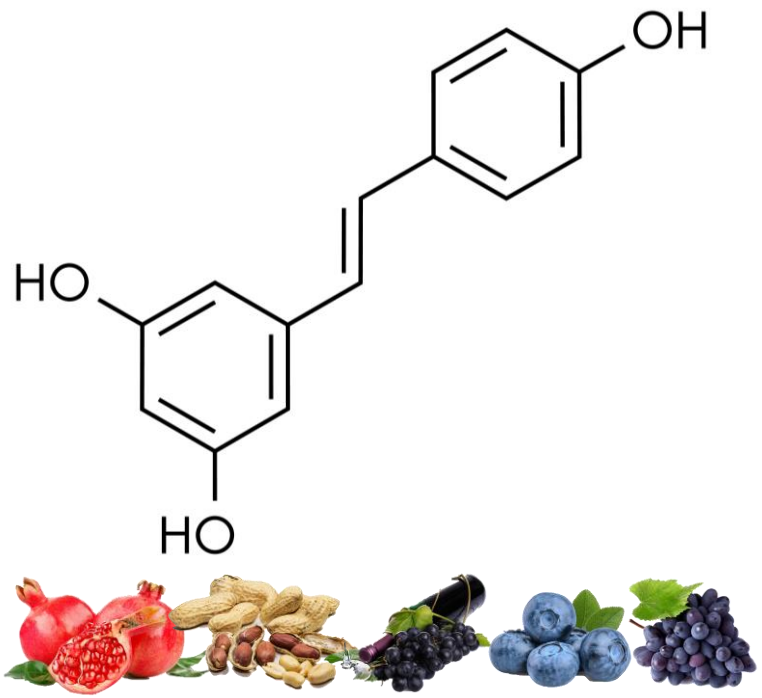
Water Soluble Resveratrol(4%)

the garden of naturalsolution
12-24, Gajangsaneopseo-ro, Osan-si, Gyeonggi-do, 18103, Republic of Korea
www.naturalsolution.co.kr info@naturalsolution.co.kr

Resveratrol

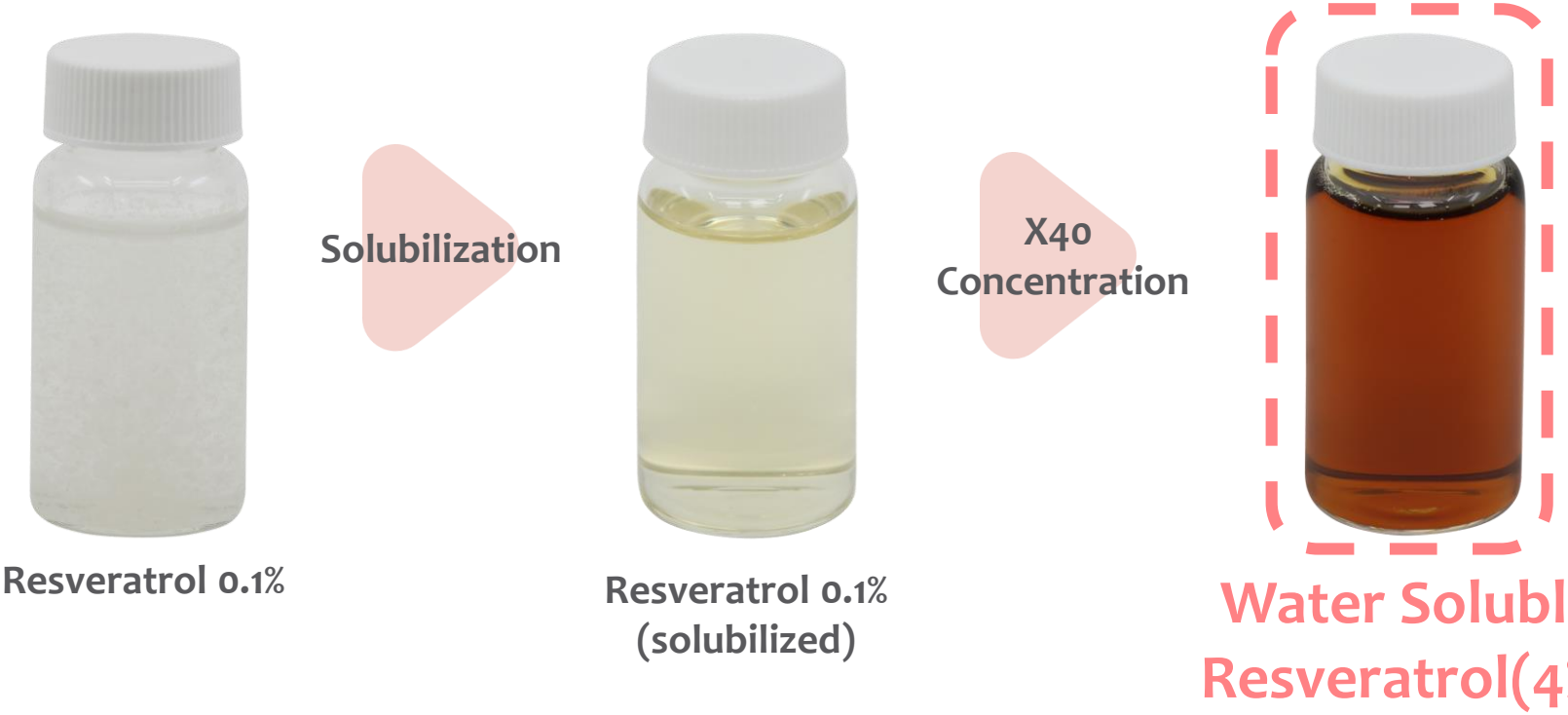


Resveratrol is a phytoalexin produced by plants like grapes or some berries when they are attacked by bacteria or fungi. It is also known as a **phytoestrogen** as it shows estrogen-like activity due to its similar structure with estrogen. Resveratrol is known to be contained in **red wine, pomegranates, dark-colored berries, peanuts, Japanese knotweed roots**, and many other plants. It is **soluble in alcohol and not in water**, so it is contained more in red wine than in grape juice.

