



DISMUTIN[®] PF

Powerful Skin Detoxifier

28-8-2023

dsm-firmenich 

DISMUTIN® PF

Powerful Skin Detoxifier

Unique product features

- DISMUTIN® PF is a cosmetic ingredient developed as a powerful skin detoxifier
- Aqueous solution of highly purified skin-identical copper-zinc Superoxide Dismutase (Cu/Zn SOD)
- Made by aerobic fermentation isolated from a natural yeast strain of *Saccharomyces cerevisiae*
- 96% natural origin (ISO 16128)
- Excellent stability and high SOD activity (45000 – 55000 PIU*/ml) guarantee outstanding efficacy

Composition

- INCI (active): superoxide dismutase

Recommended dosage

- 0.2–1%

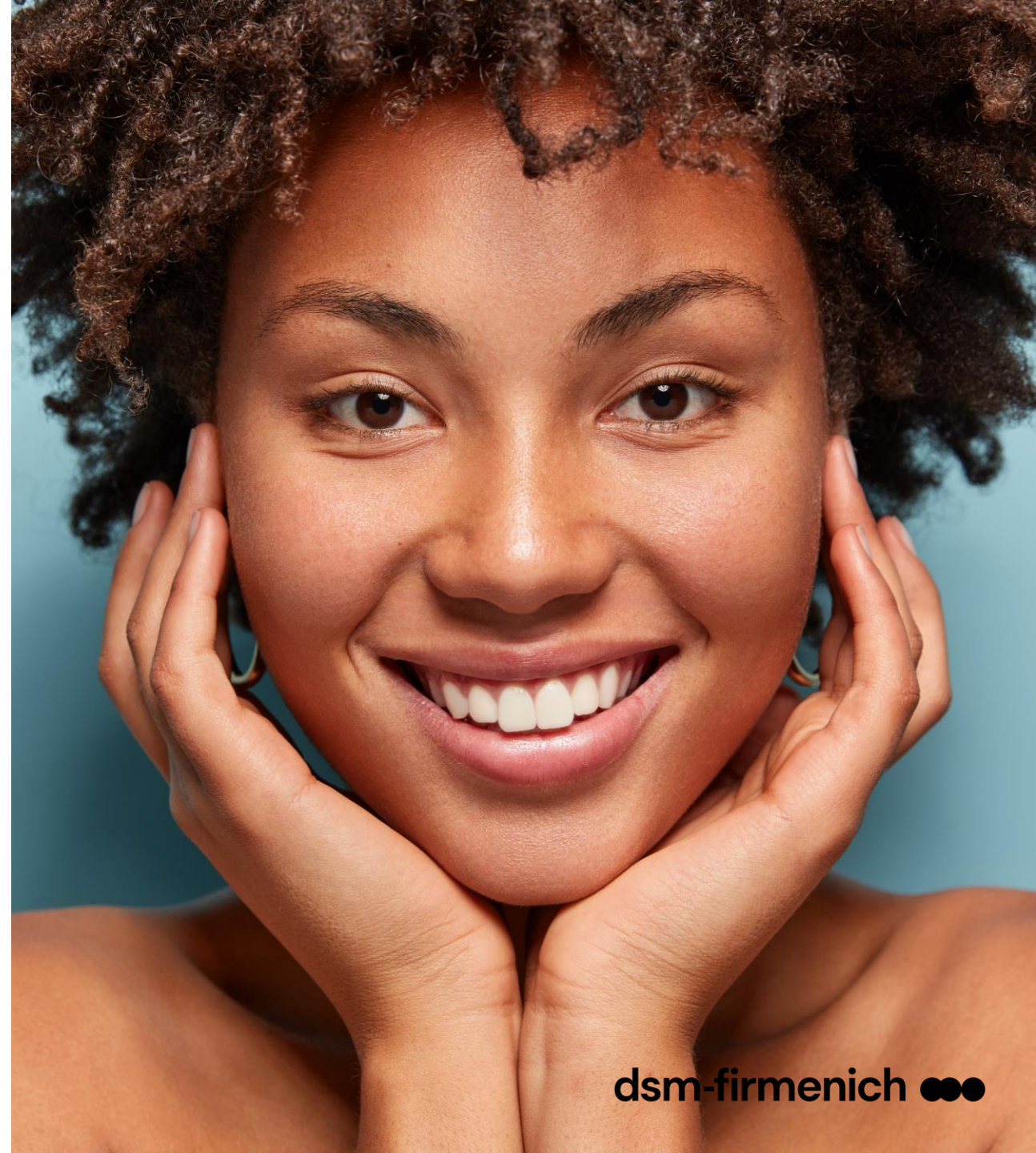


DISMUTIN® PF

Powerful Skin Detoxifier

Benefits

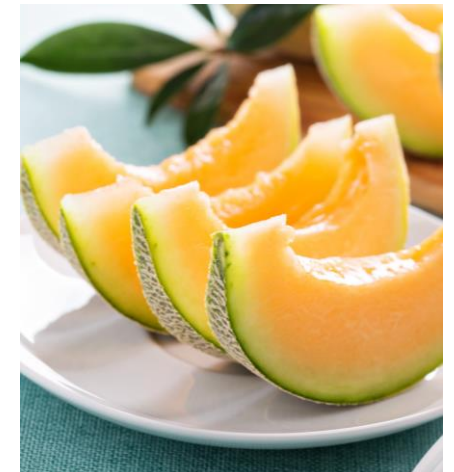
- Skin-identical Superoxide Dismutase to **support the cell's own detoxification system**
- **Protects the skin** against the harmful effects of reactive oxygen radicals formed by UV radiation or environmental factors, such as pollution
- Helps to **prevent premature skin aging** characterized by dehydration, wrinkle formation, age spots and loss of elasticity



Understanding the need

What is Superoxide dismutase?

- Superoxide dismutase – or SOD – has been known as the *enzyme of life* since 1968
- SOD is a metal-containing antioxidant enzyme found in a variety of different foods, including:
 - Honeydew, cantaloupe, wheat, corn and green vegetables like broccoli and cabbage
- SOD is widespread in the human body, including skin
- Here, we focus on **human skin copper/zinc superoxide dismutase (Cu/Zn SOD)**, the enzyme that plays a fundamental role in protecting cells from oxidative stress

