

## Novel Nutritional Agents May Be Helpful For Osteoarthritis

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**ABSTRACT:** *Osteoarthritis is the most prevalent form of arthritis, resulting in pain and motion limitation in over 50 million people in the U.S.<sup>9</sup> Originating in joint cartilage, the disease is associated with significant subchondral bone changes, triggering inflammation and pain of the surrounding joint and becoming progressively severe.<sup>9</sup> The joints most often affected in osteoarthritis are the weight-bearing joints: knees, hips, ankles, and spine. Conventional treatment and management approaches for osteoarthritis include a wide assortment of drug interventions such as non-steroidal anti-inflammatory drugs (NSAIDs), corticosteroids, muscle relaxants, and analgesics. Unfortunately, these interventions are often associated with adverse effects that can be as difficult to manage as the disease itself. Natural alternatives that may provide nutritional support to those suffering from osteoarthritis include glucosamine sulfate, D-glucuronic acid, and folic acid.*

Osteoarthritis, the most common form of arthritis, is typically treated with non-steroidal anti-inflammatory drugs (NSAIDs). These drugs are known to have a number of adverse side effects, including peptic ulcers and damage to the liver and kidneys. Prolonged use of NSAIDs actually appears to contribute to the progression of osteoarthritis — a contradiction that is often overlooked. Other popular treatment protocols include analgesics and corticosteroids — not without side effects of their own. Another problem with NSAIDs, analgesics, and corticosteroids is that their focus is on relieving symptoms, rather than treating the source of the problem.

### NATURAL NUTRITIONAL SUPPORT FOR OSTEOARTHRITIS

Given the common side effects of traditional pharmaceutical treatment, an alternative approach to osteoarthritic relief is warranted. Supplemental glucosamine sulfate, D-glucuronic acid, and folic acid are natural alternatives with individual characteristics that may provide nutritional support to the patient with osteoarthritis.

### GLUCOSAMINE SULFATE

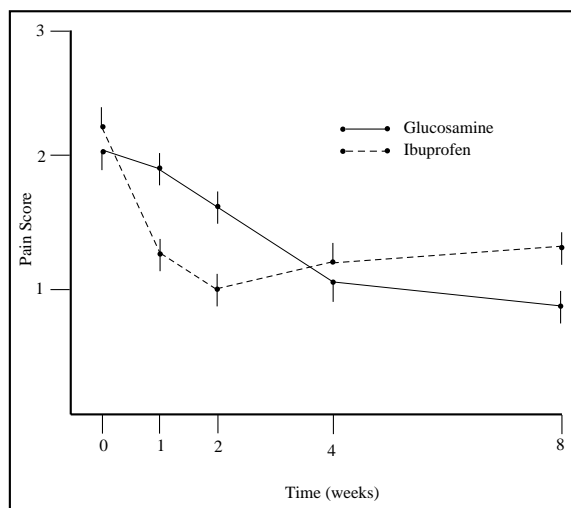
Glucosamine sulfate is a naturally occurring substance that provides nutritional support to those suffering from osteoarthritis. Classified as a chondroprotective agent, glucosamine sulfate may help to relieve symptoms of osteoarthritis and may even help stop the progression of the disease as well.<sup>1</sup>

Glucosamine is a key compound of the ground substance that makes up connective tissue.<sup>6</sup> It is this ground substance — called proteoglycans — that determines the strength and resiliency of connective tissue. Glucosamine is the preferred substrate and stimulant for proteoglycan synthesis and, at the same time, inhibits proteoglycan degradation.

Some studies show glucosamine sulfate may be more effective than placebo and may be as effective as NSAIDs in relieving the pain and inflammation of osteoarthritis.<sup>2-5</sup> D'Ambrosio et al. divided 30 patients with chronic degenerative articular disorders into 2 groups: group one received glucosamine sulfate therapy by injection for 7 days, followed by oral glucosamine for 2 weeks. Meanwhile, group two received injections of piperazine/chlorbutanol for 7 days, followed by 2 weeks of oral placebo.<sup>2</sup> The researchers observed marked symptomatic improvement in the patients who received glucosamine sulfate compared to those who received placebo. In other studies, Pujalte et al. reported similar results,<sup>3</sup> as did Crolle and D'Este, who recommend that glucosamine sulfate be considered as basic therapy for primary or secondary osteoarthrosis for relieving symptoms and restoring articular function.<sup>4</sup>

Vaz also reported positive results in a double-blind trial which compared the effectiveness of glucosamine sulfate with that of ibuprofen.<sup>5</sup> Although early response was faster with ibuprofen, the improvements with glucosamine sulfate were more consistent and progressive,

leading to significantly lower pain scores by the end of the 8 week study period (Figure 1). In none of the above investigations were complaints or significant adverse reactions noted.