Resveratrol

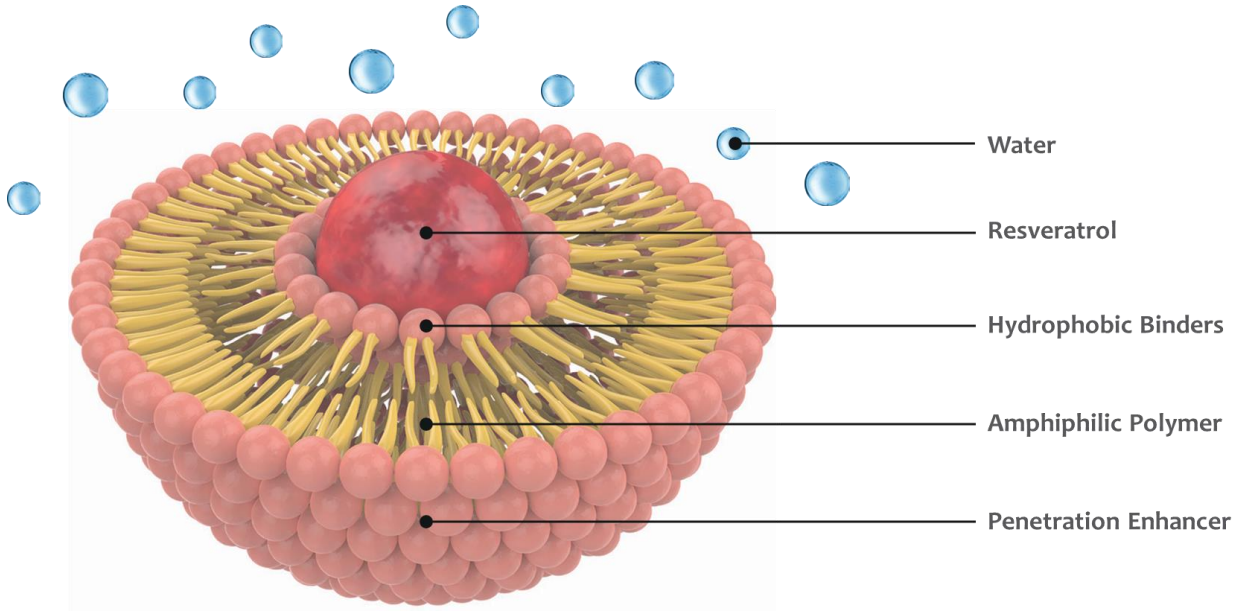
In many research studies, resveratrol is reported to have various physiological and pathological effects in humans, such is longevity, anti-cancer, anti-diabetes, anti-inflammatory, anti-oxidant, cardioprotective, and many others.

Solubilization of Resveratrol



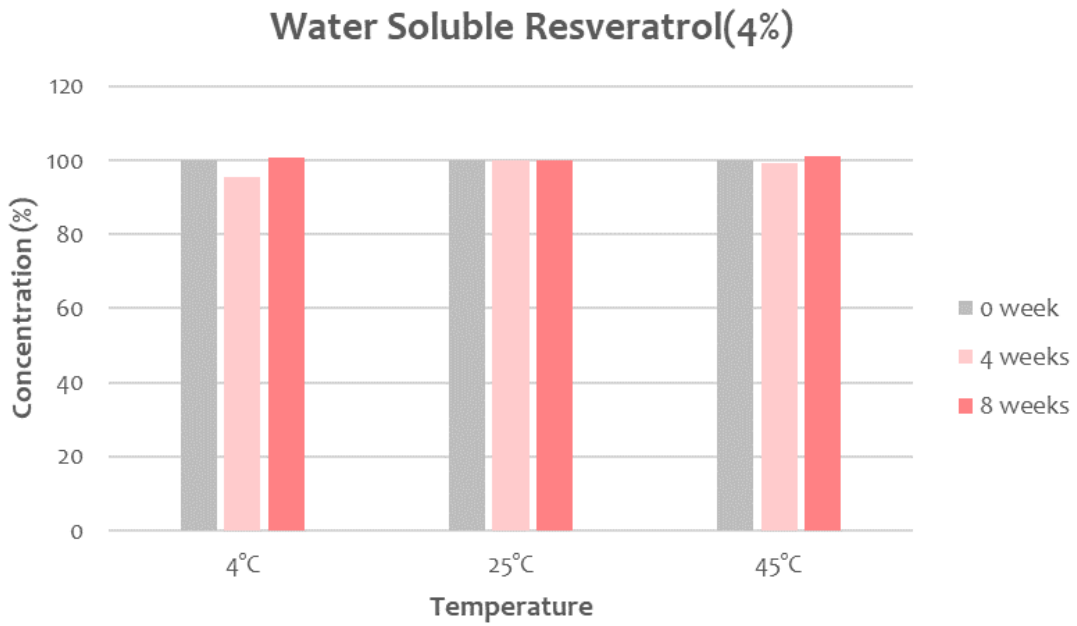
Due to resveratrol's poor solubility, a solution with 0.1% resveratrol has opaque and turbid appearance. By applying GNS's solubilization and stabilization techniques, a transparent solution with higher resveratrol (4%) can be prepared, which is Water Soluble Resveratrol (4%).

Solubilization Technology: Polymeric Micelle



For the solubilization of resveratrol, polymeric micelle technique is applied, which encapsulates hydrophobic resveratrol using a block copolymer. Through this system, surfactants can be replaced, and this results in better physical stability than the micelles with surfactants. Hydrophilic and hydrophobic stabilizers protect resveratrol and improve skin penetration.

Stability of Water Soluble Resveratrol(4%)



When we tested the stability of Water Soluble Resveratrol(4%), we found that it was stable for 8 weeks at 4, 25, 45°C without any changes in the concentration.