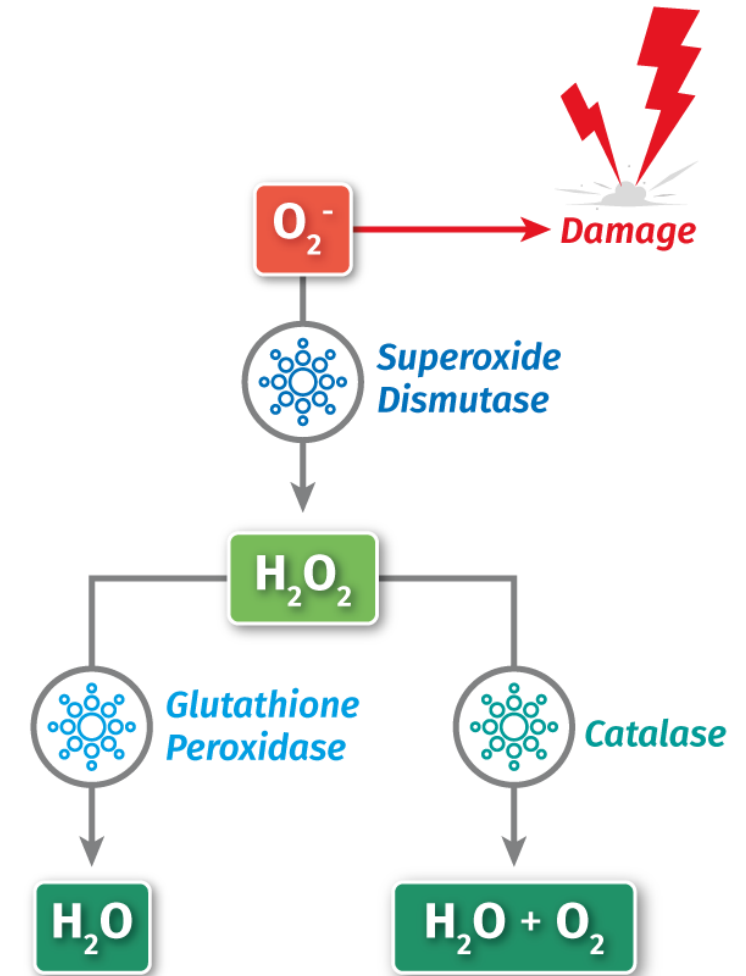


*Biofactors. 2015 Nov 12; 41(6): 383–390

Copper/Zinc Superoxide Dismutase

Mode of action

- **Oxygen** is essential for life; however it is also a very **reactive molecule**
- **Reactive oxygen species (ROS)** are **free radicals** created from oxygen that are very unstable and may cause a lot of cellular damage
- **Superoxide radical (O_2^-)** is the **most dangerous of the ROS** because it can also produce other oxygen free radicals
- **The most effective defense against superoxide (O_2^-)**, is the antioxidant enzyme **Copper/Zinc Superoxide Dismutase (Cu/Zn SOD)**
- **Cu/Zn SOD neutralizes superoxide (O_2^-)**, turning it into hydrogen peroxide; this one has to be further converted by other antioxidant enzymes (glutathione peroxidase, catalase) into oxygen and water
- **Cu/Zn SOD remains intact during inactivation of superoxide** and can continue its magic, while non-enzymatic antioxidants (like vitamin E) are used up during neutralization

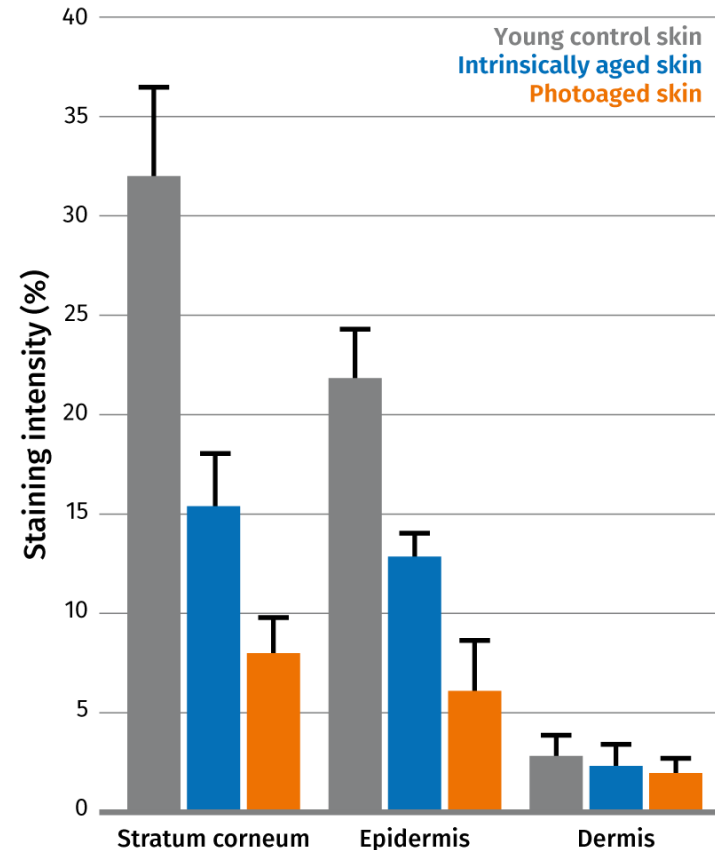


Graphic adapted from: American Journal of Sports Science and Medicine, 2013, Vol. 1, No. 1, 7-12

