



Available in 120 vegetarian capsules

- Helps to relieve joint pain associated with osteoarthritis
- Helps to relieve pain associated with osteoarthritis of the knee
- Helps to protect against the deterioration of cartilage
- A factor in maintaining healthy cartilage and/or joint health

Discussion

Healthy joints can help us move freely, exercise comfortably, and recover effectively. Nourishing and maintaining the flexible connective tissue (cartilage) in our joints are essential to maintaining our own flexibility. This formula combines three high-quality ingredients that target joint health and assist with recovery from temporary joint discomfort due to occasional overexertion or intensive activity.*

CS BiO-ACTIVE[®] Chondroitin sulfate (CS) is the most abundant glycosaminoglycan (GAG) in the body. CS is required for the formation of proteoglycans in joint cartilage. GAGs are the principal components of cartilage and synovial fluid; they bind with core proteins to form the proteoglycans that provide structure to and support the function of connective tissue. CS is thought to enhance joint health by supporting endogenous synthesis and preventing degradation of other joint GAGs. Oral administration of CS (800-1200 mg/d) has proven to positively influence joint space width, joint comfort, and fluid accumulation.^[1-4] SynovX Protect provides 1,200 mg of CS in the recommended four-capsule-per-day dosage.*

The pharmaceutical grade, low-molecular-weight CS in CS BiO-ACTIVE has demonstrated higher bioavailability^[5] and greater biological activity^[6] than other CS sources. CS BiO-ACTIVE is the reference CS for the European Union Pharmacopoeia, and it was selected by the US National Institutes of Health for their glucosamine/chondroitin trial.^[7] In fact, most of the clinical research performed using CS has employed CS BiO-ACTIVE; and in all clinical trials and over 10 years of pharmacovigilance, CS BiO-ACTIVE has shown an excellent safety profile.*

Glucosamine Sulfate Glucosamine is a naturally occurring amino saccharide (glucose with a nitrogen-containing amino group attached) that is a principle substrate for cartilage synthesis.^[8] Research suggests that glucosamine stimulates chondrocytes (cartilage cells), supports GAG synthesis, incorporates sulfur into cartilage tissue, induces hyaluronic acid (HA) production, and modulates prostaglandin (e.g., PGE2) synthesis.^[9-11] Prostaglandins (specialized hormone-like fatty acids produced in the body) regulate a wide variety of bodily functions, including cytokine production and balance. Glucosamine sulfate was found to inhibit the release of PGE2, the activity of NF-kappaB, and the synthesis of COX-2 enzymes in human chondrocytes.*^[12]

Most of the scientific research done on glucosamine has been performed using glucosamine sulfate. Oral doses of 1,500 mg/d have shown clinical benefits in joint mobility and comfort.^[9,13] Four capsules per day of SynovX Protect provide 1,500 mg of glucosamine sulfate. It is postulated that even lower doses may nourish joint tissues, especially in combination with chondroitin sulfate.*

Several studies have confirmed that the benefits of combining glucosamine sulfate with chondroitin sulfate outweigh taking them alone.^[14-16] During a randomized, double-blind, placebo-controlled clinical trial that followed 605 participants for two years, all study groups who had received glucosamine sulfate (1,500 mg/d), chondroitin sulfate (800 mg/d), or a combination of the two experienced an improvement in joint comfort. However, only the group that received a combination of glucosamine sulfate and chondroitin sulfate experienced a significant reduction in joint space width.*^[17]

Methylsulfonylmethane (MSM) As an organosulfur compound, MSM is thought to primarily benefit joint tissues by delivering sulfur. Sulfur helps maintain the strength and structure of connective tissue by forming cross-linkages through disulfide bonds—such as those found in GAGs.^[18] Research suggests that MSM may reduce joint tissue damage triggered by free radicals.^[19] One joint study shows that glucosamine and MSM achieve better results when combined than when administered individually.*^[20]

MSM's effect on free radicals also appears to support muscle recovery after exercise. Studies suggest that the significant increase in total antioxidant capacity observed subsequent to MSM supplementation was the key factor responsible for reducing muscle soreness and breakdown, which can occur after rigorous exercise. Though relatively high levels of MSM were used in the studies—1.5-3 grams total per day in Kalman's study^[21] and 50 milligrams per kilogram per day in Barmaki's study^[22]—the one gram of MSM provided in two servings of SynovX Protect can contribute to MSM dosing for exercise recovery.*

SynovX® Protect

Medicinal Ingredients (per vegetarian capsule)

Glucosamine sulfate (Exoskeleton of crab and shrimp).....	375 mg
Chondroitin sulfate (<i>Bos taurus</i> – cartilage).....	300 mg
MSM (Methylsulfonylmethane (Dimethyl sulfone))	237.5 mg

Non-Medicinal Ingredients

Hypromellose capsule, ascorbyl palmitate, silica, medium chain triglycerides.

Use for a minimum of 1 month to see beneficial effects.

DIRECTIONS: Adults: Take 4 capsules daily, or as directed by your healthcare professional.

CAUTION: Consult your healthcare practitioner prior to use if you are pregnant or breastfeeding. Consult a healthcare practitioner if symptoms worsen. Stop use if diarrhoea, abdominal pain, heartburn, nausea or vomiting occur.

CSbioactive™ CSBIOACTIVE™ is a trademark licensed by Bioibérica, S.A.U.

