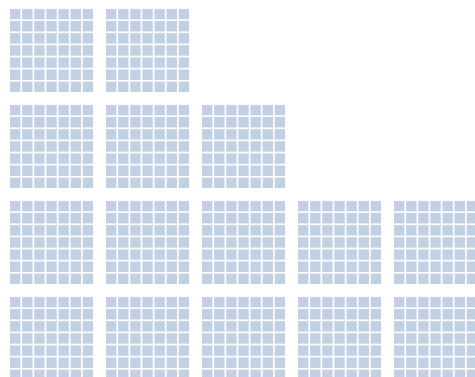




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Glucosamine Sulfate and Chondroitin Sulfate

- Decker Weiss, NMD, AACVPR

Osteoarthritis is the most prevalent form of arthritis in the U.S., according to the Arthritis Foundation. One-third of all American adults have X-ray evidence of osteoarthritis of the hand, foot, knee, or hip. Osteoarthritis is responsible for more than 7 million physician visits per year and is second only to cardiovascular disease as the cause of chronic disability in adults. As Baby Boomers age, the number of people suffering from osteoarthritis is expected to rapidly increase in the next 10 years.² While osteoarthritis research has led to the development of promising new prescription and over-the-counter medications aimed at reducing pain, none has created the excitement of glucosamine sulfate (GS), which actually addresses the underlying joint destruction.⁵

Q. What is osteoarthritis?

A. Osteoarthritis is a complex, metabolic disorder of the cartilage and bones of certain joints.^{1,4} However, to fully understand how osteoarthritis develops, we need to understand how joints work.

A joint is formed when two or more bones are brought together and held in place by muscles and tendons. Some joints have very little range of movement, such as the joints of the ribs, while others have much more range of movement. Hips, knees, elbows, wrists, and thumbs are termed synovial joints, and have the greatest range of movement and mobility of human joints. To allow such mobility, synovial joints have a unique structure.¹¹

The bones that form synovial joints are covered with cartilage. Tough fibrous tissue encloses the area between the bone ends and is called the joint capsule. The joint cavity within the capsule is lined with an inner membrane, called the synovial membrane. The membrane secretes synovial fluid, a thick, slippery fluid that fills the small space around and between the two bones. This fluid contains many substances that lubricate the joint and ease movement.^{4,11}

The cartilage of synovial joints serves two very important functions. First, it provides a remarkably smooth weight-bearing surface; synovial joints move easily. Secondly, synovial cartilage serves as a shock absorber, providing a soft, flexible foundation. Healthy cartilage absorbs the force of the energy, transmits the load to the bone, and distributes the mechanical stress created by joint movement.^{4,11}

Synovial joints function under almost continual mechanical stress. A joint's ability to withstand or resist this stress is a reflection of its health. When the mechanical stress is too great or the joint's ability to resist this stress is compromised, physical changes occur in the cartilage covering the bones.^{4,11}

Cartilage is a tough, elastic tissue, comprised mostly of water, collagen, and complex proteins called proteoglycans.¹² In osteoarthritis, the cartilage starts to weaken, becomes

frayed, and eventually breaks down. This exposes the bones of the joint, which then rub together. A gritty feeling and grinding sound may occur when an osteoarthritic joint is bent and flexed. As osteoarthritis progresses, bits of bone and cartilage often break off and float inside the joint space. The bones may enlarge, causing the joint to lose its normal shape. Tiny bone spurs may grow on the joints' sides and edges. These physical changes in the diseased joint are responsible for progressive damage and continual pain.^{4,13}

People with osteoarthritis most frequently describe their pain as deep and aching. The pain not only is felt in the affected joint but may also be present in the surrounding and supporting muscles.³ Joint inflammation also may occur, increasing the already considerable discomfort.^{1,4} Joint stiffness is another unfortunate component of osteoarthritis. Exercising the joint most often results in increased pain; however, stiffness tends to follow periods of inactivity.⁴ Humid weather often makes all osteoarthritis symptoms worse.³ As the disease progresses, the pain may occur even when the joint is at rest, creating sleepless nights and miserable days.^{3,4}

Q. What causes osteoarthritis?

A. Osteoarthritis' exact cause remains unknown. Researchers know aging doesn't appear to cause osteoarthritis. Cartilage in people with the disease show many destructive changes not seen in older persons without the disease.^{1,4,13} However, certain conditions do seem to trigger osteoarthritis or make it worse.