Efficacy Evaluation

Anti-oxidant Effect
DPPH Scavenging Activity (*in tubo*)
Inhibition of ROS Generation (*in vitro*)

Anti-inflammatory Effect
Inhibition of NO Production in RAW 264.7 Cells (*in vitro*)

Anti-allergic Effect
Inhibition of β-hexosaminidase in Basophils (*in vitro*)

Skin Brightening Effect
Inhibition of Melanin Synthesis in Melanocytes (*in vitro*)

Anti-wrinkle Effect
Increase in Procollagen Synthesis in Fibroblasts (*in vitro*)

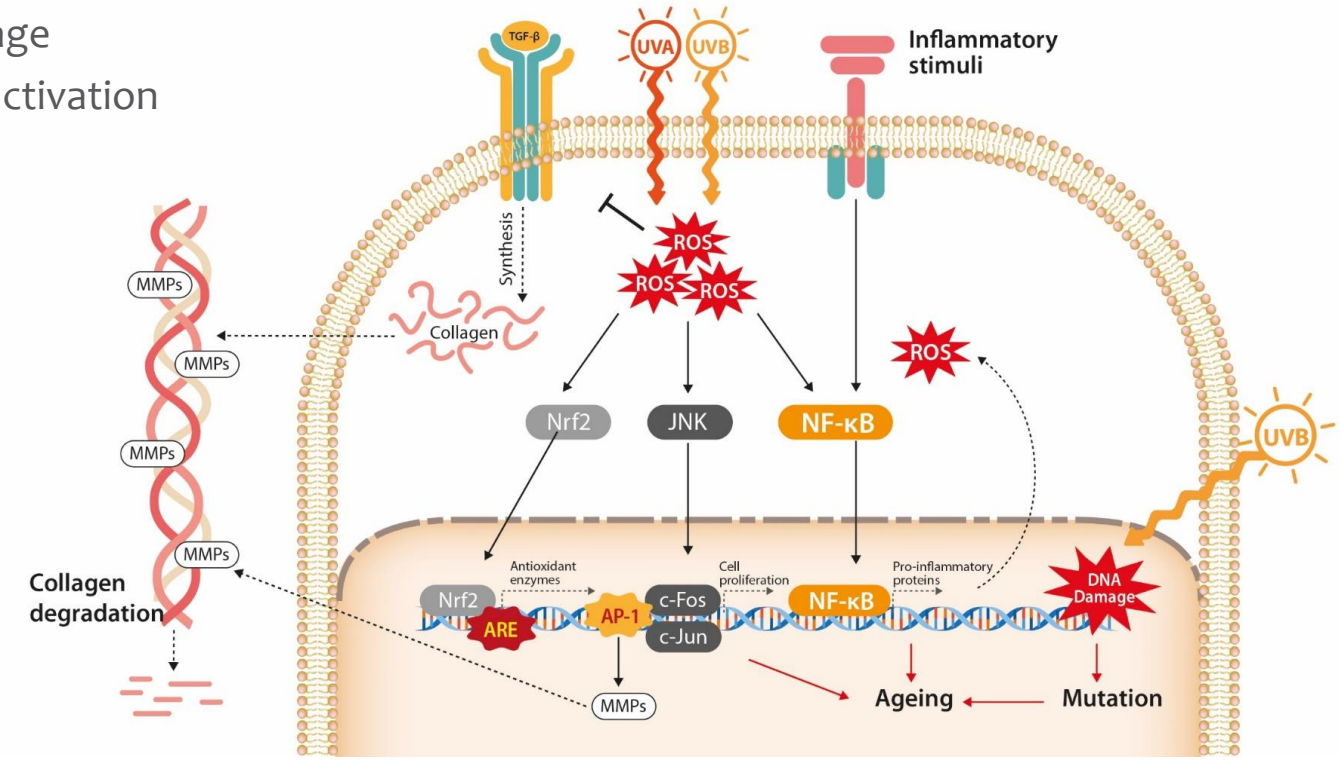
Oxidative Stress

Intracellular ROS may induce

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

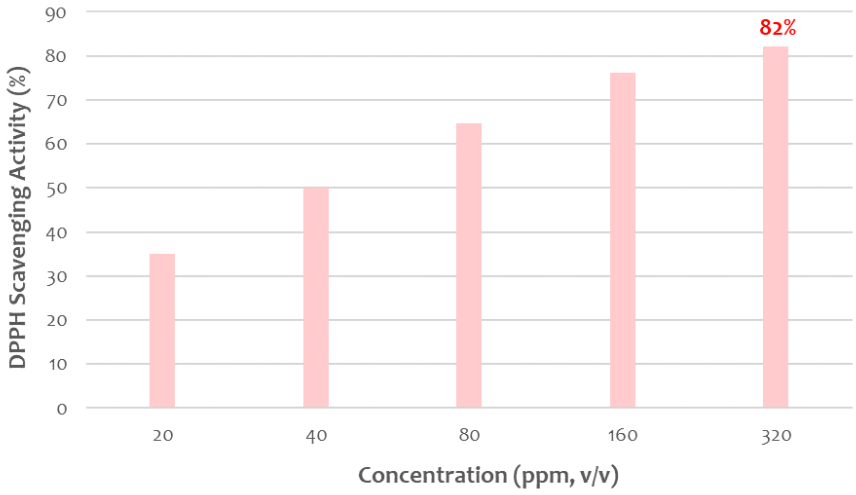
ROS ↑ **Skin Aging**

Inflammation



Anti-oxidant Effect

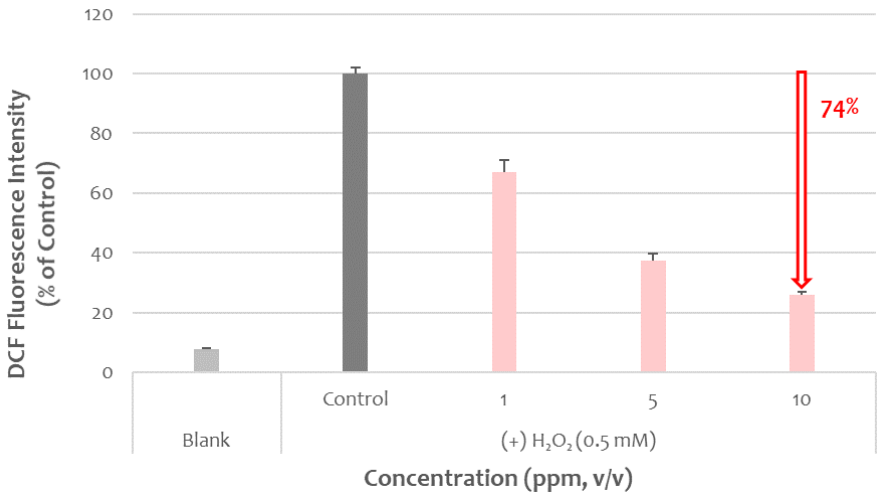
DPPH Scavenging Activity (*in tubo*)



82%↓

Scavenges free radicals by 82% at 40 ppm

Inhibition of ROS Generation (*in vitro*)

