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Brief Review of Glucosamine and Chondroitin

Osteoarthritis and degenerative disc disease are two of the most common, frustrating, and functionally limiting diseases of the musculoskeletal system. We are without curative medical treatment in regard to both (perhaps with the exception of total joint replacement). Particularly for mild to moderate disease, there is reasonable scientific evidence that two nutritional supplements, often referred to as “nutraceuticals”, indeed have predictable and durable benefit in regard to decreasing pain and improving daily function for the majority who take them regularly. Perhaps more importantly, there is evidence which suggests that these supplements may actually slow the progressive natural history of degenerative joint disease and potentially for degenerative disc disease as well. These disease modifying properties have not been seen for the mainstay of oral treatment, that being oral nonsteroidal anti-inflammatory drugs (NSAID’s).

Combined treatment of glucosamine and chondroitin sulfate has been widely used by the veterinary community for many years. The first rather small, controlled, double-blind human studies with this combination date to the early 1980’s. However, in America, glucosamine and chondroitin supplementation has been most widely used since the mid-1990’s. Americans presently spent an estimated \$600 million on glucosamine and chondroitin annually. All published studies have shown a positive effect, and no clinical trial has evidenced significant side effects. It is important for patients to understand that glucosamine and chondroitin production is not regulated by the FDA. In this manner, quality assurance is entirely at the hands of the manufacturer. As with initiation of any drug, one should be vigilant for any negative reaction or intolerance. It is also strongly recommended that one’s primary physician and orthopedic physician be made aware of any “nutraceutical” supplement.

Glucosamine and chondroitin sulfate are integral components of articular (joint lining) cartilage, and are important to the physiologic and mechanical properties of this tissue. Glucosamine is involved in cartilage formation by acting of a precursor of glycosaminoglycans (GAG’s). Chondroitin sulfate is a GAG that is a component of aggrecan structure that makes up articular cartilage. It binds collagen fibrils and limits water content by limiting the degree to which GAG’s can separate. Chondroitin sulfate plays a role in allowing cartilage to resist tensile stresses during various loading conditions by giving cartilage resistance and elasticity.

Laboratory studies have demonstrated that glucosamine stimulates chondrocytes (cartilage cells) to increase secretion of glucosaminoglycans and proteoglycans. There is also evidence of anti-inflammatory activity not related to prostaglandin metabolism (which is the primary route by which nonsteroidal anti-inflammatory drugs - NSAIDs - such as ibuprofen, aspirin, Vioxx, or Celebrex function), probably via a free radical scavenging effect. Osteoarthritis is characterized by degradative enzymes that destroy cartilage. These enzymes are competitively inhibited by chondroitin sulfate. Importantly, a synergistic effect has been notable for production of cartilage building blocks and for anti-protease activity when glucosamine and chondroitin are administered in combination.

Glucosamine and chondroitin have to be taken regularly for benefit. They can be thought of as a “vitamin for your cartilage”. You will not feel relief one hour following oral dosage, as you would likely note with the use of NSAIDs, such as ibuprofen. It is important to also understand that NSAIDs, as well as Tylenol (acetaminophen), can be taken in combination with glucosamine and chondroitin without cross-reaction; likely with additive benefit. Most combination tablets have glucosamine component of 500 milligrams, and chondroitin sulfate component of 400 mg. For the first two months of therapy, I generally recommend that a patient take two tablets in the morning and once at bedtime. Subsequently, two tablets daily may be adequate. Prices are quite variable, and these products are widely sold over-the-counter locally. If glucosamine and chondroitin have been taken regularly for 3-4 months without benefit, of course it may be reasonable to hold therapy and spend your money elsewhere!

References not limited to:

Glucosamine and Chondroitin Sulfate Are Effective in the Management of Osteoarthritis. Review article by David S. Hungerford MD, and Lynne C. Jones PhD. The Journal of Arthroplasty Vol.18 No. 3, Suppl. 1 2003

Joint Remedies: Glucosamine and chondroitin supplements appear to ease arthritis symptoms and possibly fight the disease itself-We tested 19 national products. Consumer Reports January 2002.

Glucosamine and Chondroitin in the Treatment of Osteoarthritis- interpretation of current research findings. Kevin M. Doulens MD, Atul B. Joshi MCH (ORTH), FRCS (ED), and David M. Lichtman MD. Women’s Health Orthopedic Edition, Jan/Feb 2003.

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