



OptiMSM®

OptiMIZE your Life with OptiMSM®

OptiMSM®, clinically proven to support joint health and mobility, offers a new approach to exercise recovery

OPTIMSM® BENEFITS

Supports healthy joints and range of motion

MSM is recognized for its ability to support overall joint health and a normal range of motion. In the double blinded, placebo controlled study by Linda Kim et al. (2006) results showed MSM produces a significant decrease in WOMAC pain and physical function impairment with significant improvements in the performance of daily living activities using the SF-36 evaluation⁸. Additionally a study by Debbi et al. (2011) showed significant improvement in WOMAC physical function and total WOMAC score. Debbi also found VAS Pain scores had significant improvement⁹. Usha et al. (2004) used VAS-pain scores and the Lequesne index as efficacy parameters with MSM showing significant improvement over placebo¹⁰. These three studies constitute the main foundation supporting MSM's use for maintaining healthy joints and normal range of motion.

Prevents cartilage breakdown

Studies also suggest MSM may support cartilage and help prevent its breakdown. Oshima et al. (2007) demonstrated MSM's ability to reduce mRNA expression of inflammatory cytokines i.e. TNF-alpha and IL-1 in Grade II OA chondrocytes⁶. In the published work of Kloesch et al. (2011) MSM dramatically down regulated expression

of pro-inflammatory cytokines, IL-6 and IL-8 as well as blocking IL-1 β induced IL-6 and IL-8 expression in the human chondrocyte cell line C-28/12⁵. Literature has documented the role of pro-inflammatory cytokines in cartilage destruction and MSM's role in mitigating the production of these compounds may help prevent degradation of cartilage.^{10,11,12}

Peer reviewed and recently published research indicates that daily oral supplementation of OptiMSM® may be beneficial for exercise recovery.

Human and animal studies suggest OptiMSM®:

- Helps combat exercise-induced inflammation^{1,2}
- Promotes connective tissue repair and regeneration by decreasing Reactive Oxygen and Nitrogen Species^{1,2,3,4,8}
- Decreases measures of muscle damage and soreness^{1,2}
- Supports healthy joints and range of motion^{7,8,9}
- Reduces oxidative stress following exercise^{1,2,3,4}
- Prevents cartilage breakdown^{5,6}
- Increases overall antioxidant defense^{1,2,3,4,8}

Increases overall antioxidant defense

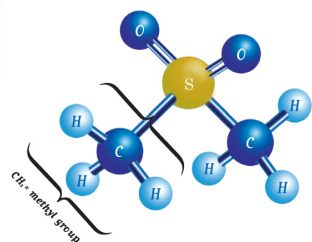
Although the work of Beilke et al. (1987) suggests that MSM is not a free-radical scavenger, it appears to inhibit the oxidative function of stimulated neutrophils thus down regulating the expression of reactive nitrogen and oxygen species. This suggests an alternative explanation to an in-vivo anti-inflammatory action tied to an overall antioxidant defense¹³. An equine study by Marañon et al. (2008) using jumping exercise as a stimulus showed that MSM supplementation resulted in a decrease in nitrous oxide (NO) and carbon monoxide (CO) expression and significant increase in glutathione, a very important intracellular antioxidant thiol⁴. Desilvestro et al. (2008) showed MSM's ability to increase liver glutathione levels by 78% in mice when supplemented with MSM¹⁶. Amiroshahrokhi et al. 2011 found MSM significantly increased glutathione and significantly reduced malondialdehyde (MDA), myeloperoxidase (MPO) and pro-inflammatory marker IL-1β in colonic tissue using a rat model of chemically induced colitis. These results add credibility to the antioxidant defense capability of MSM as it shows efficacy across different species and from different stimuli of oxidative stress. Recent Human studies also add support to MSM's ability to increase the bodies overall antioxidant defense. Kalman et al. (2012) carried out a proof of concept study on healthy adult males.

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 remove MSM sulfur.