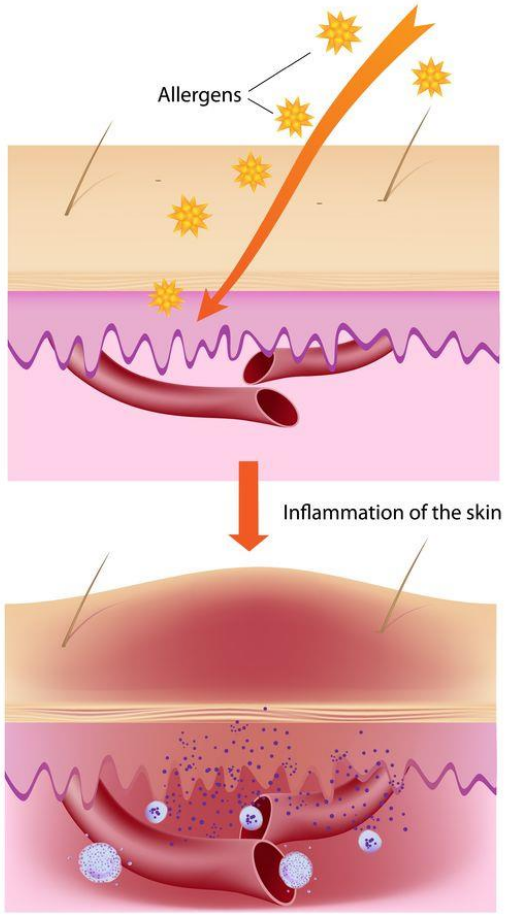


74%↓

Inhibits ROS generation by 74% at 10 ppm

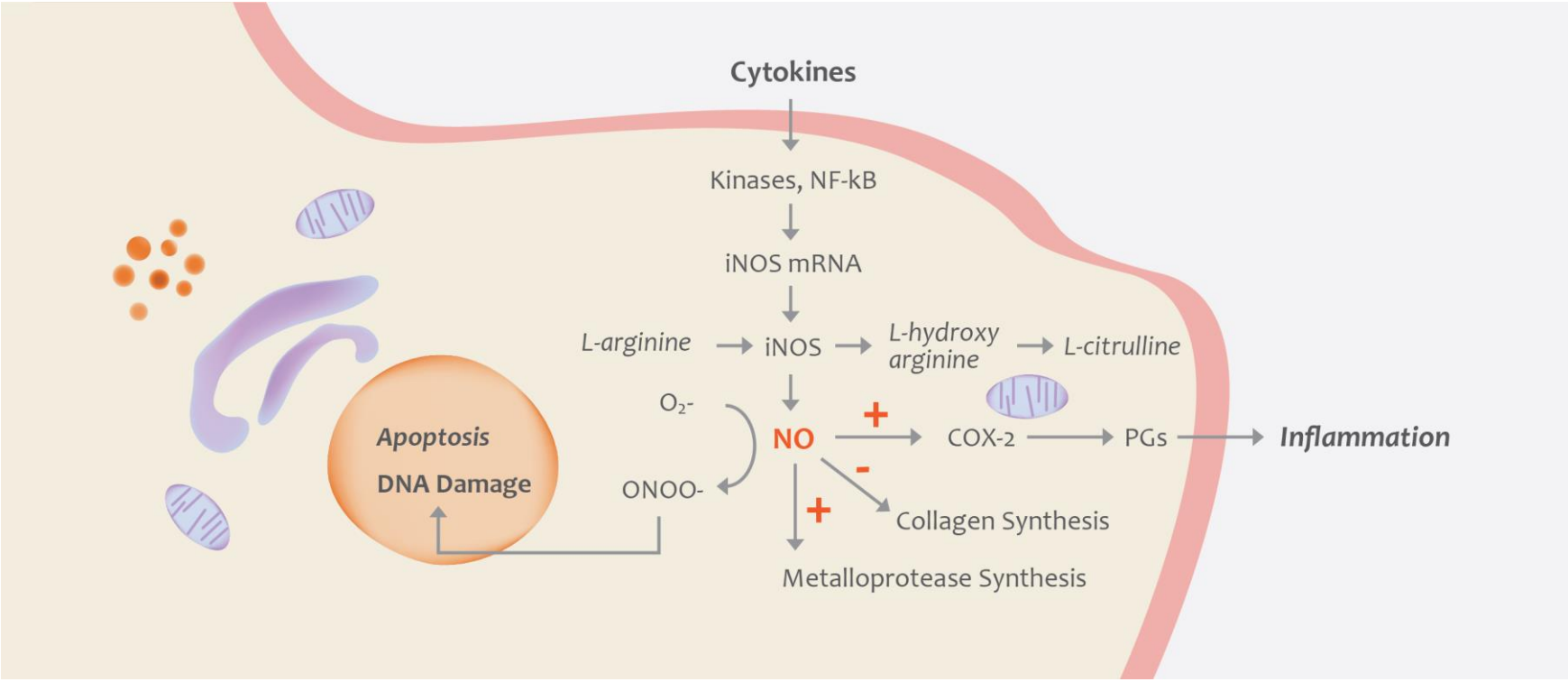
** tested with resveratrol*

What is Skin Inflammation?