**Figure 1.** Changes in pain score during the trial period: mean (± S.D.) scores. Adapted from *Curr Med Res Opin*, 1982.

Injectable, parenteral, and orally-administered glucosamine sulfate appears to be very well-tolerated, with no contraindication and no interactions with other drugs and medications. Given the positive clinical response to glucosamine sulfate, many physicians might agree with D'Ambrosia et al. that it appears to be a "first choice for the basic and long-term treatment of primary or secondary osteoarthrosic disorders."<sup>2</sup>

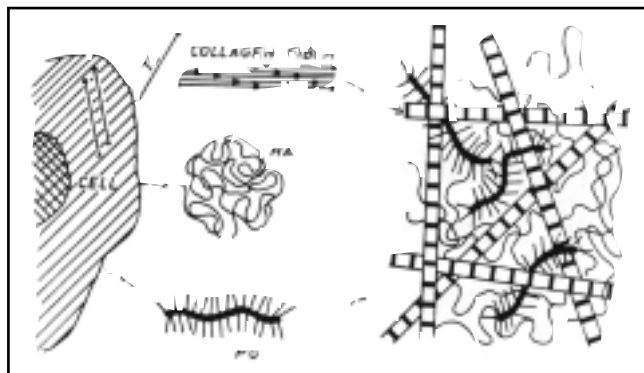
### D-GLUCURONIC ACID: ANTIOXIDANT PROTECTION FOR THE JOINTS

D-glucuronic acid and N-acetyl glucosamine make up hyaluronic acid — a mucopolysaccharide found in the intercellular fluid of various tissues, including synovial fluid, the vitreous humor of the eye, the umbilical cord, and loose connective tissue (Figure 2). Sato et al. demonstrated that hyaluronic acid and D-glucuronic acid act as free radical scavengers on Reactive Oxygen Species (ROS) in a dose-dependent manner, providing protection of synovial tissues in patients with rheumatoid arthritis.<sup>7</sup> This study demonstrated that the scavenger activity was greatest within the synovial fluid. The researchers believe the ROS scavenger ability may be due to the D-glucuronic acid in the hyaluronic acid, not the N-acetyl glucosamine. It appears that healthy synovial fluid contains other antioxidant substances such as superoxide dismutase, catalase, peroxidase, and/or other undefined antioxidants such as albumin, flavonoids, alpha-tocopherol, ascorbic acid, polyphenols, and tannin.<sup>8</sup>

### FOLIC ACID/VITAMIN B<sub>12</sub>

Although controversial, dietary causes have been implicated with the onset of both osteoarthritis and

rheumatoid arthritis. Recently, in a double-blind placebo-controlled trial Flynn et al. discovered that folic acid and vitamin B<sub>12</sub> were useful in alleviating some arthritic symptoms.<sup>9</sup> Volunteers who had been diagnosed with osteoarthritis of the hands for an average of 5.7 years were randomly allocated 6,400 mcg of folic acid per day, 6,400 mcg



**Figure 2.** Interstitial matrix components are formed intracellularly, transported to interstitial spaces, and polymerized to form a framework of interpenetrating macromolecules. Collagen fibers are formed from topocollogen (TC), whereas glycosaminoglycans form from hyaluronic acid (HA) and proteoglycan (PG).

of folic acid plus 20 mcg of vitamin B<sub>12</sub>, or a placebo for a period of 2 months. Pain, which was treated with NSAIDs prior to the study, was treated with acetaminophen as needed during the study. All subjects who consumed the B<sub>12</sub>/folate combination experienced greater "hand grip strength" values than those consuming only folic acid or placebo. Also, the number of tender joints were less with the B<sub>12</sub>/folate combination compared to just folic acid, placebo, or when the volunteers were using NSAIDs. The researchers reported no side effects from the vitamin combination and also noted the low cost of vitamins compared to NSAIDs.

### REFERENCES

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