

Glucosamine Sulfate

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Glucosamine is a naturally occurring substance that is found in high amounts in the connective tissues such as joint and spine cartilage, ligaments, tendons, mucus membranes, blood vessels, heart valves and eyes. Supplemental glucosamine is derived from the shells of shrimp and crab, with a purification method that makes allergies to shellfish unlikely.

Both Glucosamine Sulfate and Glucosamine HCl have been used for supplementation, but the majority of studies have used the sulfate form. The sulfate itself provides sulfur, an important and essential nutrient, which provides its own benefits, as a precursor to collagen and various other supporting structures in the body, and supporting detoxification pathways.

Glucosamine sulfate is absorbed 90% after oral administration. It stays elevated in the plasma for about an hour. Consequently, administration in divided doses of 1000 mg at a time throughout the day is recommended. Studies have shown the minimum dose of 1500 mg per day to have multiple benefits as shown below:

GLUCOSAMINE FOR JOINT SUPPORT

Many studies, including double blind placebo controlled trials, have clearly shown that glucosamine sulfate supplementation benefits **osteoarthritis** as follows:

1. It prevents the narrowing of the inter joint spaces. Studies showed even an increase of this space in certain subjects of up to +0.14 mm, whereas placebo patients experienced a progressive narrowing of it (from -0.4 to -0.1mm) per year (data from a study that lasted for three years that used 1500 mg/day).¹⁷ This effect is actually classified by many authors of studies as *disease modifying*, as opposed to typical pharmaceutical interventions that have only a symptomatic relieving effect.^{1-5, 17} Glucosamines were also found to alleviate arthritis of the lumbar spine.¹³
2. It reduces joint swelling.
3. It reduces pain, comparable to NSAIDS such as ibuprofen. This effect tends to occur after 4-8 weeks for glucosamines as opposed to after 2 weeks for NSAIDS, but it gets progressively better in time with glucosamine, which eventually outperforms the NSAIDS without side effects. Also, the pain relief experienced from glucosamine supplementation lasts up to 8 weeks after discontinuation.¹⁴

Glucosamine sulfate supplementation is also believed to help with **rheumatoid arthritis** by supporting the repair of the joints and thus compensating partially for the destruction caused by the auto-immune process.^{10, 11} NSAIDS are not ideal to use in this case because of their potential to worsen the leaky gut condition that may be part of the cause of rheumatoid arthritis.^{8, 9}

Be aware that alcohol and NSAIDS can inhibit the conversion of Glucosamine to N-Acetyl Glucosamine (NAG), which is a necessary step for glucosamine utilization in the body.

SYNERGY OF GLUCOSAMINE WITH MSM¹⁹

A recent randomized, double-blind, parallel, placebo-controlled study employed 500 mg of glucosamine sulfate and 500 mg of MSM three times daily, alone or in combination for 12 weeks. The results demonstrated a great improvement on pain and swelling in all interventions and proof of synergy or additive effect in the glucosamine and MSM group as follows:

1. Glucosamine alone group - a 65% reduction in pain
2. MSM group - a 51% reduction in pain
3. MSM + Glucosamine group - 78% reduction in pain, and 90% reduction in swelling with a more rapid onset of reduced pain and inflammation than for any compound alone.

MECHANISM OF ACTION OF GLUCOSAMINE

Glucosamine supplementation benefits the skeletal system in the following ways:

1. Provides precursors for the continuous repair of joint and spine cartilage, ligaments, and tendons by stimulating the formation of glycosaminoglycans, mucopolysaccharides and hyaluronic acid.¹⁴
2. Stimulates formation and secretion of synovial fluid, which acts as a lubricant for the joints.¹⁴
3. Stimulates the production of protective mucus for the intestinal tract, which is especially important for users of NSAIDs and those with leaky gut conditions (relevant to rheumatoid arthritis).^{8, 9}
4. Glucosamine prevents excessive elevation of the COX-2 enzyme above normal levels indirectly by inhibiting IL-1 beta, which is a trigger for inflammation by inducing the excessive expression of COX-2.⁶

GLUCOSAMINE FOR HYALURONIC ACID PRODUCTION-SKIN AND WOUND HEALING

“Glucosamine appears to be the rate-limiting substrate for hyaluronic acid production”,^{20, 21} which is essential for wound healing and skin health.

GLUCOSAMINE FOR SUPPORT OF GLAUCOMA

Primary open-angle glaucoma may be a consequence of weak trabecular mesh, which controls ocular fluids. Glucosamine supplementation may be helpful in supporting these structures.²²

OTHER FACTS

Other nutrients have been shown in studies to be effective in altering the course of arthritis and may be great adjuncts to glucosamine supplementation: GLA, fish oil/cod liver oil, SAM-e and green tea.^{15, 16}

“Anti-inflammatory drugs (prescription and over-the-counter, which include Advil®, Motrin®, Aleve®, Ordus®, Aspirin, and over 20 others) alone cause over 16,500 deaths and over 103,000 hospitalizations per year in the US”, according to a review article published in the New England Journal of Medicine. Clearly you can see that for long term care, simply controlling your pain with NSAIDs is not the solution, particularly in light of how toxic they can potentially be. Vioxx® was voluntarily taken off the market by Merck. Celebrex® works in the same manner. The main concern about COX-2 specific drugs is their potential for blood clotting - which can increase the risk of strokes and/or heart attacks.

SUGGESTED USAGE

One DFH Glucosamine capsule provides 1000 mg or 1 gram of actual glucosamine. 1-2 per meal is most often recommended by doctors. See the Designs for Health OsteoArthritis Nutritional Support Protocol for more details.

Be aware of the variability of actual glucosamine content among glucosamine products available on the market. One study found that the amount contained ranged from 0%-115% of the amount claimed on the label.¹²

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