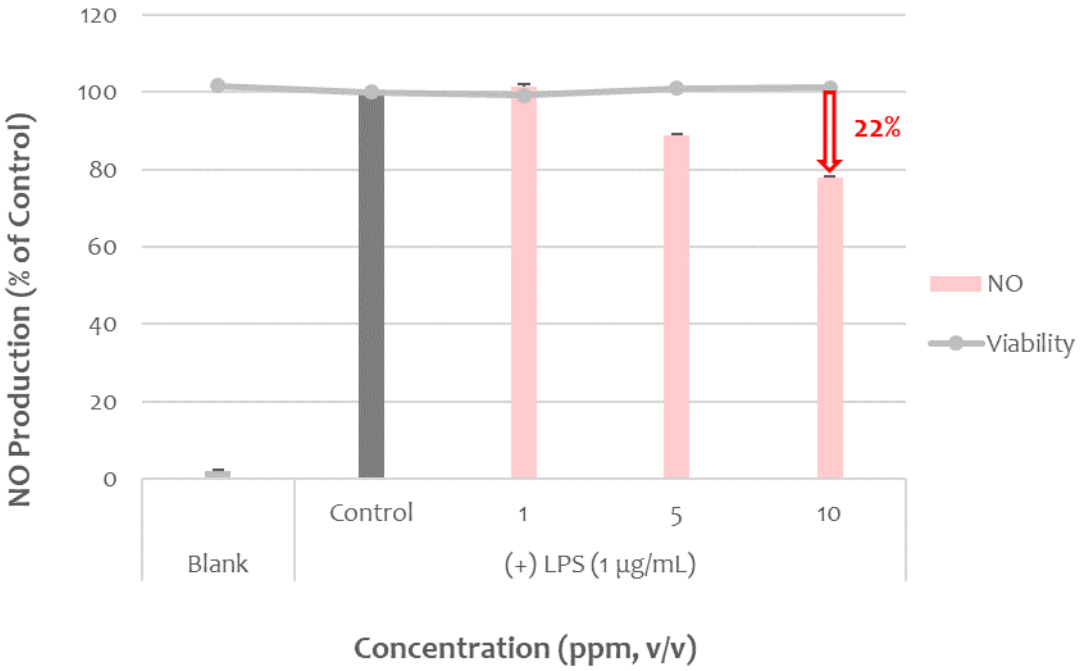
Inflammation is part of the complex immunological responses to a wide range of harmful stimuli including skin injury, tissue necrosis, infection, and irritants. The immune system is responsible for protecting our body from the harmful stimuli and of maintaining homeostasis. Like any other part of the 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



Anti-inflammatory Effect

Inhibition of NO Production in RAW 264.7 cells (*in vitro*)

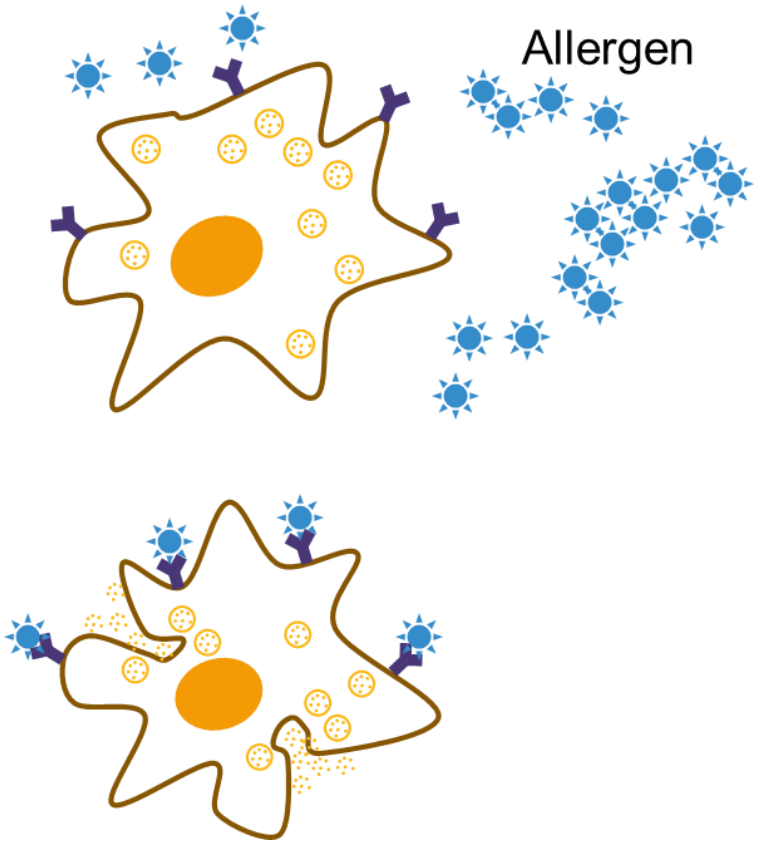


22%↓

Inhibits NO Production by 22% at 10 ppm

** tested with resveratrol*

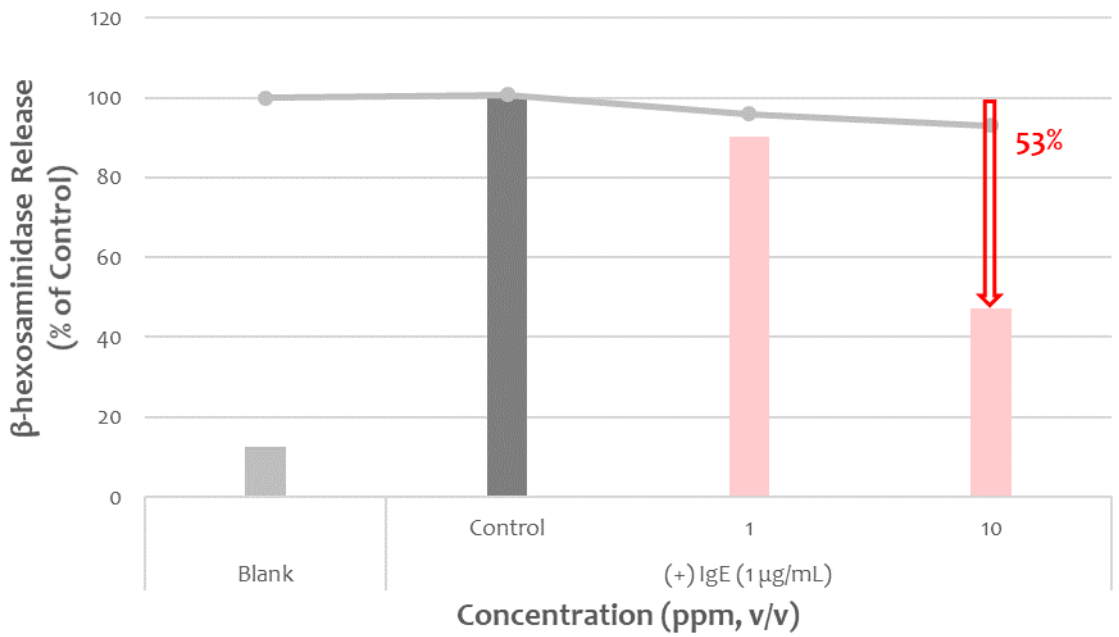
Allergic Reaction: β-hexosaminidase Release



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.

