



OptiMSM[®]

BY **Bergstrom[®]**
Nutrition

Strengthen Skin Within

Clinically proven bio-available
dietary source of sulfur.

With aging, poor diet/lifestyle and environmental insults (such as UV rays), the skin is placed under incredible stress that may offset its natural homeostasis and accelerate its aging process.

Being the barrier from our external environment it is also a direct reflection of the lifestyle we lead.

The most visible effect of skin aging occurs when there is a weakening of the extracellular matrix within the dermis (a breakdown of collagen rich connective tissue).

Visibly, the skin becomes thinner and more fragile losing its strength and resilience.

About MSM

Methylsulfonylmethane (MSM), also known as dimethyl sulfone (DMSO₂) and methyl sulfone, is an organic sulfur-containing compound that occurs naturally in a variety of fruits, vegetables, grains, and animals including humans. However, processing, heating, storage, and preparation of foods removes essential MSM sulfur.

MSM is 34% sulfur by weight, and sulfur has long been a valued ingredient in dermatology. Sulfur may contribute to the cross linking of proteoglycans/collagen (the structural framework in skin tissue) and is a building block of keratin, the chief structural constituent of hair and nails. OptiMSM[®] is featured in many major dietary supplements brands' hair, skin and nail formulas.

GRAS

designated by FDA

Supports structural integrity of skin

Component of collagen & keratin
for healthy skin, hair and nails

Supports glutathione production,
primary antioxidant enzyme that
neutralizes damaging free radicals

May inhibit pro-inflammatory
mediators that weaken skin structure
and resistance

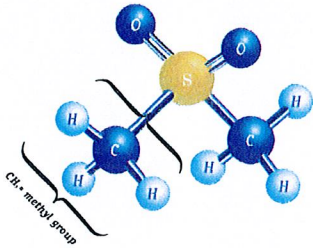
Oral supplement and topical use



Bergstrom[®]
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Chemical Formula & Characteristics

(CH₃)₂SO₂. Odorless, water-soluble, white crystalline material



Use: Oral and Topical
Suggested Dose:

Oral: 2-6 g powder
Topical: see cosmetic sheet



MECHANISM OF ACTION

As a source of bio-available sulfur¹, MSM maintains disulfide bonds that hold collagen strands in strong form and preserve the pliancy of connective tissue. By maintaining healthy collagen, cross-linking or "hardening" of the tissue is inhibited allowing for healthy dermal functioning.

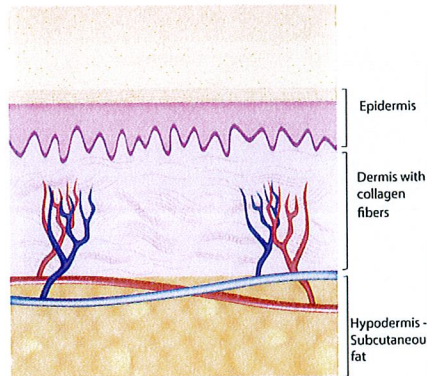
Glutathione is important to maintain a healthy skin defense against oxidative stress induced by UVR^{2,3,4}. Similar to intense exercise that creates oxidative stress and reduces glutathione levels. The skin (when exposed to UVR) also experiences an influx of oxidative stress. Although not a direct antioxidant, MSM has been shown in humans to significantly increase plasma glutathione levels⁵.

Collagen is the most plentiful protein in the body; it makes up 70% of the dry weight of human skin and is a highly flexible structure. Vitamin C is essential for the formation of collagen and sulfur active bonds (disulfide bonds) that hold collagen fibers together⁶.

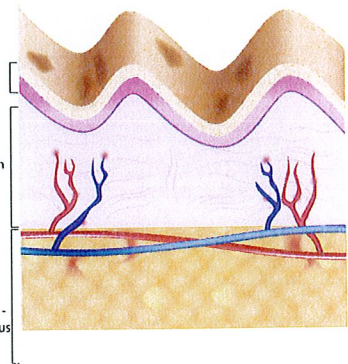
Structural deterioration that occurs within skin's connective tissue is due to progressive cross-linking of protein within collagen fibers.

Known as the "cross linking theory" the increased cross-linking defragments its natural chemical structure and causes "stiffening" or "folding" within the tissue (wrinkles).

