

PURIFIED CHONDROITIN SULFATES

by Ronald L. Myers, CNC

In this issue of we will take an in-depth look at Purified Chondroitin Sulfates. Because of the book "The Arthritis Cure" by Jason Thedosakis, MD, chondroitin sulfates and glucosamine sulfates have become household words to people who probably still can't spell them correctly. And, a controversy rages regarding which supplement is superior in the treatment of arthritis. Because of this controversy, we will address glucosamine sulfates and possibly provide information on this supplement unknown to you before now.

WHAT ARE CHONDROITIN SULFATES?

Chondroitin Sulfates are known by a number of other names such as, mucopolysaccharides, glycosaminoglycans and proteoglycans. Obviously, with names like "glycos" and "saccharide", sugar plays a role in their synthesis. To make a long story short, chondroitin sulfates are synthesized through several steps from glutamine or glucosamine sulfate. So the controversy rages: should we use glucosamine sulfates or chondroitin sulfates?

WHAT YOU MAY NOT KNOW ABOUT GLUCOSAMINE

NSAIDS are known to inhibit the synthesis of chondroitin sulfates (CS) at three enzymatic sites, they are: glucosamine 6P synthetase; acetyl CoA synthetase; and UDPG dehydrogenase. What this means is, if you are using glucosamine in treating arthritic patients and those patients are taking NSAIDS to reduce pain and inflammation, they are also inhibiting the synthesis of CS for repair and regeneration of cartilage.

Furthermore, increased levels of glucosamine cause the following biochemical disruptions:

1. Inhibition of lipid-dependent glycosylation of proteins (The Glycoconjugates, vol. III, 1982.) The synthesis of certain peptides involves lipid-dependent linkage.
2. Inhibition of insulin dependent lipogenesis (storage of energy as fat). (Biochem J. 266, 909-916, 1990). The clinical effect of this action remains to be determined.
3. Inhibition of cysteine-proteases. These are proteolytic enzymes such as papain and bromelain. Bromelain is widely used as an oral anti-inflammatory agent. The intended effectiveness of this enzyme is inhibited by the concurrent administration of glucosamine.

Research published in 1991 indicates that to use glucosamine as an effective anti-inflammatory agent, the patient must take 10 times the amount of NSAIDS they would need to give the same reduction in inflammation. Glucosamine was not found active against specific mediators of inflammation such as serotonin, bradykinin or histamine. Glucosamine has no effect on the cyclooxygenase pathway involved in inflammation.

Finally, scientists at Rotta Pharmaceuticals of Milan Italy (a main supplier of glucosamine to the world market), concluded that "82% of the glucosamine (given as an oral dose; ED) is to a large extent broken down into smaller fragments". Two separate studies found that 50% of the oral dose is apparently used for energy, and the 35% of the dose is excreted in the urine. Numbers like these explain why such high doses (5 grams t.i.d.) are needed to produce results in the studies published to date.

WHAT YOU MAY NOT HAVE KNOWN ABOUT CHONDROITIN SULFATES

Some still doubt the oral uptake of CS. This has been reported by Morrison and Murata. Human subjects were found to absorb 90% or greater of the oral dose of *purified* chondroitin sulfates. Of the CS products available, it is important to use the purified form. Most CS products are derived from bovine trachea. Bovine trachea contains many cross-linked collagens, which are very difficult to digest and therefore trap available CS rendering them unabsorbable. The cost of the purified forms of CS is greater but when absorption of 90% or more CS compared to 10% or less from the non-purified form, the greater cost becomes negligible. The data regarding the relative absorption of CS is based on radioactive isotope studies that showed 8% of this radioactivity was attached to large molecular weight GAGs (CS), while the remainder was degraded to free sulfate. This means that oral CS is absorbed from the digestive tract into the blood and is taken up and metabolized by the tissues, which obviously have the ability to uptake large molecules of CS.

The work of Morrison, et al, (Coronary Heart Disease and the Mucopolysaccharides, 1974, p109-127) deals primarily with the cardiovascular properties of CS. These have been reviewed by numerous authors and the effects observed are:

1. Antithrombotic effects
2. Anti-atherosclerotic effects
3. Increased coronary arterial collateral circulation
4. Regeneration and repair action at intracellular connective tissues of both arterial and myocardial tissues.

Morrison also observed that "the repair and regeneration of myocardium in ischemic heart patients is evident within 24 to 48 hours after administration of CS from EKG changes, and by normalization of serum enzyme profiles (CK, LDH, SGOT)." CS administration has also been found quite effective in patients presenting with hypercholesterolemia. The mechanism of action is yet to be determined in this condition.

