

Glucosamine, Chondroitin and MSM...Relieve Pain, Protect and Rebuild Joints Connective Tissue

Damaged and Worn Cartilage Can Be Repaired and Rebuilt

Due to normal wear and tear, tissues are constantly being broken down and replaced or restructured. Aging, disease or injury make conditions less than ideal and tissues are broken down faster than they can be regenerated. When the amount of cartilage matrix degraded by chondrocytic enzymes exceeds the amount of new matrix synthesized, cartilage naturally degenerates. Increased turnover of the cartilage matrix is seen in osteoarthritic joints compared to normal joints. If this process continues, cartilage destruction is followed by hardening and formation of bone spurs in the joint margins. The result is pain, deformity and limited movement in the joint.

When all the raw materials needed are available, cell building is a very efficient process. When there are deficiencies, the new cells may be weak, rigid or deformed. Research shows that, by supplying the body with natural substances that inhibit cartilage breakdown and promote cartilage repair, damaged cartilage can be replaced by healthy new cartilage. These effects have been confirmed with electron micrography.⁽¹⁻³⁾

High Potency Formula Provides Essential Building Materials for Joints and Connective Tissue

Chondroitin sulfate is a glycosaminoglycan (GAG), a type of proteoglycan predominant in the ground substance of cartilage, bone and blood vessels. This ground substance allows cells in tissues to adhere to one another and gives joints their strength and resilience. Its basic structure is a long chain of alternating glucuronic acid and glucosamine sulfate.⁽⁶⁾

In test tubes, chondroitin sulfate stimulates production of cartilage and inhibits enzymes that degrade it.⁽¹⁾ Clinical trials demonstrate improved joint function and mobility, reduced pain and inflammation and an actual reversal of joint degeneration as detected by radiographs. This reversal includes improvement in the volume and quantity of joint connective matrix and synovial fluid.⁽⁷⁾

Both **glucosamine sulfate** and **N-acetyl glucosamine** are involved in formation of connective tissue and can be used to generate the much larger chondroitin sulfate molecules. Glucosamine sulfate is a stabilized compound of glucosamine, whereas N-acetyl glucosamine is derived from glucosamine further along the pathway toward connective tis-

GC-MSM 3550™
Nutrients to Support the Function and Structure of Joints and Connective Tissue

Product No. 762 Fill Size: 120 Capsules

Four Capsules Contain:	% Daily Value
Vitamin C (ascorbic acid) -----	100 mg. 167%
Vitamin E (Covitol®) Succinate -----	50 I.U. 167%
Pantothenic Acid (as calcium pantothenate)-	100 mg. 1000%
Manganese (as manganese amino acid chelate)	2 mg. 200%
Molybdenum (as molybdenum amino acid chelate) -----	75 mcg. 100%
Methyl Sulfonyl Methane (Lignisol™ MSM)	1700 mg. *
Glucosamine Sulfate-----	1500 mg. *
Chondroitin Sulfate -----	250 mg. *
N-Acetyl Glucosamine -----	100 mg. *
L-Cysteine -----	100 mg. *
N-Acetyl Cysteine -----	10 mg. *
L-Glutathione (reduced) -----	4 mg. *
Green Shell Mussel -----	50 mg. *

Green shell mussel is a natural source of mucopolysaccharides (chondroitin sulfate) and superoxide dismutase.

Other ingredients: rice flour, magnesium stearate, gelatin.
*Daily Value not established.

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Lignisol™ MSM is a trademark of Carolwood Corp.

RECOMMENDED USE: Three to six capsules daily, in divided doses.

sue formation. Both are important contributors to hyaluronic acid, a major cushioning component of the joints.⁽⁸⁾

In a 3-year, double-blind, placebo-controlled trial of 212 osteoarthritis patients reported in *The Lancet*, patients given the placebo had progressive joint-space narrowing (as shown by radiographs) and their symptoms worsened. Symptoms improved in the glucosamine sulfate group and there was no significant joint-space narrowing.⁽⁵⁾

In several studies, glucosamine helped relieve the joint pain and stiffness of osteoarthritis. With continued use, it was even more effective than ibuprofen for joint pain.⁽⁹⁾ Because glucosamine is not an analgesic or a powerful anti-inflammatory, its beneficial effects do not appear rapidly. However, since it can apparently reverse the disease process, its effects are more pronounced and longer lasting than those of standard treatment.