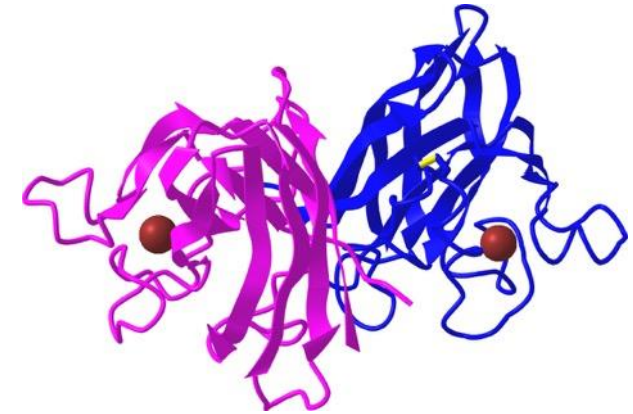
Copper/Zinc Superoxide Dismutase

In Human Skin

- Copper/Zinc Superoxide Dismutase (Cu/Zn SOD) is a stable enzyme containing 153 amino acid (MW 15.9 kDa)¹
- Cu/Zn SOD exists as a dimer of identical subunits, binding one Zinc atom and one Copper atom, which together have either a structural or catalytic function¹
- Cu/Zn SOD is found at high levels in the Stratum corneum and Epidermis, but only low levels are found in the Dermis²
- As we age, the levels of Cu/Zn SOD in the skin are depleted, so applying Cu/Zn SOD topically can counteract this loss²



Crystal Structure of Human Cu/Zn SOD³



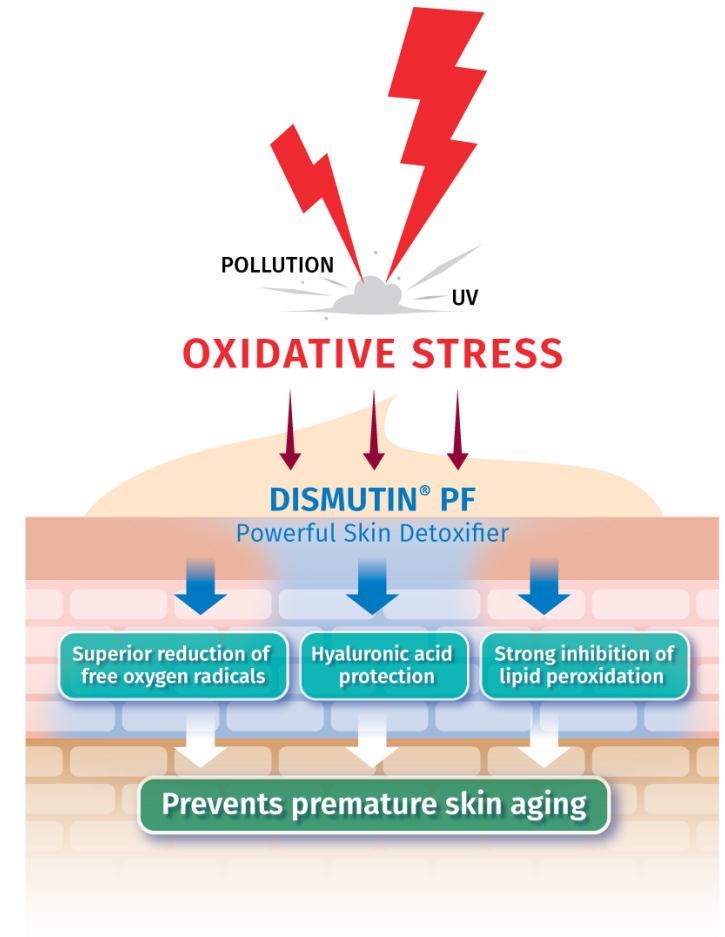
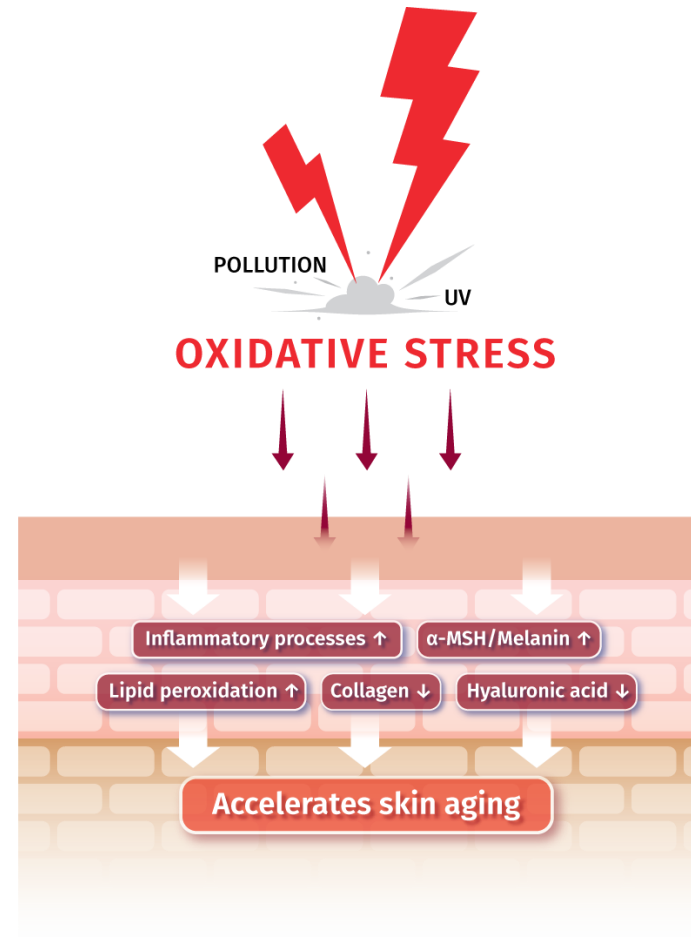
1. Copper/Zinc Superoxide Dismutase in Human Skin: Current Knowledge Frontiers in Medicine Volume 7, Article 183, 2020.

