



Joint Support

Damage to cartilage as a result of decades of stressing the collagen matrix can result in pain and discomfort ranging from minor stiffness to the debilitating effects of arthritis. This formula is a special blend of ingredients designed to naturally reduce inflammation and promote the production of collagen and the rebuilding of cartilage. In addition to the select vitamins, minerals, and botanicals described below, specific enzymes are added to facilitate the breakdown of the botanical cell walls and subsequently to release the active ingredients for use by the body.

Cartilage Support and Anti-Inflammatory Ingredients

Glucosamine is a simple molecule (an aminomonosaccharide) composed of glucose and an amine. Glucosamine is naturally occurring in the human body where its primary function in joint tissue is to stimulate the manufacture of glycosaminoglycans. It also promotes the absorption of sulfur into cartilage. The clinical benefits of **Glucosamine Sulfate** have been studied quite extensively. Studies comparing the use of glucosamine sulfate with both placebos and standard NSAIDS, in relieving the pain and inflammation of osteoarthritis, have shown better long-term results with glucosamine, without the side effects associated with long-term NSAID use. Numerous other studies of glucosamine use have produced similar positive results. The standard dosage used is 500 mg. Obese individuals, patients with peptic ulcers, and individuals taking diuretics may need to take more. The improvement with glucosamine sulfate lasts for a period of 6-12 weeks after the end of treatment, indicating that use over long periods or repeated short-term courses might be

necessary. However, given the safety and excellent tolerability of glucosamine, it is suitable for long-term or continuous use.



Supplement Facts

Serving Size: 1 Capsule

Servings Per Container: 60

Amount Per Serving	% DV
Vitamin C (from acerola cherry ext)	1.7 mg 3%
Vitamin E (mixed tocopherols from soy)	2.5 I.U. 8%
Manganese (as manganese amino acid chelate)	0.08 mg 4%
Glucosamine potassium sulfate (from shrimp)	500 mg *
Methylsulphonylmethane (MSM)	50 mg *
Chondroitin sulfate	25 mg *
Flax seed	10 mg *
Wheat germ	10 mg *
Hydrolyzed bovine collagen	5 mg *
Whole-istic proprietary enzyme blend	21 mg *
Serrazimes®	6,000 U *
Bromelain	200,000 FCCPU *
Protease 6.0	1,680 HUT *
Cellulase	100 CU *

*Daily Value not established

Other ingredients: Capsule (gelatin and water), rice bran, calcium lactate trihydrate and magnesium citrate





MSM (methylsulfonylmethane) or dimethyl sulfone (DMSO₂) is a naturally occurring sulfur compound found in normal human and other vertebrate diets. Although naturally occurring, MSM is easily destroyed by cooking, storing, and processing. MSM is a valuable supplement as a penetrant, working synergistically at the cellular level with Vitamin C. It makes individual cell walls more permeable, both making it easier to rid themselves of toxins that are created within the cell, and to absorb nutrients more easily. This characteristic of increasing the permeability of cells explains its ability to relieve pain, as pain is often caused by the accumulation of toxic buildup in the cells of joints, muscles, and fluids. Many studies show the potential of MSM as a therapeutic agent. These studies demonstrate its ability to inhibit the degeneration of articular cartilage common in rheumatoid arthritis. MSM is necessary for collagen synthesis in skin, hair, and nails. It keeps the cells from becoming rigid. In addition, MSM relieves arthritis and reduces muscle cramps and back pain. It also scavenges free radicals and speeds wound healing.

Chondroitin sulfate consists of repeating chains of molecules called mucopolysaccharides. Working synergistically, Glucosamine and Chondroitin stimulate the synthesis of new cartilage and work together to strengthen the body's natural repair mechanism. This works to normalize the cartilage matrix and in essence helps to repair joints at a cellular level. Chondroitin sulfate is a major constituent of cartilage, providing structure, holding water and nutrients and allowing other molecules to move through cartilage. This is a very important benefit of chondroitin sulfate, as there is no blood supply to cartilage. In a degenerative joint disease, such as osteoarthritis, there is a loss of chondroitin sulfate as the cartilage erodes. Animal studies indicate that chondroitin sulfate may promote healing of bone, which is

consistent with the fact that the majority of glycosaminoglycans found in bone consist of chondroitin sulfate. In people with osteoarthritis, research has confirmed that chondroitin sulfate helps restore joint function.

Hydrolyzed bovine collagen is a concentrated blend of protein and amino acids, particularly arginine, glycine, and proline. Collagen's joint function support comes from its rich protein content. Hydrolyzed bovine collagen is an effective anti-inflammatory tool because it supplements the body's collagen production with high concentrations of protein and amino acids.

VITAMINS

Vitamin E is not only a potent antioxidant helping to prevent damage from free radicals, but it also acts to stabilize and protect cell membranes, thus protecting red and white blood cells from breakage. Studies have shown that when the blood concentration of vitamin E falls below certain levels, the red blood cells tend to break open (erythrocyte hemolysis). In addition, some research has indicated a synergistic effect between vitamin E and fatty acids in their ability to reduce Tumor Necrosis Factor-induced apoptosis. (For this reason, fatty acids from flaxseed and wheat germ have been included in this formula.) Tumor Necrosis Factor (TNF) is an immunomodulatory and pro-inflammatory factor that induces a variety of cellular responses including apoptosis (programmed cell death). It is implicated as a causative factor in several physiological and pathological conditions. The ability to reduce the cell death induced by TNF could result in a beneficial effect on organ dysfunction associated with inflammation in various diseases.