Methyl sulfonyl methane (MSM) is an excellent source of useable organic sulfur, one of the most important raw materials for building healthy new cells. One of its most significant uses as a supple-

ment is its demonstrated ability to relieve pain and inflammation.⁽¹⁰⁾

When rigid fibrous tissue cells swell and become inflamed, pressure and pain result. MSM can restore flexibility and permeability to cell walls allowing fluids pass through the tissues more easily. Harmful substances (lactic acid and toxins) are allowed to flow out while nutrients are permitted to

Protective Nutrients Reduce Connective Tissue Damage

Free radical scavengers (antioxidants) have a great influence on various acute and chronic connective tissue disorders. Therapy with antioxidants may reduce or eliminate clinical symptoms.⁽¹¹⁾ The interaction of free radicals with protein structures results in, among other things, the gradual development of cross-links in collagen fibers, a characteristic sign of aging. Tissues become constricted and tight, interfering with cellular circulation and drainage.⁽¹²⁾

Glutathione is uniquely qualified to protect against this type of free radical damage, working both outside the cell and intracellularly in the enzyme glutathione peroxidase.⁽¹²⁾ This tripeptide made up of the amino acids L-cysteine, L-glutamic acid and L-glycine, plays an important role in cellular metabolism, reduces disulfide linkages in proteins and participates in synthesis of DNA precursors.⁽¹³⁾

The sulfur-rich amino acid **L-cysteine** and its derivative **N-acetyl cysteine** also slow abnormal cross-linking in collagen and are dietary precursors to reduced glutathione. Supplements can increase plasma and lymphocyte levels of glutathione.⁽¹²⁾

Manganese is a necessary cofactor for the enzyme glycosyltransferase which is needed for the uptake of sulfate in the synthesis of proteoglycans. Manganese deficiency has been associated with decreased GAG in discs as well as lack of tone in ligaments and tendons. In animals, manganese deficiency inhibits proteoglycan production and results in deformed bones and joints.⁽¹⁴⁾

Green shell mussel is a significant non-bovine source of chondroitin sulfate and the antioxidant enzyme superoxide dismutase.

In addition to its importance as an antioxidant, **vitamin C** is essential for maintenance of collagen. The synovial fluid which lubricates the joints becomes thinner, allowing freer movement, when serum levels of vitamin C are high.^(4,15) It can also increase plasma and lymphocyte levels of glutathione.⁽⁵⁾

Vitamin E has been used therapeutically in both types of arthritis. Its benefit was first thought to be

flow in, preventing the pressure buildup in cells that causes inflammation and pain.⁽¹⁰⁾

Arthritis patients report substantial, long-lasting relief with MSM supplements. While glucosamine supplements have been effective for mild to moderate cases of arthritis, MSM appears to be more effective for severe cases of both osteoarthritis and rheumatoid arthritis. Glucosamine and MSM taken together seem to relieve pain most effectively.⁽¹⁰⁾

due to its antioxidant and membrane stabilizing actions. Later studies show that vitamin E can inhibit enzymatic breakdown of cartilage as well as stimulate cartilage synthesis. It also works synergistically with peroxidase and other antioxidant enzymes (superoxide dismutase, catalase) and it has a slight anti-inflammatory action due to its effect on prostaglandin and leukotriene synthesis.⁽⁴⁾

Pantothenic acid may be reduced in arthritic patients and there is preliminary evidence that supplementation may be beneficial.⁽⁴⁾

Molybdenum is a trace mineral essential in enzyme systems that mobilize iron from the liver, detoxify aldehydes and sulfites.⁽¹⁵⁾

WARNING: This information is provided for health care professionals only. **This publication and the product contained herein have not been approved or evaluated by the Food and Drug Administration. This publication and the product contained herein are not intended to diagnose, treat, cure or prevent any disease.** The product relates to nutritional support only.

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