2. Sanders et al. The journal of investigative dermatology vol. 118, no 4, April 2002. 3. <https://www.ncbi.nlm.nih.gov/Structure/pdb/2ZKY>

Understanding the Solution

DISMUTIN® PF Mode of action

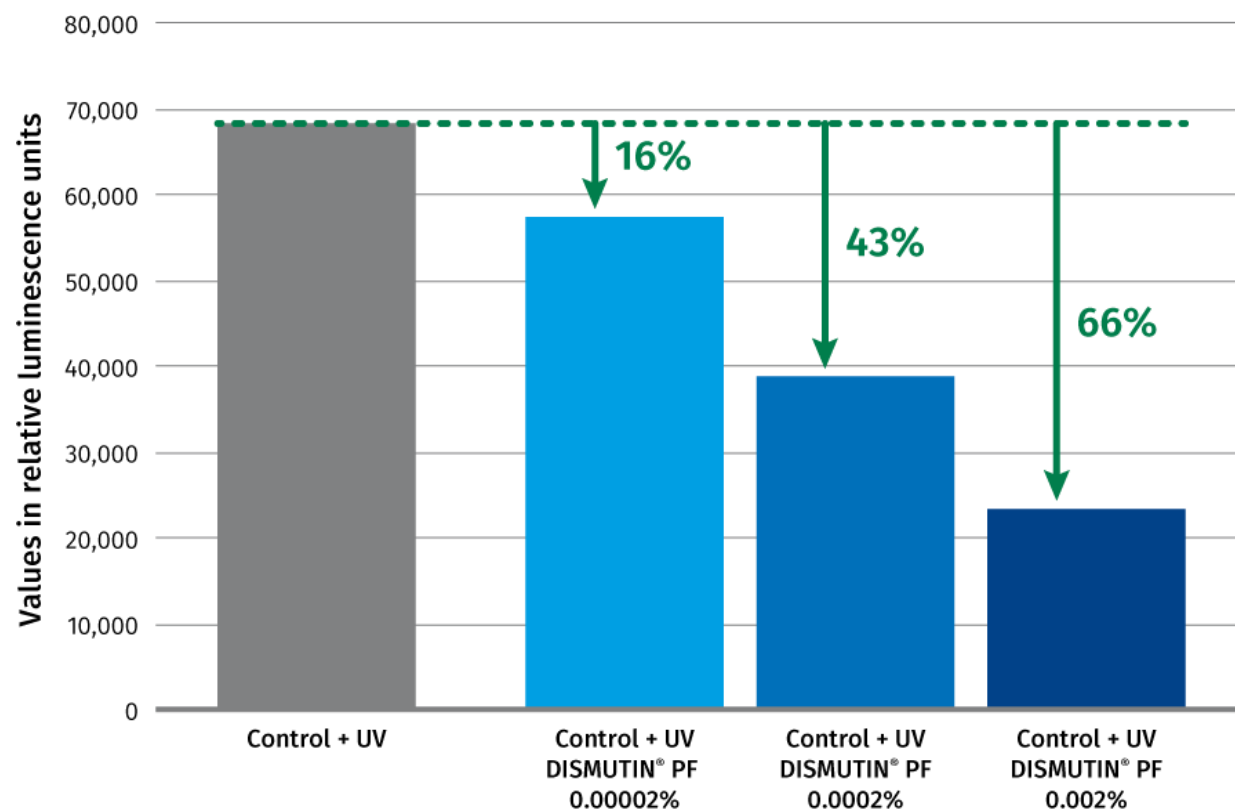
- **Oxidative stress** causes cellular damage and can directly damage lipids, proteins and sugars
- Specifically, it can **degrade collagen** and hyaluronic acid and contribute to premature skin aging, i.e to the appearance of fine lines and wrinkles
- It can **accelerate skin pigmentation** and triggers inflammation processes as well
- DISMUTIN® PF **protects the skin against the harmful effects of free oxygen radicals** formed by UV radiation or environmental factors, such as pollution
- DISMUTIN® PF **strongly reduces free oxygen radicals** and inhibits lipid peroxidation
- DISMUTIN® PF thus **helps to prevent premature skin aging** characterized by dehydration, wrinkle formation, loss of elasticity and age spots