Vitamin C (from *Acerola*) is a known anti-inflammatory. It has been shown to break, or lyse, fibrin, one of the integral substances in an inflammatory response. Essential to the formation of collagen, vitamin C protects against blood clotting and bruising, and promotes the healing of wounds. Furthermore, it has been added to this product for its antioxidant value and to maintain proper cellular function. Vitamin C is required for tissue growth and repair, and also increases the absorption and effectiveness of both Glucosamine and Chondroitin.

BOTANICALS

Acerola (*Malpighia glabra* L) In addition to its vitamin content, acerola contains mineral salts which have been shown to aid in the remineralization of tired and stressed skin. Its mucilage and proteins have skin hydrating properties and promote capillary conditioning.

Flaxseed (*Linum usitatissimum*) contains alpha-linolenic acid (an omega-3 fatty acid), and has been extensively studied, particularly for its anti-inflammatory properties. Many anti-inflammatory pharmaceutical products work by inhibiting the production of certain eicosanoids and cytokines. It has been shown that flaxseed oil also has the ability to block the production of these pro-inflammatory factors.

Wheat germ (*Triticum aestivum* L.) is the vitamin and mineral-rich embryo of the wheat berry that is removed when flour is refined from whole wheat to white. It contains 50% of the RDI for folate, the B vitamin that aids in the production of healthy red blood cells. It also contains a significant amount of vitamin E, thiamin and zinc.

MINERALS

Minerals act as catalysts for many biological reactions within the human body, including muscle response and inflammation. They keep blood and tissue fluids from becoming either too acid or too alkaline and permit other nutrients to pass into the bloodstream, thereby preventing excess inflammation. They also help draw chemical substances in and out of the cells and aid in the creation of antibodies. The minerals selected for this formula have functions that relate to the decrease of inflammation and nutrient delivery.

Manganese plays a role in activating numerous enzymes. It aids in the utilization of choline and is an activator of enzymes that are necessary for utilization of biotin, thiamine, and ascorbic acid. Manganese is a catalyst in the synthesis of fatty acids and cholesterol. It also plays a part in protein, carbohydrate, and fat assimilation.

Calcium Many people with chronic inflammation, particularly due to arthritis, take many types of pain medications, including steroids. These medications hinder the absorption of calcium, possibly accelerating the development of osteoporosis, and in turn, leading to even more pain and inflammation. Calcium also has many other important functions, such as aiding the utilization of silica, activating several enzymes, and regulating the passage of nutrients in and out of the cell walls.

Magnesium Seventy percent of magnesium is found in the bones. Among its many uses, magnesium activates enzymes necessary for the metabolism of carbohydrates and amino acids. It also promotes the absorption and metabolism of other minerals, such as calcium, phosphorus, sodium, and potassium.





ENZYMES

The **enzymes**, (bromelain, protease, serrazimes® and cellulase) are added to this product to aid in the breakdown and delivery of nutrients from the other ingredients, as well as for their anti-inflammatory benefits.

Bromelain is also a component of this enzyme blend. It has been extensively studied, both in experimental models and clinical studies, for its effects on the inflammatory response. Its main pharmacological effects probably relate to its ability to significantly reduce edema by activating fibrinolysis. Bromelain is a mixture of sulfhydryl proteolytic enzymes obtained from the pineapple plant. It was introduced as a therapeutic agent in 1957, and there is extensive research supporting its beneficial effects, including reducing inflammation in rheumatoid arthritis. The anti-inflammatory effect of bromelain may result from several mechanisms, including the inhibition of pro-inflammatory compounds. It is also known to activate compounds that break down a substance called fibrin. Fibrin forms a matrix that walls off the area of inflammation, resulting in blockage of blood vessels and in inadequate tissue drainage and edema. Bromelain also blocks the production of kinins, compounds produced during inflammation that are known to increase swelling and cause pain.

Protease in this formula has been added for its anti-inflammatory properties, and to increase the absorption of the ingredients' protein content. Plant and microbial proteases have been studied since the 1960's for their role in the treatment of inflammation and inflammatory disorders. In both animal and human trials, proteolytic enzymes from a variety of sources have repeatedly been shown to significantly reduce inflammation resulting from sickness or

injury. Early research on the anti-inflammatory actions of proteases pointed entirely to their antithrombic and fibrinolytic aspects to explain this phenomenon. However, recent studies indicate that, in addition to degrading fibrin, microbial proteases may actually inactivate pro-inflammatory cytokines to prevent or attenuate inflammatory cascades.

Serrazimes®

Serrapeptidase is a protease, recognized as a pharmaceutical agent and sold under the names Danzen and Aniflazyme, which has been used in Europe and Asia to treat heart disease, inflammatory diseases, and bacterial infections for over 25 years. The proteolytic activities of Serrapeptidase explain these applications. But serrapeptidase is initially isolated from *Serratia marcescens*, a potentially pathogenic bacterium, found in the gut of the Japanese silkworm. Serrazimes® is a protease system with the same in vitro activity as Serrapeptidase, but one from a source organism, *aspergillus melleus*, which has long history of safe use in dietary supplements.

Like Serrapeptidase, Serrazimes® has been shown both in vitro and in vivo to significantly inhibit inflammatory responses. Additionally, in a head to head in vivo trial between protease from *Aspergillus melleus* and Serrapeptidase, protease from *Aspergillus melleus* not only showed better anti-inflammatory results than Serrapeptidase, but it also showed fewer side effects. For these reasons, Serrazimes® is not only an adequate substitution for Serrapeptidase, but is clearly the better choice.

Cellulase has been added for its ability to convert cellulose (one of the basic components of cell walls) to glucose. Cellulase contributes to the effective breakdown of some of the specific fibrous cell walls present in grains and botanicals making their nutrients more bioavailable.

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