

## Supplement Sampler Glucosamine Chondroitin

### **Best Indications**

- Osteoarthritis (OA), knee pain

### **Mechanism of Action**

Glucosamine and chondroitin are proteins involved in the production of the structural joint matrix, including cartilage, synovial fluid, and connective tissue. Both proteins may prevent cartilage destruction, as chondroitin is known to inhibit certain enzymes including leukocyte elastase involved in this process. Both glucosamine and chondroitin come in many forms such as glucosamine hydrochloride, glucosamine sulfate, and chondroitin sulfate; controversy exists over their specific mechanisms of action, absorption, and effectiveness in treating osteoarthritis.

### **Best Studies**

#### Glucosamine

Two randomized controlled trials (RCT) showed that taking 1500 mg of glucosamine sulfate daily for three years significantly reduced progression of knee osteoarthritis compared to placebo.<sup>1,2</sup> This conclusion was based on measurements of joint space narrowing on knee x-rays. Both studies reported improved pain and function in patients taking glucosamine.

In their review of the evidence, The Natural Medicines Comprehensive Database concluded that glucosamine hydrochloride was not helpful in pain reduction for patients with osteoarthritis, although did not comment on the evidence for glucosamine sulfate.<sup>3</sup>

A Cochrane Review of 25 studies with 4963 patients examined the use of glucosamine (primarily glucosamine sulfate, most commonly dosed at 1500 mg per day) in osteoarthritis of the knee. Authors concluded that studies using glucosamine sulfate manufactured by the Rotta brand showed significant improvement in pain and function compared to placebo, while glucosamine produced by other companies did not demonstrate significant results.<sup>4</sup>

#### Chondroitin

A RCT demonstrated significant improvement in pain and function for 162 symptomatic patients with osteoarthritis of the hand after taking chondroitin sulfate 800 mg daily for six months when compared to placebo.<sup>5</sup>

Another RTC showed no improvement in pain or function in patients with knee osteoarthritis taking chondroitin sulfate 800 mg daily for 2 years compared to placebo.<sup>6</sup> However, joint space measurements were significantly improved in the group taking chondroitin, suggesting its possible role in slowing disease progression.



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## Glucosamine Chondroitin

Meta-analyses of 7 RTCs examining the use of chondroitin sulfate in the treatment of osteoarthritis found that its use for greater than 4 months was associated with a significant symptomatic improvement.<sup>7</sup> However, the chondroitin was given along with additional pain medications that could have affected the results.

Results from a Cochrane Review evaluating the effectiveness of chondroitin for the treatment of osteoarthritis are pending.<sup>8</sup>

### Glucosamine/Chondroitin

Meta-analysis of 15 RTCs that assessed the effectiveness of glucosamine sulfate (typically 1500 mg daily for 3 months to 3 years) or chondroitin sulfate (800-2000 mg daily for 3 months to 1 year) reported a significant improvement in OA symptoms. Additionally, glucosamine sulfate was found to improve joint space narrowing.<sup>9</sup>

The Glucosamine/Chondroitin Arthritis Intervention Trial (GAIT) studied the use of glucosamine hydrochloride alone (1500 mg), chondroitin sulfate alone (1200 mg), and the combination of both for six months in 1500 people with osteoarthritis knee pain. Although participants with more significant pain (moderate to severe OA) reported a 22% pain reduction, there was no difference in pain compared to placebo or nonsteroidal anti-inflammatory medication.<sup>10</sup> Of note, the form of glucosamine (hydrochloride) used in this trial is less commonly used and studied.

### Dose

Glucosamine – Take 500 mg three times daily (or single daily dose of 1500-2000 mg).

Chondroitin – Take 400 mg two to three times daily (or single daily dose of 1000-1200 mg).

### Side Effects

Glucosamine – Well-tolerated, although can cause abdominal cramping, gas, and bloating. Some patients with diabetes report high blood sugars while taking glucosamine, although evidence shows no effect on glucose or hemoglobin A1C. Avoid with a shellfish allergy, as glucosamine is made from crustacean shells.

Chondroitin – Well-tolerated, although can cause nausea and heartburn. Commonly made from bovine trachea.

Taking glucosamine alone or with chondroitin may increase the effects of warfarin (Coumadin) resulting in a higher risk of bruising and bleeding.

### Cost

Typically \$15-17/ month supply.

### Clinical Bottom Line

Evidence is controversial but suggests that glucosamine sulfate and even chondroitin may reduce pain and decrease progression of knee and hand osteoarthritis. Due to low cost and minimal side effects compared to other interventions, consider a trial of glucosamine sulfate and chondroitin for 3-6 months.



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## Glucosamine Chondroitin

### **References**

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