DISMUTIN® PF

Strong inhibition of lipid peroxidation

Effect of DISMUTIN® PF on free radicals synthesis by human keratinocytes in suspension after UV irradiation



Test method

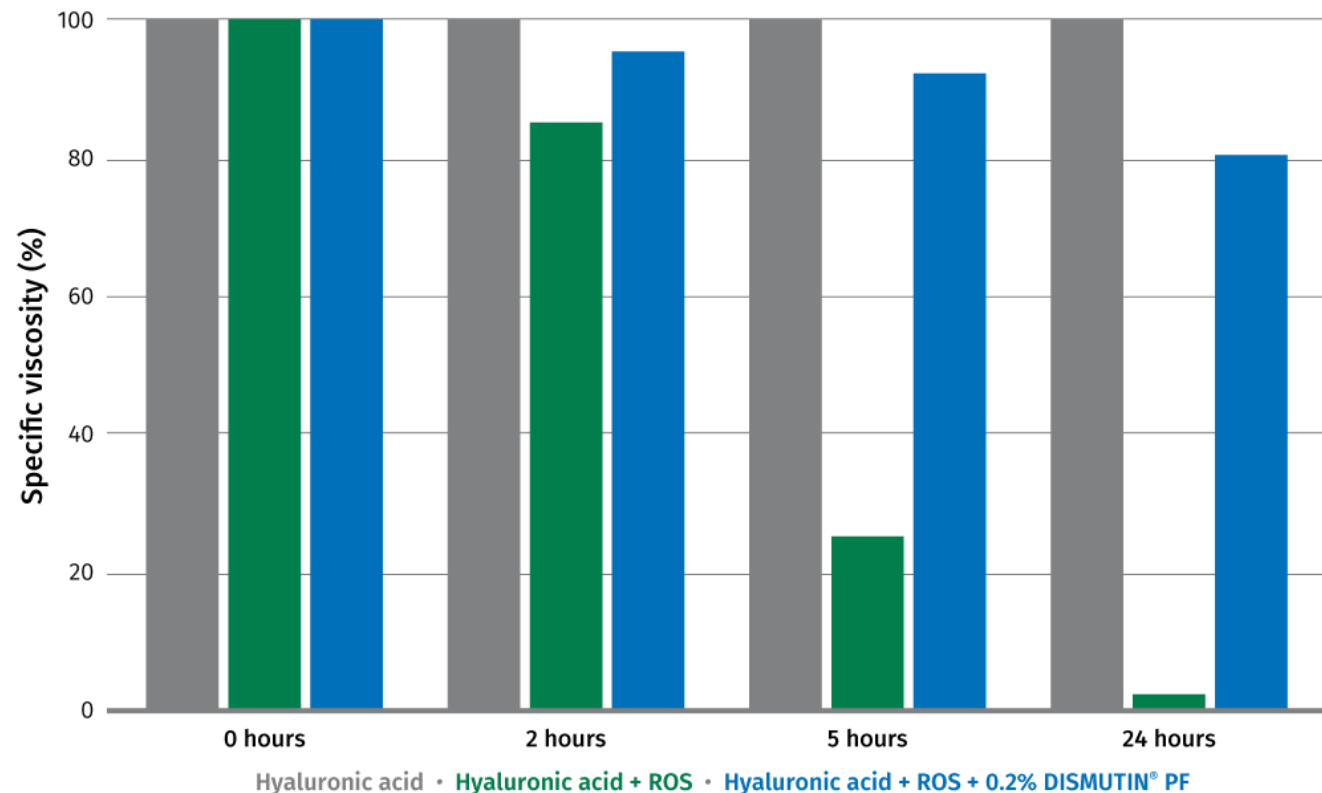
In this *in-vitro* model, keratinocyte cultures, incubated with different concentrations of DISMUTIN® PF, were irradiated for 30 min with UV-A and B. The lipidperoxides formed due to reactive oxygen species were measured by means of luminiscence as relative luminiscence units.

