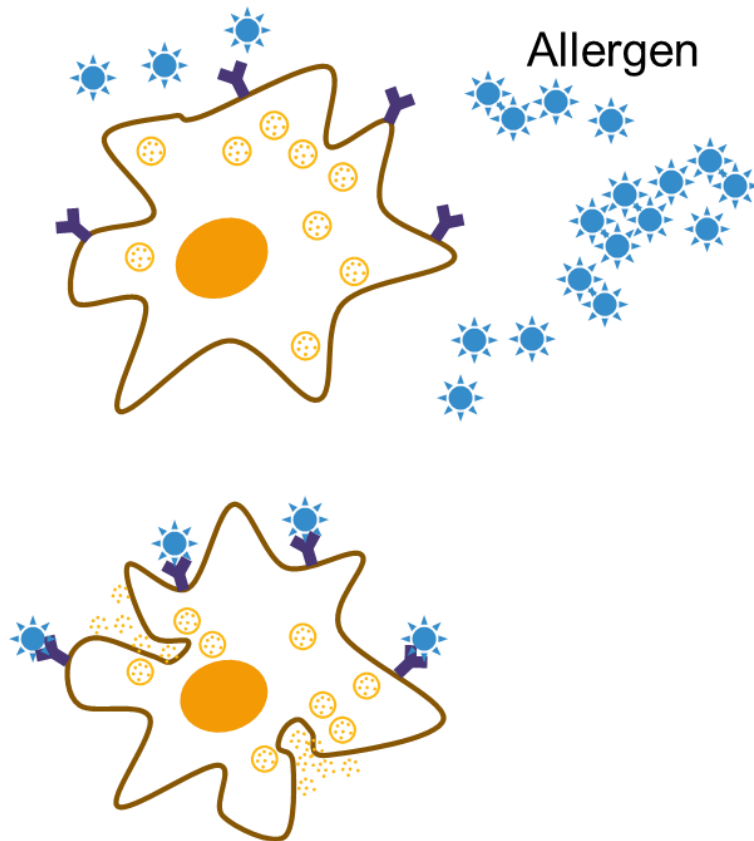
The anti-inflammatory property of **Seactive** has been identified by measuring the NO production in RAW 264.7 cells. As a result, it showed **25% of decrease of NO** by treating **2% of Seactive** in macrophage.

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.

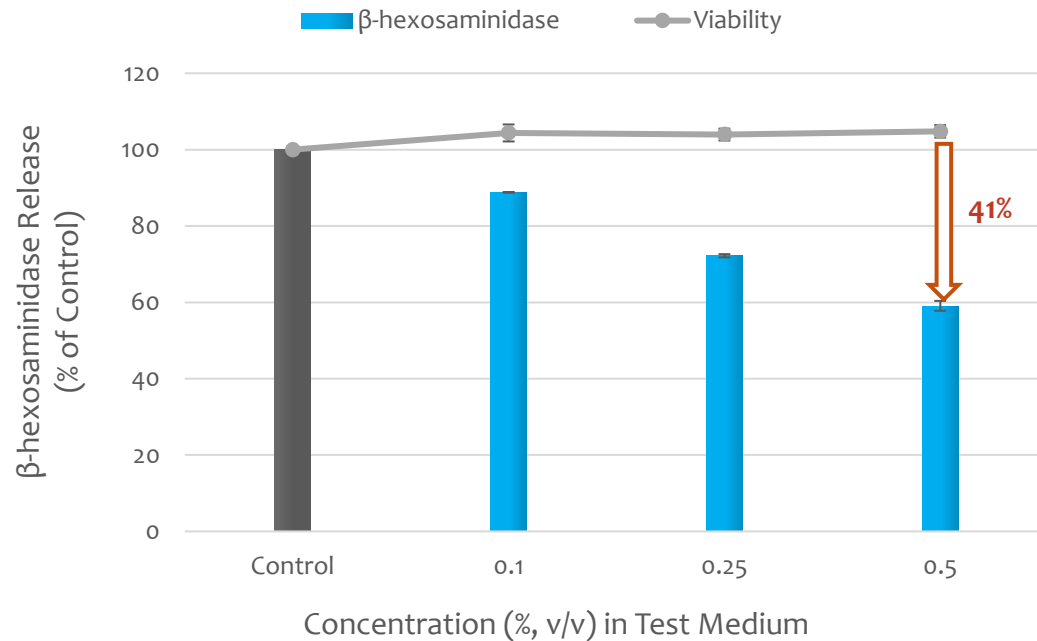
Allergic Reaction: β -hexosaminidase Release



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.