Anti-allergic Effect

Inhibition of β-hexosaminidase Release in Basophils (*in vitro*)

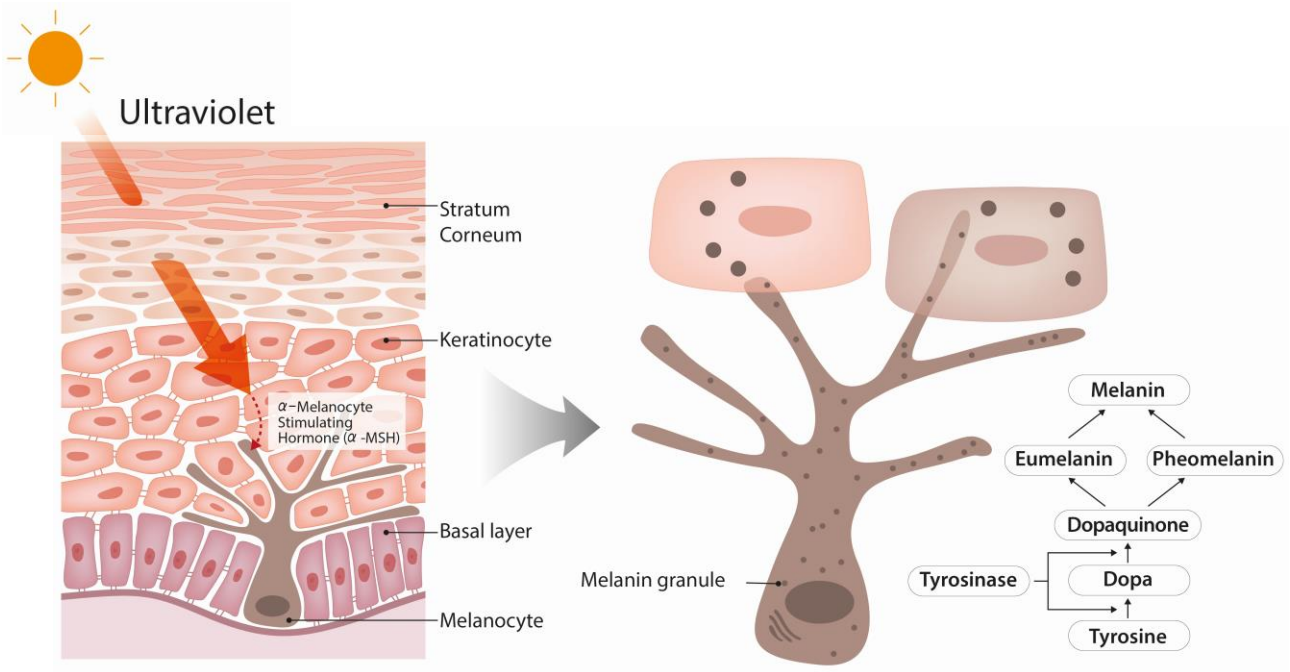


53%↓

Inhibits β-hexosaminidase Release by 53% at 10 ppm

** tested with resveratrol*

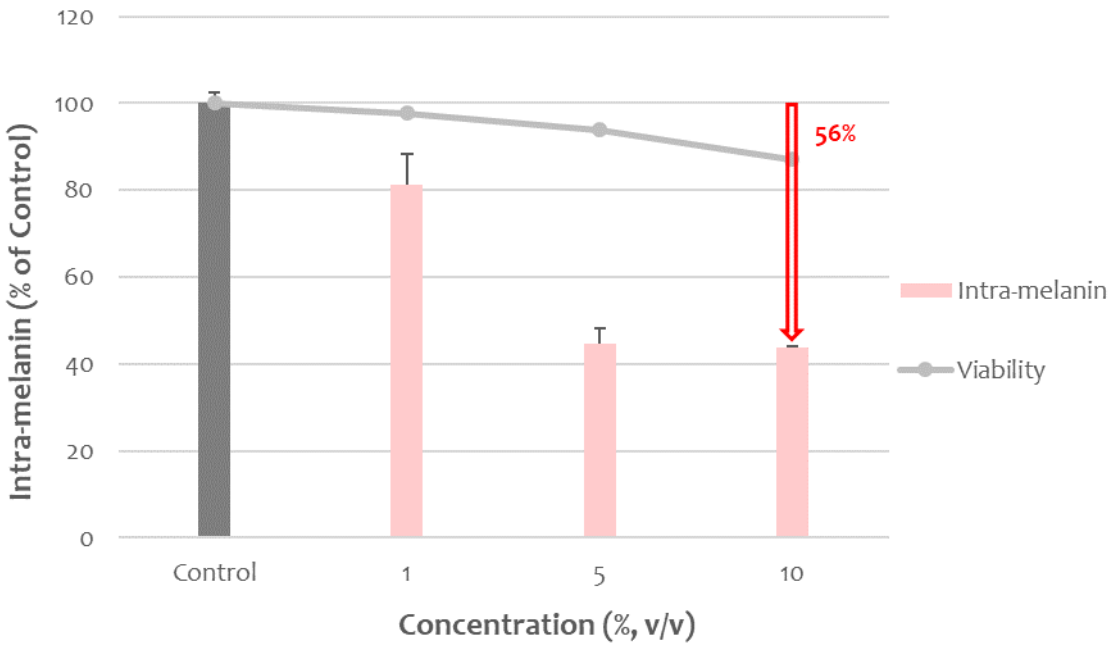
Skin Pigmentation



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. Upon exposure to UV radiation, DNA damage triggers cytokines, growth factors and other inflammatory factors to stimulate melanin production. Melanin is synthesized in melanocytes through a series of oxidative reactions involving amino acid tyrosine in the presence of the enzyme tyrosinase. This leads to the production of melanin, and melanin granules synthesized in the melanocytes are transferred to keratinocytes.