Up to 66% reduction of lipid peroxidation mainly by scavenging reactive oxygen radicals

DISMUTIN[®] PF

Protection of hyaluronic acid against oxygen radicals

Specific viscosity of a hyaluronic acid solution in presence of the ROS-generating system and DISMUTIN[®] PF



Test method

The protective effect of DISMUTIN[®] PF was studied by exposing high molecular weight hyaluronic acid to a system which generates free oxygen radicals (hypoxanthine/xanthine oxidase*).

The consequences of the attack of free radicals were determined by measuring the decrease in the viscosity of a solution of hyaluronic acid (0.25%).

DISMUTIN[®] PF (0.2%) protects hyaluronic acid against oxygen radicals

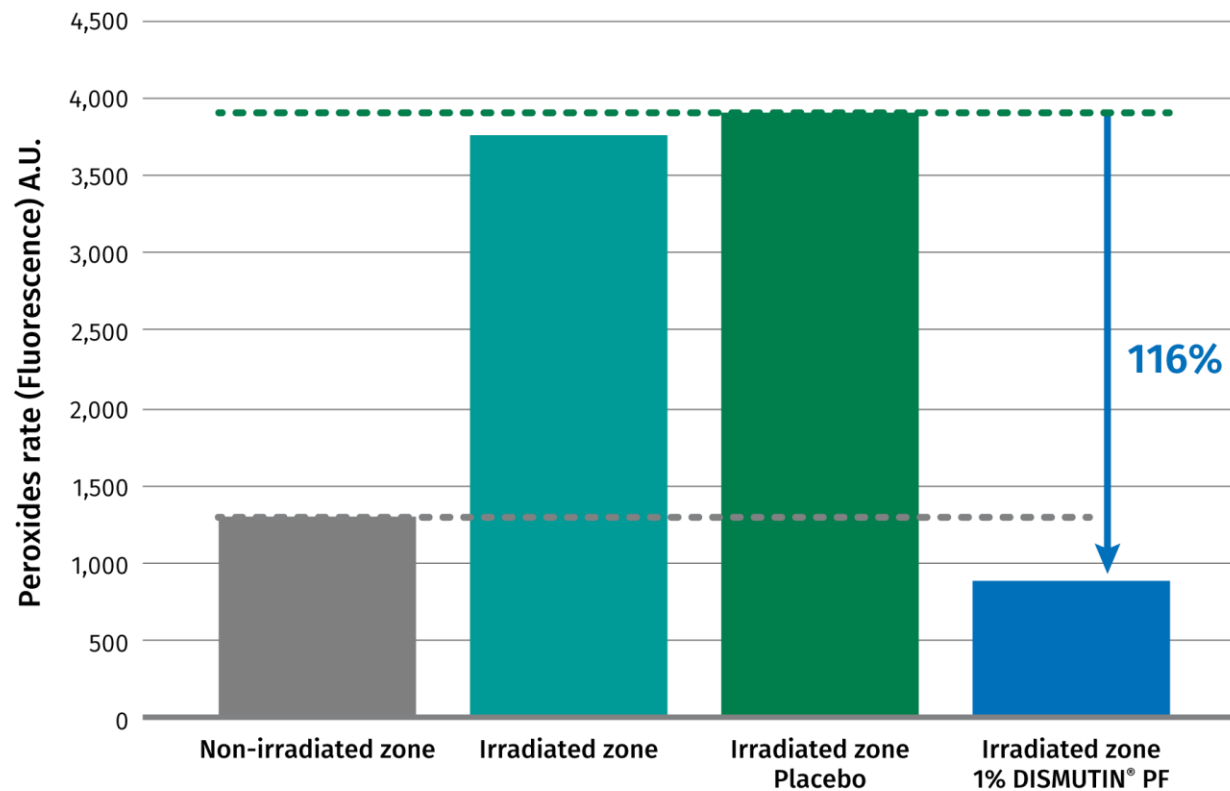
Xanthine oxidase (XOD), widely found in tissues, is an enzyme that catalyzes the oxidation of hypoxanthine into xanthine and of xanthine into uric acid, whereby Superoxide anion radical ($O_2^{\bullet-}$) is formed.