Melvyn Werbach, MD, recommends the use of CS in his book "Nutritional Influences on Illness", 1987. He uses the term glycosaminoglycans (mucopolysaccharides) instead of CS, but he recommends their use in the following conditions:

1. Glycosaminoglycans (GAGs) 1200 to 3000mg t.i.d. for Rheumatoid Arthritis
2. GAGs 1200mg t.i.d. for atherosclerosis
3. GAGs 1200 to 3000 mg t.i.d. for Osteoarthritis

Numerous researchers have studied the healing effects of CS and have found they are due to its ability to nurture and regenerate connective tissue, which is found in, between and around every organ in the body. Connective tissue has been accurately described as a body system of

"mesenchymal matrix". Lower back strength increased by 66% for patients supplemented with CS and by 258% for patients supplemented with CS and a wide range of nutrients tailored to musculoskeletal health (*Bio-Musculoskeletal Paks*). It appears these accessory nutrients (vitamins, minerals, proteolytic enzymes, etc) significantly enhance the healing properties of CS.

UPDATE

Research published within the last 5 years shows that in unison supplementation (with CS) with IGF-1 (Gammanol Forte) and vitamin C (Bio C Plus 1000) was able to prevent chondrocyte damage!

According to Charles Denko and Charles Malesud of Case Western Reserve University School of Medicine "Pathophysiological response of articular cartilage in early OA represents a constellation of anabolic and catabolic dysfunctions by the chondrocyte. Restoration of normal IGF-1 levels (Gammanol Forte) could play an important role in maintaining cartilage homeostasis in early OA."¹ IGF-1 (Insulin Growth Factor-1) is an anabolic mediator that stimulates articular chondrocyte matrix synthesis, augments articular repair and inhibits chondrocyte mediated matrix catabolism. Independent reports indicate that reduced growth and repair observed in degenerative cartilage disorders may be related to an inability of IGF-1 to exert its physiological and anabolic effects on chondrocytes.² In other words, if IGF-1 metabolism is disturbed, sugar cannot get into the chondrocyte.

Vitamin C stimulates the synthesis of the matrix assembly and has a general anabolic action on chondrocytes. Framingham data shows that patients with a high intake of vitamin C had a reduced risk of cartilage loss.³ As a reducing agent, vitamin C is the battery that keeps things going.

ENDOCRINE CONSIDERATIONS

Chondrocytes are highly glycolytic and require a regular supply of glucose for optimal ATP production and cell homeostasis. A steady supply of glucose is needed for chondrocyte viability and matrix synthesis. Low cellular levels of glucose in chondrocytes cause the release of matrix digesting enzymes (MMP-2) in cartilage. Cortisol inhibits glucose uptake in chondrocytes. Damage to soft tissues is characteristic of hypothyroidism and diabetes.⁴

¹ Frontiers in Bioscience 4, Oct 15, 1999.

² Mobasheri, Review article, J Histopathology, 2002.

³ Arthritis Rheum, 1996 Apr; 39(4): 648-56.

⁴ Mobasheri

BRC PRODUCT CONSIDERATIONS

Biotics, of course provides Purified Chondroitin Sulfates under that product name. But there is market demand for glucosamine as well, which BRC began including in the line in the 1990's. There are many products available for you to choose from they are:

Bio-Musculoskeletal Paks provides Purified Chondroitin Sulfates, vitamin C, Gamma Oryzanol (Gammanol Forte) and proteolytic enzymes. Excellent product, should be used more often for soft tissue recovery and support.

Chondro-Plus provides purified chondroitin sulfates, manganese and vitamin B12. The B12 or cobalt is a synergist to manganese, which helps promote ligament strength and stability.

Chondrosamine Plus, Chondrosamine S the only difference in these products is the type of glucosamine provided. ***Chondrosamine Plus*** provides glucosamine HCl and ***Chondrosamine S*** provides glucosamine sulfate. Both products provide purified chondroitin sulfates and vitamin C.

Gluco-Syn-Amine source of glucosamine HCl and accessory nutrients.

Osteo-B-Plus provides purified chondroitin sulfates, manganese, vitamin B12, calcium and accessory nutrients. This is an excellent product for osteo arthritis and osteoporosis.

Purified Chondroitin Sulfates provides 250mg of PCS per tablet.

Rehab Support Pack provides purified chondroitin sulfates, vitamin C, manganese and a host of accessory nutrients.

CONCLUSION

CS provides a tool you can use in your practice to help arthritic patients, coronary patients, low back patients, connective tissue support and regeneration, and to enhance the healing process after trauma or surgery. Using the purified form the dose is 2 to 3 tablets t.i.d., in the initial stages of treatment; Purified Chondroitin Sulfates could be dosed as high as 5 tablets t.i.d.

Available from Viotron International, Ltd.

(800) 437-1298