
Chondroitin Sulfate

James Meschino DC, MS, ND

General Features

Chondroitin Sulfate contains a mixture of intact or partially hydrolysed glycosaminoglycans (GAG), of molecular weights ranging from 14,000 to over 30,000 Daltons. Their large molecular weight and size greatly reduces their bioavailability, with their absorption from the gastrointestinal tract being limited to no more than 11-13 percent. By contrast, the absorption of glucosamine sulfate is known to be approximately 98 percent.^{1,2}

Most of the positive studies using Chondroitin Sulfate with arthritic patients have used injectable forms. However, even these studies have demonstrated less benefit than the oral ingestion of glucosamine sulfate.³

Generally speaking, Chondroitin Sulfate molecules are at least fifty to three hundred times larger than glucosamine sulfate molecules and are usually too large to pass through the normal intact intestinal barrier. Even the small percentage that may get absorbed into the bloodstream is too large to be delivered to cartilage cells.^{1,2,4}

Any clinical benefit derived from taking Chondroitin Sulfate is probably due to the absorption of sulfur (which supports cartilage structure), or smaller GAG molecules broken down by the digestive tract.⁵

In the journal "Rheumatology International", researchers concluded that the chondroprotection afforded by orally administered Chondroitin Sulfate is biologically and pharmacologically unfounded.⁴ "Pooled literature on Chondroitin Sulfate biochemistry offers enough information to assert that neither intact, nor polymerized Chondroitin Sulfate is absorbed by the mammalian gastrointestinal tract. Therefore, any direct action of orally administered Chondroitin Sulfate on cartilage and chondrocytes is not possible."⁶

Moreover, the few clinical trials that have been done using orally administered Chondroitin Sulfate demonstrate that it is far less effective than glucosamine sulfate.⁷⁻¹⁰

A recent report in the Lancet (January 2001), indicated that the addition of Chondroitin Sulfate to glucosamine products has not been shown to provide a further benefit to the use of glucosamine sulfate alone.¹¹

Supplementation Studies and Clinical Applications

Osteoarthritis: Oral supplementation with Chondroitin Sulfate has typically used 400 mg, three times per day in most studies. Far more impressive results have been achieved using glucosamine sulfate, which is faster acting and provides much greater over-all benefits.³

Dosage

Osteoarthritis: 400 mg, three times per day⁸

Drug-Nutrient Interactions

No well-known drug interactions exist for Chondroitin Sulfate¹²

-
1. Conte A, Volpi N, Palmieri L, Bahous I, Ronca G. Biochemical and pharmacokinetic aspects of oral treatment with chondroitin sulfate. *Arzneum Forsch/Drug Res* 1994;45(8):918-25.
 2. Setnikar I, Palumbo R, Canali S, Zanolio G. Pharmacokinetics of glucosamine in man. *Arzneum Forsch/Drug Res* 1993;43,10:1109-13.
 3. Murray M. *Encyclopedia of Nutritional Supplements*. Rocklin, CA: Prima Publishing; 1996.
 4. Baici A, Horler D, Moser B, et al. Analysis of glycosaminoglycans in human sera after oral administration of chondroitin sulfate. *Rheumatol Int* 1992;12:81-8.
 5. Vaz AL. Double-blind clinical evaluation of the relative efficacy of ibuprofen and glucosamine sulfate in the management of osteoarthritis of the knee in out patients. *Curr Med Res Opin* 1982;8:145-9.
 6. Baici A, Wagenhauser FJ. Bioavailability of oral chondroitin sulfate. *Rheumatology Int* 1993;13:41-3.
 7. Pipitone VR. Chondroprotection with chondroitin sulfate. *Drugs Exptl Clin Res* 1991;18:3-7.
 8. Hirondelet JL. Double-blind clinical study with oral administration of chondroitin sulfate versus placebo in tibiofemoral gonarthrosis. *Litera Rheumatologica* 1992;14:77-82.
 9. Conrozier T, Vignon E. The effect of chondroitin sulfate treatment in coxarthrosis. *Litera Rheumatologica* 1992;14:69-75.
 10. Morreale P, Manopulo R, Galati M, Boccanera L, Saponati G, Bocchi L. Comparison of the anti-inflammatory efficacy of chondroitin sulfate and diclofenac sodium in patients with knee osteoarthritis. *J Rheumatol* 1996;23:1385-91.
 11. Reginster JY, Deroisy R, Rovati LC, Lee RL, Lejeune E, Bruyere O, et al. Long-term effects of glucosamine sulfate on osteoarthritis progression: a randomized, placebo-controlled clinical trial. *Lancet* 2001;357:251-6.
 12. Healthnotes 2000, Healthnotes, Inc (www.healthnotes.com): chondroitin sulfate.
-