Normally, the lining mucosal cells of the digestive tract have an especially high turnover rate such that the whole layer of surface cells may be renewed in 3-4 days. An inability to manufacture adequate building blocks (in this case, glucosamine "amino-sugars") will cause the intestinal wall to "thin" and allow toxins and not fully digested proteins into the bloodstream. Studies with MSM given to animals in their drinking water indicated that microorganisms in the gut lining may be responsible for incorporating sulfur from MSM into sulfur-bearing amino acids, with a positive benefit to this essential aspect of the metabolism. MSM may thus play a role in improving this aspect of gut health. Physiologically, organic sulfur is well-established as a precursor to the biosynthesis of the amino acid taurine, an important element in the production of bile.

Experimental findings show that MSM may reduce the impact upon the health of the intestinal tissues of various toxins. Similar protective benefits have been found with other tissues as well. Such results may represent a

generalized nutritional support for certain classes of endothelial cells, or it may be the case that the immune-modulating effects of MSM are partially due to the free radical scavenging actions of organic sulfur. Further research is needed in this area to clarify the protective mechanisms involved.

#### Usage

Take 1 to 3 tablets, capsules or 1/4 teaspoonful one to three times per day, or as directed by your qualified health consultant.

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the intestinal tract.

MSM

Common to all of these are problems in the health of the intestinal wall. Animal studies provide evidence that supplementation with MSM supports improved health of

with parasites.

One of the more curious findings with MSM is that some types of immune responses are positively modulated. The reasons for this are not at all clear. However, one route of protection may be support for gastrointestinal health. As an example, rheumatoid arthritis, which is an autoimmune disease, is strongly associated with the passage of toxins and certain proteins through the wall of the gut and into the blood. This is sometimes referred to as "leaky gut" syndrome. Interestingly, MSM is said to as "leaky gut" syndrome. Interestingly, MSM is said to improve allergies, constipation, and even problems to improve allergies, constipation, and even problems

#### The Gut-Immune Connection

repair functions in the body. Osteoarthritis is a condition which increases demands made upon all those elements which are necessary for the synthesis of cartilage. It might, therefore, be expected that supplementing sulfur would enhance joint tissue repair. A recent study performed at UCLA found that MSM, indeed, is helpful in this regard.

Under conditions of greatly increased demand, even relatively abundant minerals can be in short supply to critical

test for cystine.

was given to one hundred arthritis patients intravenously in one trial, many found that the pain and other symptoms of their arthritis disappeared and that their fingernails returned to normal in the nail

fingernails. This can lead to brittle or soft nails and can be an indication of either inadequate sulfur to match the a poor ability to manipulate dietary sulfur to match the body's needs. Interestingly, when sulfur

In the case of osteoarthritis and similar joint and ligament injuries, MSM may work through several different nutritional mechanisms. For example, it was discovered in the 1930's that sufferers from arthritis often have below normal levels of cystine (a metabolite of cysteine) in their

parts per million MSM.

Sulfur is well represented in the human organism because it is required for the repair of joint tissues and for the construction of connective tissues. MSM itself is abundant in our bodies. Some authors have estimated that upwards of 85% of the sulfur found in living organisms is provided by MSM and related compounds. For instance, the circulatory system of an adult human contains about 0.2 circulatory system of an adult human contains about 0.2

#### Supplying Sulfur for Joint Repair

Whether MSM possesses significant antioxidant properties of its own has apparently not been studied directly. However, sulfur compounds typically serve this role in the body and help to transport methyl groups for various purposes. It may be the case that many of the effects of MSM are partially due to the free radical scavenging actions of sulfur.

handling and storage.

MSM is a stable, bioavailable source of sulfur which can be derived from plants grown either on land or in the sea. Marine sources include algae and phytoplankton. Hence, there is even a "sulfur cycle" in the biosphere in which sulfur is taken up from the soil by plants, is released into the atmosphere as the highly volatile dimethyl sulfide, then is oxidized in the upper atmosphere to dimethyl sulfide, then is oxidized in the upper atmosphere to dimethyl sulfide, sulfoxide (DMSO), which then becomes the atmospheric source of MSM. DMSO and MSM return to the soil via source of MSM. DMSO and MSM return to the soil via the rain, and then the sulfur cycle repeats itself. Plants in their fresh state thus contain a quantity of MSM when grown on sulfur-rich soils, although most of the compound found in plant foods may be lost by improper compound found in plant foods may be lost by improper



Many of the benefits derived from onions, garlic and the cruciferous vegetables, such as cabbage and broccoli, may come from the sulfur which these methionine, cysteine and taurine are wery important in maintaining normal metabolism and in supplying the building blocks for the production and repair of the skin, cartilage, ligaments

## MSM: Sulfur Source and Antioxidant

of bioavailable sulfur.

and tendons.

Current research continues to supply an increasing amount of scientific evidence that explains and confirms past anecdotal reports of the benefits of MSM. Jarrow FORMULAS® MSM provides the highest quality available of this versatile source

MSM (short for methylsulfonylmethane, also known as dimethyl sulfone) is currently experiencing renewed popularity as a safe and useful supplement. MSM has generated numerous anecdotal reports of its benefits in cases of allergies, arthritis and joint pain. Other areas of interest include nutrition for the skin, hair and nails, as well as support of the health of the gastrointestinal tract.

### An Extraordinarily Versatile Mutrient

Methyl-Sulfonyl-Methane
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