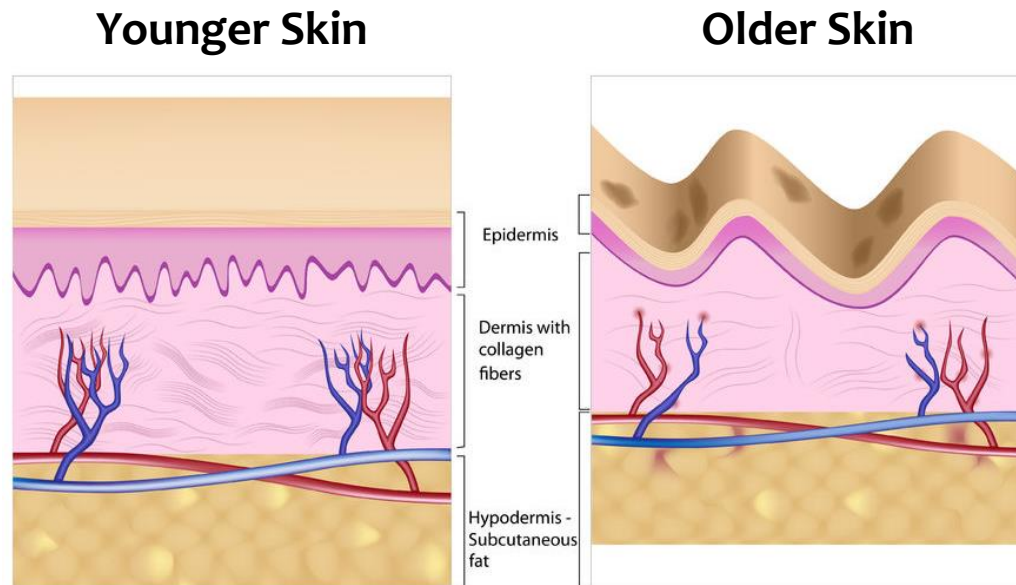
in vitro Efficacy Evaluation: Anti-allergic Effect

β-hexosaminidase Release Inhibition Activity in Basophils



Seactive significantly reduced β-hexosaminidase in basophils with a percentage of 41% by treating 0.5% of Seactive.

Skin Aging and Wrinkle Formation

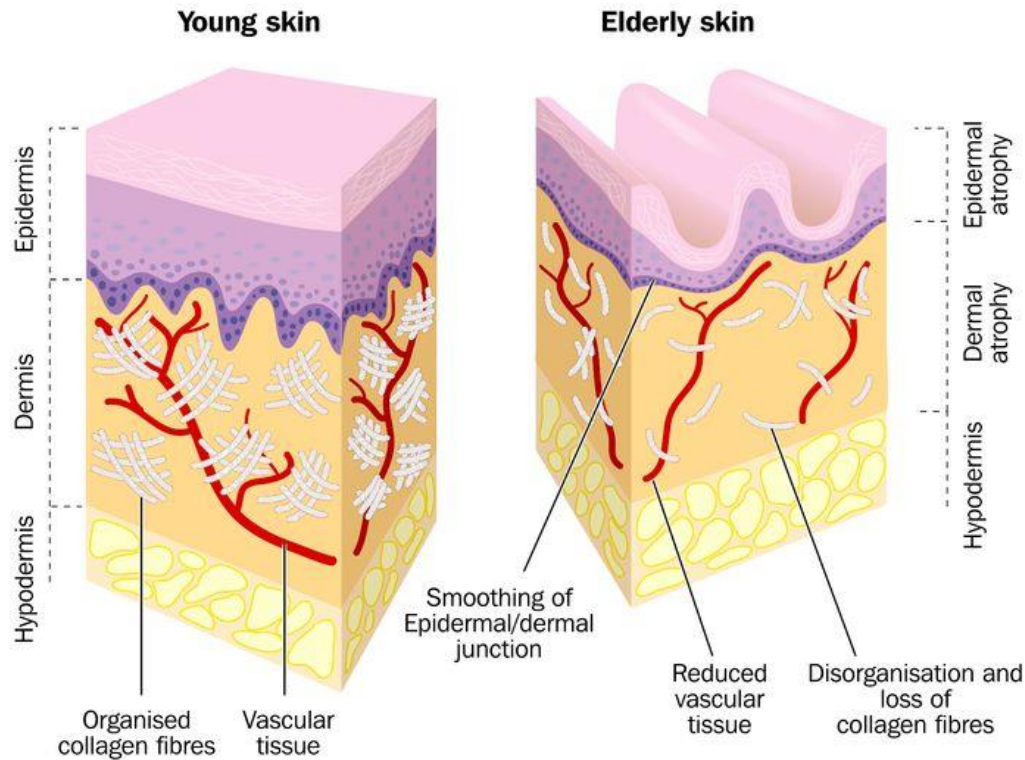


❖ Skin aging is noted by

- a decrease of elasticity
- formation of wrinkles and fine lines
- degradation of collagen
- thinner and weaker skin
- damaged connective tissues