*Voegeli et al International Journal of Cosmetic Science 15,153-161 (1993)

DISMUTIN® PF

Superior reduction of reactive oxygen radicals – proved in an in vivo study

Cutaneous peroxide rate by fluorescence measurement on analyzed skin zones



Test method

In this *in-vivo* study, marked zones on 5 volunteers' (average age of 29 years) forearms were irradiated by UVA (SUN 3000S®/Mutzhas). Afterwards, one field was treated with a placebo cream and one with cream containing 1% DISMUTIN® PF. A non-irradiated zone was used as the control.

24 hours after UV-irradiation, each test zone was stripped twice. The second strip was used for the peroxide determination (fluorescence determination).

- Superior reduction of UV-induced reactive oxygen radicals
- DISMUTIN® PF thus supports the cell's own detoxification system and protects the skin against UV-induced damage

That makes DISMUTIN® PF

The ideal active ingredient for...



Beauty **detox treatments** to restore skin
(mask, mist, etc. ...)



Powerful **antioxidant** applications



De-aging daily creams for **regeneration**



Any kind of **protection formulations**
(sun care, environmental stress,
pollution, etc. ...)



And DISMUTIN[®] PF

Is easy to formulate

- Water soluble
- The optimal pH for formulations ranges from 5.0–8.0
- Can be processed either warm (<60°C) or cold and is incorporated into the aqueous phase of a cosmetic formulation
- Concentration of 0.2–1% for best efficacy results



DETOX Cosmetics

With Superoxide Dismutase



Superoxide Dismutase Saccharide Mist

A mist infused with a more potent form of **superoxide dismutase derived from yeast with an extremely high activity** of up to 55000 pyrogallol autooxidation inhibitor units per ml **to fight oxidation and reduce inflammation.**



Super Antioxidant Concentrate Serum

It uses Vitamin C and peptides plus **potent antioxidants** to help preserve and rejuvenate skin's surface and visibly enhance firmness.

This state-of-the-art serum helps **minimize damage from environmental attack** that causes skin to look older, while also helping to visibly improve a dull skin tone It.



C-Tango Multivitamin Eye Cream

This eye cream contains responsibly sourced global ingredients, including five forms of vitamin C that work together to brighten uneven tone and firm.

It offers unparalleled defense against damaging UV rays, pollution and other free radicals when paired with peptides and antioxidants like vitamin E and **superoxide dismutase**



Calming Biomimetic Cream

Instantly calm sensitized skin from various environmental pollutants and external stressors as it adds glow, improves skin sensitivity, and helps it to regain comfort.

Optimizes skin environment, offering **strong anti-oxidant efficacy for healthy skin**



Oxygen-Glow

Super-perfecting radiance cream

Smooths – Evens – Plumps – **Detoxifies**

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