Superoxide Dismutase (SOD)

In our cells, we have our own SOD, but we can protect our skin by supplementing them with topically applied SOD. This active has been used in topical formulations to reduce free radical damage and to prevent chain reactions that would eventually reach deeply into the skin. An example of this would be to reduce fibrosis following radiation for breast cancer[1]. At Skin Actives we produce near-pharmaceutical quality SOD, which is suited specifically for skin care applications. This means that we can offer excellent quality at reasonable prices.

Applications

- Eliminates superoxide radicals capable of per-oxidating lipids
- Prevents lipid peroxidation chain reactions from reaching deep into the skin
- Prevents damage of fragile cell membranes

Use

- Avoid extremes of pH and alcohols, and add Superoxide Dismutase at the final stage, when the product is cool.
- It is suggested that Superoxide Dismutase and other antioxidant enzymes supplied by us are used in conjunction with antioxidant molecules like Glutathione or similar.

Function

Superoxide radicals are formed in a number of metabolic reactions, including lipid peroxidation initiated by light or metal ions. This process is the cause of rancidity of oils, but it also happens in live tissues and may be a cause of cancer, inflammatory diseases, atherosclerosis, aging, etc. One of the reasons why the superoxide radicals are so dangerous is because they start chain reactions where more and more free radicals are formed, reacting with all cell constituents and wreaking havoc. In the human body, the main chain breaking antioxidants are the water soluble Super-oxide Dismutase (SOD) and the lipid soluble alpha-D-tocopherol (vitamin E).

SOD is a particularly stable enzyme that converts the destructive superoxide radical into a less danger-ous form, hydrogen peroxide (which will, in turn, be convert-ed into water and normal oxygen by the enzyme catalase). The size of the Superoxide Dismutase used in skin care varies between 10,000 and 30,000 molecular weight, relatively small for an enzyme but large enough to be excluded from live cells. The fact that Superoxide Dismutase is unlikely to enter live cells is not a problem. Lipid peroxidation occurs every-where in the skin, not just in the live cells but also in the epi-dermis. The role of Superoxide Dismutase is to eliminate the free radicals resulting from lipid peroxidation and to prevent the chain reactions that would eventually reach deeply into the skin, and this is perfectly suitable via topical application.

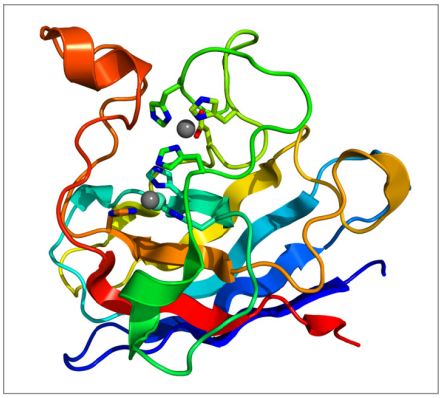

Figure 1: Cu/Zn Superoxide Dismutase. Crystallographic structure of the SOD enzyme (cartoon diagram) complexed with copper (blue green sphere) and zinc (gray) cations.

Technical Information

INCI:	Superoxide Dismutase.
Synonyms:	Cu/Zn-SOD, SOD1, SOD, Superoxide Dismutase, Superoxide: superoxide oxidoreductase.
Molecular Weight:	Between 10,000 and 30,000, containing 151 amino acids.
Purity:	Purity is greater than 90% as determined by analysis using SDS-PAGE.
Activity	Equal or greater than 2500 units/mg protein.
Formulation:	Suspension in ammonium sulfate (80% saturation).
Production:	Produced in *E. coli* and purified using proprietary chromatographic techniques.
Optimal Concentration:	Should be determined for each specific application.
Storage:	This suspension is stable at 2-8°C. Do not freeze.
Reconstitution:	Add saline solution to the suspension to re-dissolve Superoxide Dismutase.

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References

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2 Sarsour, Ehab H., Goswami, M Kalen, AL., Goswami, PC. (2010) MnSOD activity protects mitochondrial morphology of quiescent fibroblasts from age associated abnormalities. Mitochondrion 10 : 342-349.