Younger Skin



Older Skin



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- 3) Beani, JC. Enhancement of endogenous antioxidant defenses: a promising strategy for prevention of skin cancers." *Bull Acad Natl Med.* (2001);185(8):1507-25.
- 4) Verschooten L., et al., "New strategies of photoprotection." *Photochem Photobiol.* (2006); Jul-Aug;82(4):1016-23.
- 5) Babak Nakhoslin-Rooh., et al. "Effect of chronic supplementation with methylsulfonylmethane on oxidative stress following acute exercise in untrained healthy men." *J of Pharmacy and Pharmacology* (2011); 63: 1290-1294.
- 6) Pulglieste, P. "Vitamin C in Skin Care." *Skin Inc.* 2009. <http://www.skininc.com/skinscience/physiology/46738787.html> accessed March 25th 2012

OptiMSM® is manufactured in Bergstrom Nutrition's dedicated U.S. GMP-compliant, ISO 9001:2008 registered, FSSC22000:2010 certified facility and is GRAS-designated.

These products are not intended to diagnose, treat, cure, or prevent any disease. These statements have not been evaluated by the food and drug administration.

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720-01-209.0

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OptiMSM® may protect skin from UV induced oxidative stress by:

- As a bio-available source of sulfur, supports the production of endogenous antioxidant enzyme Glutathione, a primary scavenger of damaging ROS created from UVR in the skin.
- Potentially down regulating pro-inflammatory intermediates NF-kB, cytokines, MMP's (stimulated by ROS) that degrade dermal extracellular matrix, the connective tissue that maintains skin resilience and structure.

OptiMSM® & Photoprotection

Systemic photoprotection by oral supplementation to support endogenous antioxidant systems is becoming a growing interest in biochemistry research. Supplementation with key antioxidant enzymes, such as glutathione peroxidase, catalase, superoxide dismutase or with non-enzymatic antioxidants is proving effective in animal and human clinical studies (Steenoornden, 1997; Helmut Sies, 2004).

Glutathione is a tripeptide composed of the amino acids cystine, glycine and glutamic acid. It is the major endogenous antioxidant enzyme in the non-lipid portion of cells (most of the cytoplasm). Functions include detoxification of ROS and peroxides, regulation of cell growth and protein function. Accordingly it is one of the three antioxidant enzymes that neutralize damaging ROS generated when skin is exposed to UVR (Steenvoorden, et al., 1997, Béani, 2001, Verschooten L, 2006; Lima, 2011; Oresajo, 2010). Sulfur forms the thioester linkages of the glutathione molecule.

Glutathione is important to maintain a healthy skin defense against oxidative stress induced by UVR (Steenvoorden, 1997; Béani, 2001; Verschooten L, 2006;). Similar to intense exercise that creates oxidative stress and a decrease in glutathione levels, the skin when exposed to UVR also experiences an influx of oxidative stress. Although not a direct antioxidant, MSM has been shown in humans

to significantly increase plasma glutathione levels (Babak Nakhostine-Roohi, et al., 2011). Supplementation of MSM was shown to prevent GSH depletion following acute bouts of exercise (Marañón, et al., 2008, Babak Nakhostine-Roohi, et al., 2011). As a source of bio-available sulfur, MSM is a precursor in glutathione metabolism (DiSilvestro, R, et al., 2008). OptiMSM was effective in preventing glutathione depletion during activity and increasing plasma glutathione levels post exercise recovery in healthy untrained humans (Babak Nakhostine-Roohi, et al., 2011).

In another study, researchers examined OptiMSM's protective effect against skin damage induced by UVB irradiation in mice. OptiMSM was effective in alleviating post UVB inflammatory response of exposed skin (Hasegawa, et al. 2005). Researchers concluded OptiMSM protected skin from UVR damage by removing damaging ROS and suppressing skin inflammation. It is proposed that MSM's anti-inflammatory effect may be due to its ability to inhibit pro-inflammatory transcription factors NF-kB and cytokine expression that further damage skin homeostasis and accelerate deterioration (Beike, et al., 1987, Burkhard, et al., Kim et al., 2009, Takashi Hasegawa, et al., 2005).

OptiMSM® for Healthy Hair

Sulfur has long been recognized as an important nutrient for healthy hair. Radiolabeled oral dosage MSM has been shown to be incorporated into hair, skin and nails. (Otsuki, 2002). Sulfur is also a building block of keratin, the chief structural constituent of hair and nails.



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These statements have not been evaluated by the Food & Drug Administration. This product is not intended to diagnose, treat, cure or prevent disease.