Skin changes with increasing age due to both intrinsic and extrinsic factors. Intrinsic skin aging is determined by genetic factors, hormonal status and metabolic reactions such as oxidative stress. One of the most important extrinsic skin aging factors is induced by UV radiation by sun exposure, referred to as *photoaging*. Smoking cigarettes and environmental pollution are also essential factors in premature skin aging and wrinkle formation.

Anti-wrinkle Mechanism

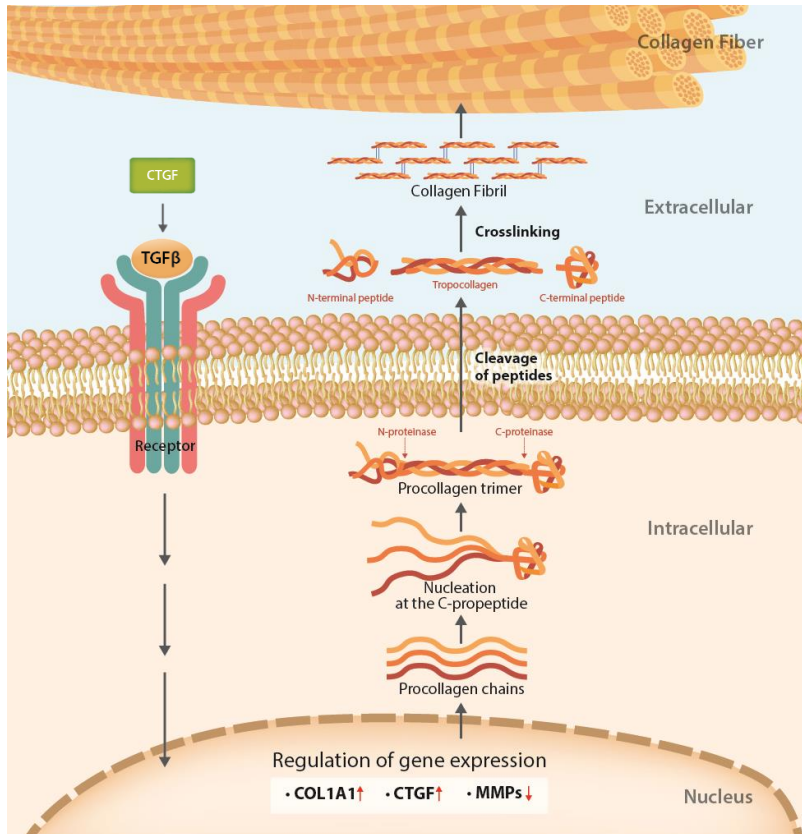


- Stimulation of collagen synthesis
- Inhibition of collagen degradation
- Inhibition of elastin degradation
- Stimulation of fibroblast proliferation



- **Prevention of wrinkle formation**
 - **Increase in skin elasticity**
 - **Wrinkle improvement**