Skin Brightening Effect

Inhibition of Melanin Synthesis in Melanocytes (*in vitro*)

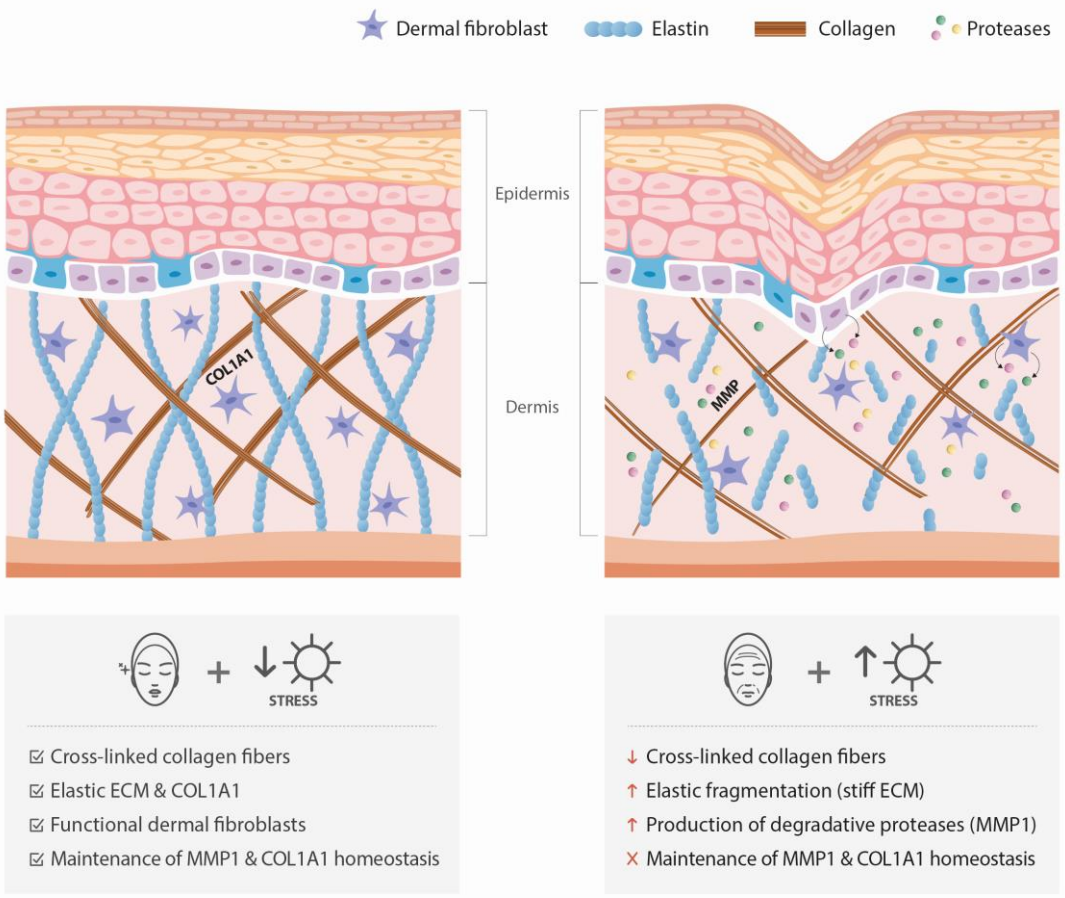


56%↓

Inhibits Melanin Synthesis by 56% at 10 ppm

** tested with resveratrol*

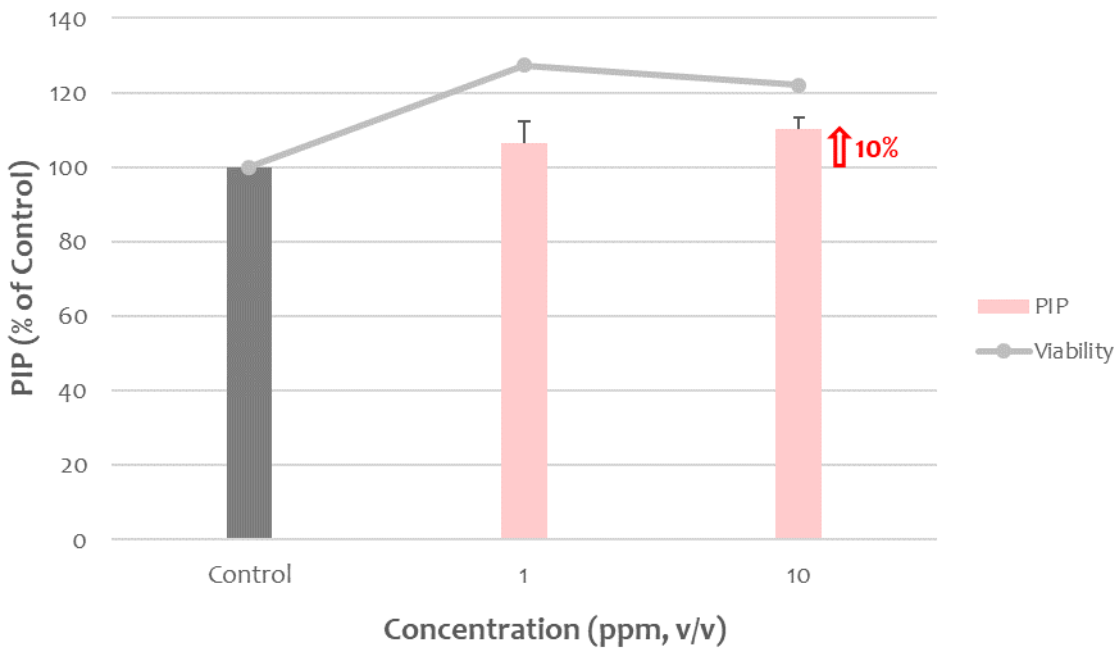
Mechanism of Wrinkle Formation



The skin has two main layers, which are the 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.

Anti-wrinkle Effect

Increase in Procollagen Synthesis in Fibroblasts (*in vitro*)