References

1. Kahan A, Uebelhart D, De Vathaire F, et al. Long-term effects of chondroitins 4 and 6 sulfate on knee osteoarthritis: the study on osteoarthritis progression prevention, a two-year, randomized, double-blind, placebo-controlled trial. *Arthritis Rheum.* 2009 Feb;60(2):524-33. [PMID: 19180484]
2. Möller I, Pérez M, Monfort J, et al. Effectiveness of chondroitin sulphate in patients with concomitant knee osteoarthritis and psoriasis: a randomized, double-blind, placebo-controlled study. *Osteoarthritis Cartilage.* 2010 Jun;18 Suppl 1:S32-40. [PMID: 20399899]
3. Wildi LM, Raynauld JP, Martel-Pelletier J, et al. Chondroitin sulphate reduces both cartilage volume loss and bone marrow lesions in knee osteoarthritis patients starting as early as 6 months after initiation of therapy: a randomised, double-blind, placebo-controlled pilot study using MRI. *Ann Rheum Dis.* 2011 Jun;70(6):982-89. [PMID: 21367761]
4. Hochberg MC, Clegg DO. Potential effects of chondroitin sulfate on joint swelling: a GAIT report. *Osteoarthritis Cartilage.* 2008;16 Suppl 3:S22-24. [PMID: 18768335]
5. Adebowale A, Du J, Liang Z, et al. The bioavailability and pharmacokinetics of glucosamine hydrochloride and low molecular weight chondroitin sulfate after single and multiple doses to beagle dogs. *Biopharm Drug Dispos.* 2002 Sep;23(6):217-25. [PMID: 12214321]
6. Tat SK, Pelletier JP, Mineau F, et al. Variable effects of 3 different chondroitin sulfate compounds on human osteoarthritic cartilage/chondrocytes: relevance of purity and production process. *J Rheumatol.* 2010 Mar;37(3):656-64. [PMID: 20110528]
7. Barnhill JG, Fye CL, Williams W, et al. Chondroitin product selection for the glucosamine/chondroitin arthritis intervention trial. *J Am Pharm Assoc.* 2006 Jan-Feb;46(1):14-24. [PMID: 16529337]
8. Glucosamine. Natural Standard Database. <http://www.naturalstandard.com/databases/herbssupplements/glucosamine.asp>? Accessed February 4, 2014.
9. Kelly GS. The role of glucosamine sulfate and chondroitin sulfates in the treatment of degenerative joint disease. *Altern Med Rev.* 1998 Feb;3(1):27-39. Review. [PMID: 9600024]
10. Igarashi M, Kaga I, Takamori Y, et al. Effects of glucosamine derivatives and uronic acids on the production of glycosaminoglycans by human synovial cells and chondrocytes. *Int J Mol Med.* 2011 Jun;27(6):821-7. [PMID: 21455564]
11. Kapoor M, Mineau F, Fahmi H, et al. Glucosamine sulfate reduces prostaglandin E(2) production in osteoarthritic chondrocytes through inhibition of microsomal PGE synthase-1. *J Rheumatol.* 2012 Mar;39(3):635-44. [PMID: 22089456]
12. Largo R, Alvarez-Soria MA, Díez-Ortego I, et al. Glucosamine inhibits IL-1beta-induced NFkappaB activation in human osteoarthritic chondrocytes. *Osteoarthritis Cartilage.* 2003 Apr;11(4):290-8. [PMID: 12681956]
13. Selvan T, Rajiah K, Nainar MS, et al. A clinical study on glucosamine sulfate versus combination of glucosamine sulfate and NSAIDs in mild to moderate knee osteoarthritis. *Scientific World Journal.* 2012;2012:902676. [PMID: 22577354]
14. Tat SK, Pelletier JP, Vergés J, et al. Chondroitin and glucosamine sulfate in combination decrease the pro-resorptive properties of human osteoarthritis subchondral bone osteoblasts: a basic science study. *Arthritis Res Ther.* 2007;9(6):R117. [PMID: 17996099]
15. Lippiello L, Woodward J, Karpman R, et al. In vivo chondroprotection and metabolic synergy of glucosamine and chondroitin sulfate. *Clin Orthop Relat Res.* 2000 Dec;(381):229-40. [PMID: 11127660]
16. Clegg DO, Reda DJ, Harris CL, et al. Glucosamine, chondroitin sulfate, and the two in combination for painful knee osteoarthritis. *N Engl J Med.* 2006 Feb 23;354(8):795-808. [PMID: 16495392]
17. Fransen M, Agaliotis M, Nairn L, et al. Glucosamine and chondroitin for knee osteoarthritis: a double-blind randomised placebo-controlled clinical trial evaluating single and combination regimens. *Ann Rheum Dis.* 2014 Jan 6. [Epub ahead of print] [PMID: 24395557]
18. Methylsulfonylmethane (MSM). Monograph. *Altern Med Rev.* 2003 Nov;8(4):438-41. [PMID: 14653770]
19. Brien S, Prescott P, Lewith G. Meta-analysis of the related nutritional supplements dimethyl sulfoxide and methylsulfonylmethane in the treatment of osteoarthritis of the knee. *Evid Based Complement Alternat Med.* 2011;2011:528403. [PMID: 19474240]
20. Usha PR, Naidu MU. Randomised, double-blind, parallel, placebo-controlled study of oral glucosamine, methylsulfonylmethane and their combination in osteoarthritis. *Clin Drug Investig.* 2004;24(6):353-63. [PMID: 17516722]
21. Kalman DS, Feldman S, Scheinberg AR, et al. Influence of methylsulfonylmethane on markers of exercise recovery and performance in healthy men: a pilot study. *J Int Soc Sports Nutr.* 2012 Sep 27;9(1):46. [PMID: 23013531]
22. Barmaki S, Bohlooli S, Khoshkharesh F, et al. Effect of methylsulfonylmethane supplementation on exercise - Induced muscle damage and total antioxidant capacity. *J Sports Med Phys Fitness.* 2012 Apr;52(2):170-4. [PMID: 22525653]

Additional references available upon request

EXCLUSIVE • PATENTED