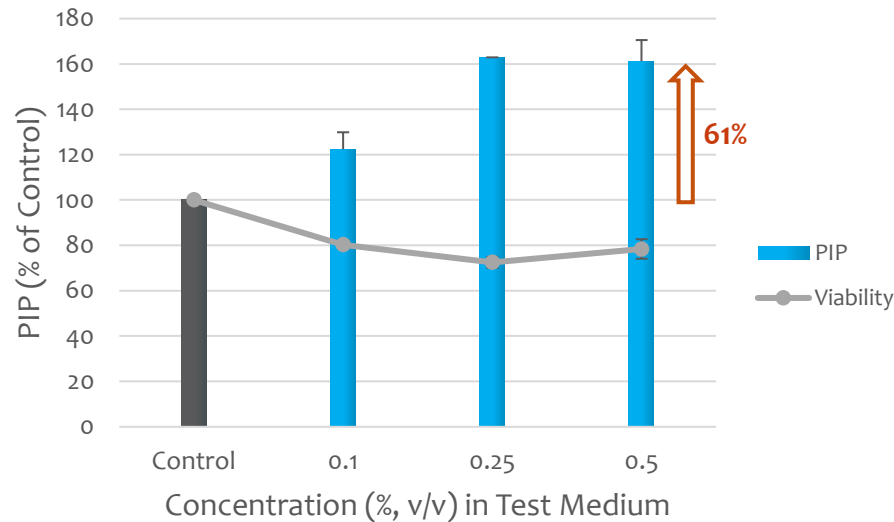
Mechanism of Collagen Synthesis



Transforming Growth Factor (TGF)-β, a key mediator of fibroblast activation, is known to induce the expression of extracellular matrix (ECM) proteins, such as collagen, elastin, etc., and to stimulate the production of protease inhibitors that prevent the enzymatic breakdown of the ECM by matrix metalloproteinases (MMPs).

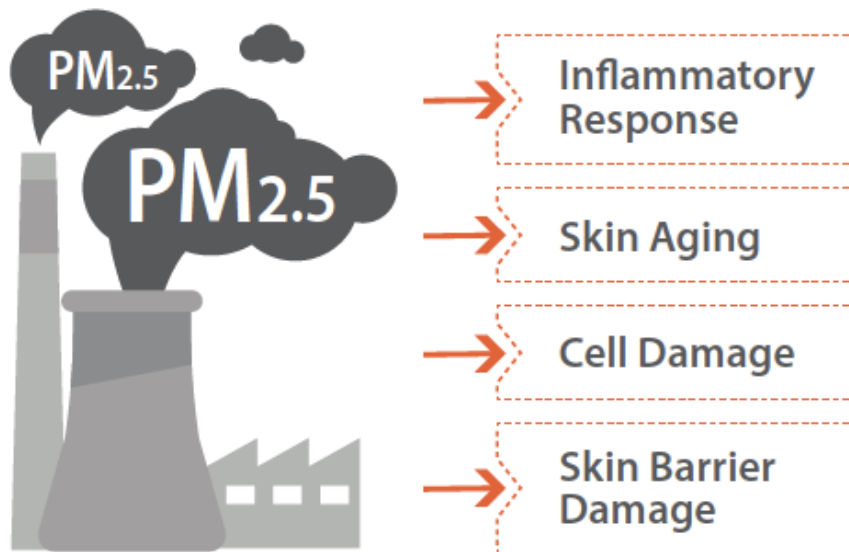
in vitro Efficacy Evaluation: Anti-wrinkle Effect

Collagen Synthesis Activity in Human Fibroblast Cells



Anti-wrinkle property of Seactive is identified by measuring the PIP (Procollagen Type I) production in human fibroblast cells. As a result, it showed **61% increase of PIP** by treating **0.5% of Seactive**.