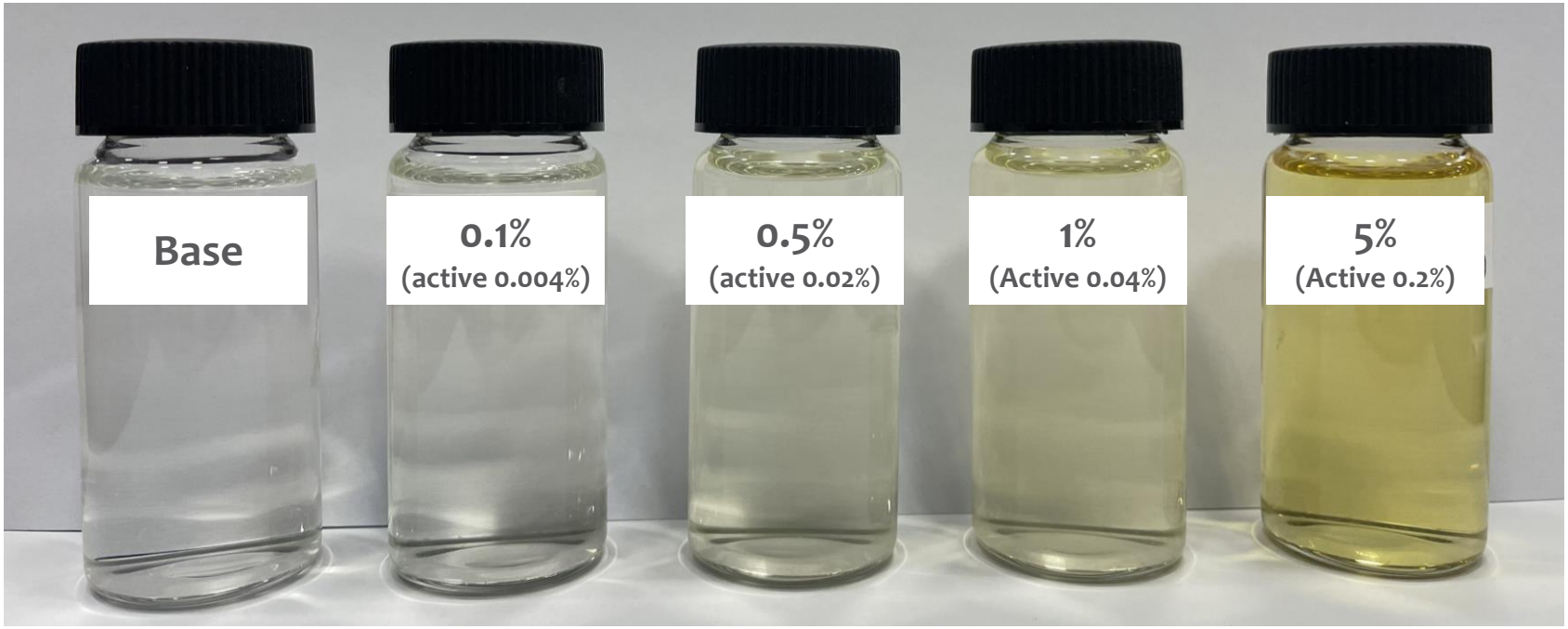
10%↑

Increases Collagen Synthesis by 10% at 10 ppm

** tested with resveratrol*

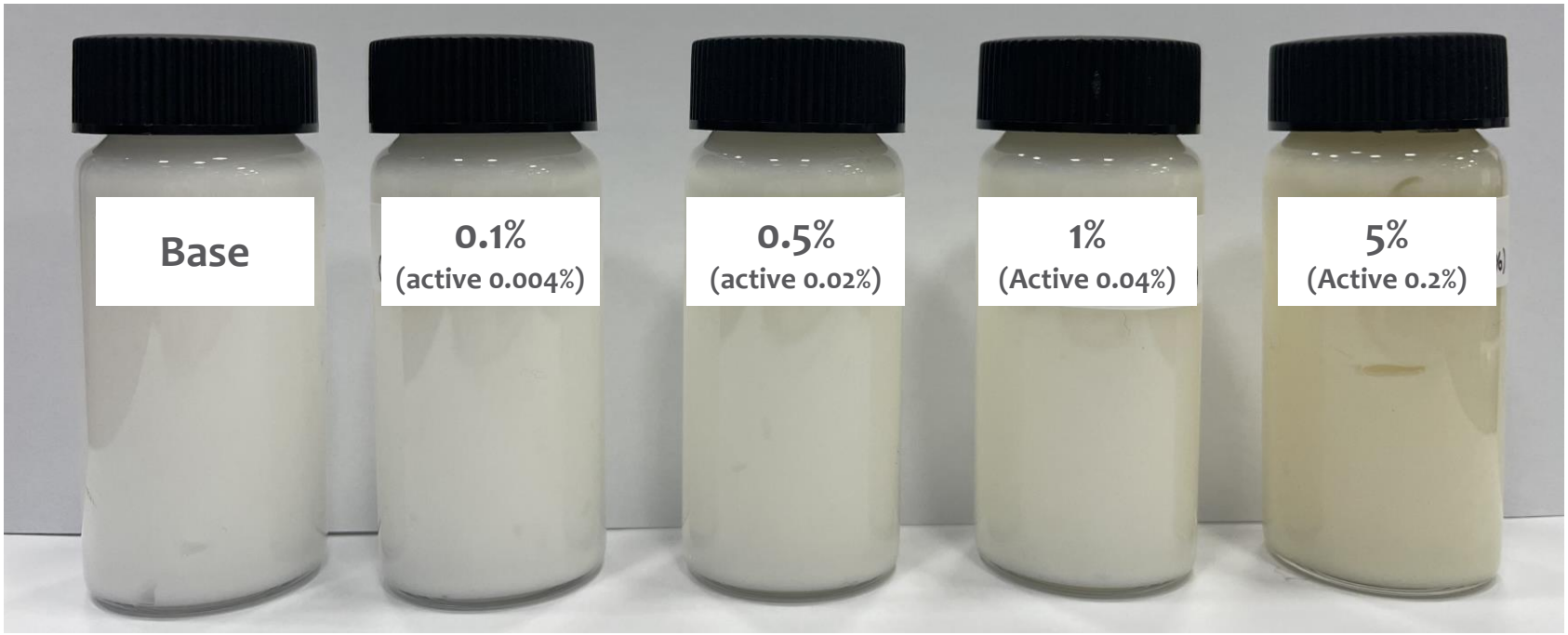
Formulation Color

In Toner



Formulation Color

In Cream



Marketing Points

- Highly concentration resveratrol solution
- Polymeric micelle technology
- Better physical stability than the micelles with surfactants.
- Increase in skin permeability
- Applicable in various formulations
- Excellent anti-oxidant, anti-allergic, skin brightening efficacies

Product Information

- **Product Name:** **Water Soluble Resveratrol(4%)**
- **INCI Name:** **Resveratrol**
- **IECIC Name:** **Resveratrol**
- **Dosage:** 1 – 5%
- **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"

the garden of naturalsolution
www.naturalsolution.co.kr

12-24, Gajangsaneopseo-ro, Osan-si,
Gyeonggi-do, 18103, Republic of Korea

TEL: +82-31-374-5240 FAX: +82-31-374-5246