Chemical Formula & Characteristics

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



Use: Oral
Suggested Dose:
 Oral: 2-6 g powder



This study used two different doses of MSM results indicating that plasma trolox equivalent antioxidant capacity (TEAC) increased in a dose dependant manner. In addition homocysteine levels before treatment were either unchanged or increased slightly immediately post exercise whereas with MSM treatment homocysteine levels decreased significantly in all subjects immediately post exercise and trended towards significance in the higher dosage group¹. In Kim et al. (2008) results also indicated significant decrease in urine MDA and serum homocysteine levels in the MSM treatment group¹. Whether the role of homocysteine is causative or a result of oxidative stress is poorly understood however it is agreed that increased oxidative stress and increased homocysteine levels occur simultaneously^{17, 18}. Oxidized and reduced glutathione levels have been evaluated in both humans by Nakhostin-Roohi et al. (2011) and horses by Marañon et al. (2008) consistent results from both studies indicate a significant improvement in plasma antioxidant capacity. Further evidence also was shown in the double blinded, placebo controlled human study by Barmaki et al. (2012). This study showed an increase in serum total antioxidant capacity (TAC)². The cumulative results of two animal studies and four human studies, three of which are double blinded placebo controlled, make a very strong case of MSM's ability to favorably influence the body's overall antioxidant defense capability.

Reduces oxidative stress following exercise

The Nakostin-Roohi study showed a decrease in oxidated glutathione and an increase in reduced glutathione compared to placebo following an acute bout of exercise. This suggests a reduction in oxidative

stress. These results are consistent with results from the equine model used by Marañon. Oxidative stress is caused by an imbalance between the production of reactive oxygen and nitrogen species and the body's natural ability to neutralize these radicals. This can lead to oxidative damage of cells. Measurements of specific marker compounds can be used to determine the degree of cellular damage and their components such as lipids, proteins and DNA. Malondialdehyde (MDA) is a naturally occurring product of lipid peroxidation. MDA was evaluated by Kim² and Nakhostin-Roohi with significant decreases seen by both for the MSM treatment group vs. placebo. Nakhostin-Roohi also measured protein carbonyls (PC) which is a marker for protein oxidative damage. Significant reduction was also seen in PC. In the study by Barmaki et al (2012) creatine kinase (CK) and lactate dehydrogenase (LDH) were measured as possible markers of oxidative damage to muscles following an acute bout of exercise. Results showed a significant reduction in these enzymes and the investigators suggest this may be due to MSM's ability to prevent lipid per-oxidation therefore preventing leakage of CK and LDH from cell membranes thus reducing the serum concentrations.

Promotes connective tissue repair and regeneration by decreasing reactive oxygen/nitrogen species.

RONS are generally perceived as destructive in nature. However they are useful in initiating necessary inflammatory responses that lead to healing. It is important however that these free radicals are mediated so oxidative stress which may lead to hyperactive inflammatory or immune response is avoided. This may involve activation of certain transcription factors such as nuclear factor kappa B (NF-kB). Studies have shown that MSM has inhibits the activation of NF-kB and its

translocation^{5,6}. This action may lead to maintaining adequate antioxidant status, preventing oxidative stress which that can hinder tissue repair and regeneration.

Helps combat exercise—induced inflammation & Decreases measures of muscle damage and soreness

In the recently published study by Kalman et al. (2012) a visual analog scale was used to obtain the subjects' perception of muscle soreness at two and 48 hours post exercise, with less muscle soreness suggesting better exercise recovery. There were statistically significant increases in muscle soreness with and without product two hours post exercise ($p=0.021$ and $p=0.007$ respectively) supporting the fact that the exercise protocol was of sufficient intensity to induce soreness. It was found that the low-dose group (1.5 grams) had a 0.5 point greater reduction in muscle soreness after supplementation with MSM than baseline, and the high-dose group (3.0 grams) had a 1.5 point greater reduction in soreness after supplementation compared to baseline. This 1.0 point difference between dosages in baseline-adjusted muscle soreness from two hours post exercise to 48 hours post exercise approached statistical significance suggesting a product dose related improvement. As mentioned previously in the study titled "Effect of methylsulfonylmethane supplementation on exercise-induced muscle damage and total antioxidant capacity" by Barmaki et al. (2012) the enzyme creatine kinase (CK) was measured. Elevated CK is indicative of trauma or skeletal muscle damage. This kind of damage or trauma would generally cause an inflammatory response and pain. Significant lower values of CK were found in the MSM group compared to placebo at 24 and 48 hrs post exercise. These results suggest that MSM may protect the muscles from damage from acute bouts of exercise and the resulting soreness or inflammation that may accompany it.





About Bergstrom Nutrition

Bergstrom Nutrition produces the world's only GRAS-designated proprietary and patented forms of MSM (methylsulfonylmethane) in its GMP-compliant, ISO 9001:2008 registered, FSSC22000:2010 certified production facility, exceeding industry standards for optimal purity and product consistency. The Vancouver, Washington-based company pioneered the use of MSM for human consumption in 1989.

Nutritional Safety

- Kosher and Halal certified
- Non-GMO
- Gluten and allergen free
- Non-shellfish derived
- Vegan



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