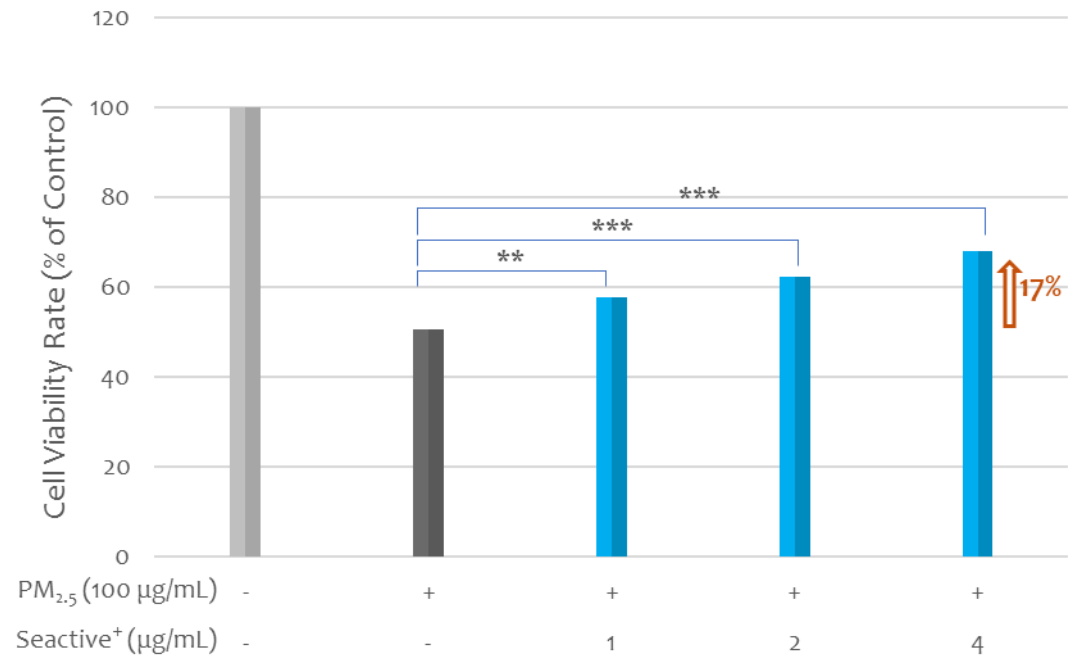
Particulate Matter (PM) Action



Particulate Matter (PM), known as microscopic dust, is one of the common causes of air pollution in recent years as the economy has been developed. PM includes numerous air pollutants and, among them, PM_{2.5} indicates particulate matter less than 2.5 μm which is secondary air pollution reacted physically and chemically with various first air pollutants. PM causes many internal damages in the human body such as inflammation, skin aging, cell damage, skin barrier damage, and so on.

in vitro Efficacy Evaluation: Anti-pollution Effect

Cell Recovery Activity from PM2.5-induced Damage in HaCaT Cells

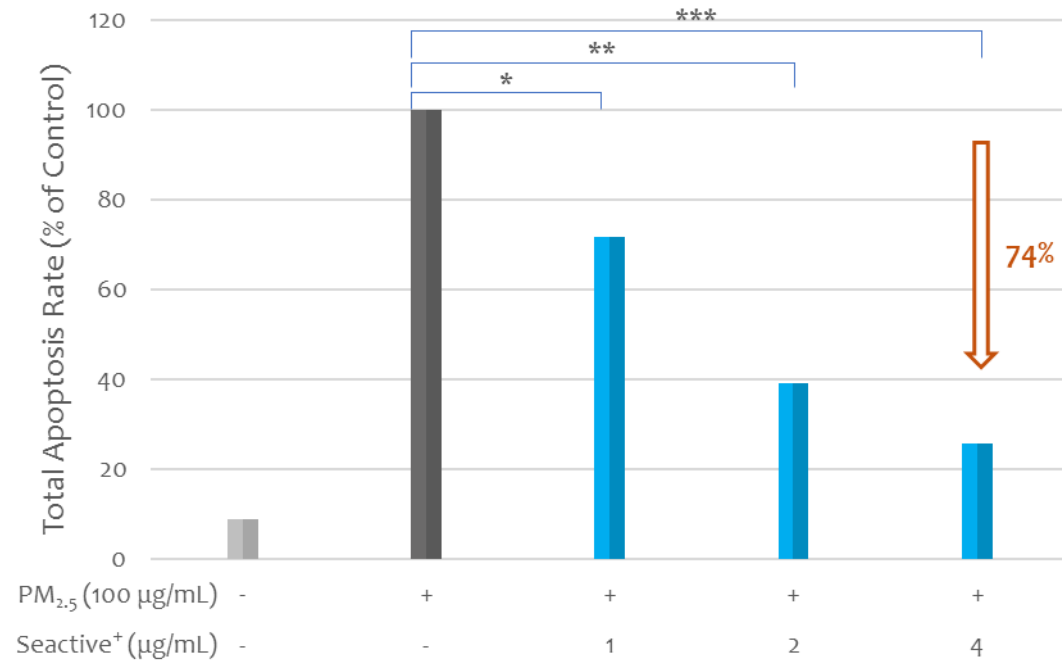


Seactive⁺: Seactive Freeze-dried (FD) Powder
 Seactive FD Powder 4 µg/mL=Seactive(PD) 0.13%

** p<0.01, and *** p<0.001 vs. the control group (PM2.5-alone)

in vitro Efficacy Evaluation: Anti-pollution Effect

🍷 Anti-apoptotic Activity on PM2.5 treated HaCaT Cells



Seactive⁺: Seactive Freeze-dried (FD) Powder
 Seactive FD Powder 4 µg/mL=Seactive(PD) 0.13%

*P<0.05, ** p<0.01, and *** p<0.001 vs. the control group (PM_{2.5}-alone)

Market Reference

Estée Lauder / La Mer



The Eye Concentrate

- Fast absorbing treatment for eye rims
- Essential energy and renewing hydration to reduce the dark circles, lines, and wrinkles.
- Contain marine ingredients to improve skin condition

Estée Lauder / Clinique



Clinique ID: Active Cartridge Concentrate for Compromised Skin

- Custom blend hydrator for compromised skin
- Contain Cica and marine ingredients to improve skin moisturizing barrier

Product Information

- Product Name: Seactive(PD)-RSPO
- INCI Name: Ecklonia Cava Extract (China Compliant)
- 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"