Some families seem to have a lot of osteoarthritis, pointing to a genetic factor. This is most commonly seen in people who have osteoarthritis of the hands.⁴ Repeated trauma can contribute to osteoarthritis, too. Athletes, extremely active people, and individuals who have physically demanding jobs often develop the disease. Persons who have certain bone disorders are more prone to osteoarthritis due to the continuous, uneven stress in their hips and knees.^{4,13}

Obesity is also a risk factor for the disease. In overweight women, osteoarthritis of the knee is fairly common.¹³ Excess pounds also may have a direct metabolic effect on cartilage beyond the effects of increased joint stress.^{14,15} Obese people also often have more dense bones. Research has shown dense bones may provide less shock-absorbing function than thinner bones, allowing more direct trauma to the cartilage.¹⁶

Q. Can osteoarthritis be prevented?

A. While there is currently no sure way to prevent osteoarthritis or slow its progression, some lifestyle changes may reduce or delay symptoms. The Arthritis Foundation states that maintaining a

healthy weight, losing weight if needed, and regular exercise are effective osteoarthritis prevention measures.¹

Optimal calcium intake in younger years is vital to ensure a healthy aging skeletal system.¹⁷⁻¹⁹ Vitamins A, C, D, and E have been studied for their role in osteoarthritis prevention. These vitamins also have shown benefit in individuals who have osteoarthritis.²⁰⁻²²

Q. What treatments are available for osteoarthritis?

A. The goal of treatment is to reduce or relieve pain, maintain or improve movement, and minimize any potential permanent disability.⁴ Typically, nonsteroidal anti-inflammatory drugs or NSAID's (pronounced "n-sayds") such as aspirin and ibuprofen are used for pain and inflammation relief. These medications are effective in treating only the pain of osteoarthritis.³

These medications have many side effects, some of which are serious. NSAID-induced gastrointestinal complications cause more than 100,000 hospitalizations and nearly 16,500 deaths annually in the U.S.²³ Aspirin can cause an extremely annoying and continual ringing in the ears. NSAID's frequently cause damage to the stomach lining, which can produce uncomfortable heartburn and abdominal pain. Continued NSAID use may lead to the development of stomach ulcers. NSAID-related ulcers can perforate the stomach lining and cause life-threatening bleeding.³ Most NSAID's also interfere with blood clotting and may cause kidney damage. When older persons take NSAID's, dizziness, drowsiness, memory loss, and decreased attention span may occur.³

Acetaminophen (Tylenol® and similar medications) is similar to aspirin and other NSAID's in its pain-relief abilities. However, acetaminophen doesn't reduce inflammation.²⁴ And while acetaminophen doesn't have the same side effects of aspirin and other NSAID's, if large doses are taken, liver damage can occur.²³

Newer medications called COX-2 inhibitors provide both pain relief and reduce inflammation without the many side effects of acetaminophen, aspirin, and other NSAID's.^{25,26} More recent research has indicated that, in certain situations, COX-2 inhibitors also can cause stomach lining damage and bleeding.^{27,28} While aspirin, NSAID's, and COX-2 inhibitors may reduce osteoarthritis pain, they do nothing to stop or slow down cartilage deterioration. In other words, these medications have no effect on the disease itself.²⁴

That is why many believe glucosamine sulfate (GS) and chondroitin sulfate (CS) are preferable to pain relievers and anti-inflammatory medications in osteoarthritis treatment: they actually improve synovial joint health.¹² And they do this without potentially life-threatening side effects.

Q. How do GS and CS work?

A. GS improves the health of joints affected by osteoarthritis. This supplement is so effective that even physicians who mostly rely on conventional medications routinely recommend it to their patients with osteoarthritis. In fact, GS is so good at treating osteoarthritis, many physicians use it for their own osteoarthritic joints.²⁹

There is even more good news. When glucosamine sulfate is combined with low-molecular weight CS, even greater benefits can be achieved. GS and CS are naturally occurring compounds found in human joints.^{6,7} The right GS/CS combination actually reverses damage in joints affected by osteoarthritis, in turn significantly reducing pain and stiffness.⁸⁻¹⁰

Glucosamine occurs naturally in the body and is found in synovial fluid. Glucosamine is a basic building block for proteoglycan, one of the important compounds of synovial cartilage.^{5,30,31} It also is required for the formation of lubricants and protective agents for the joints.³⁰

In Europe, GS and CS have been used to treat osteoarthritis for more than 10 years. While persons with arthritis felt much better when they took GS and CS, no one really knew how these compounds worked. When European and American researchers first started to study glucosamine, they discovered GS can reduce synovial joint inflammation. This explains why people felt better after taking it.

Q. What has additional study of GS and CS revealed?

A. As the scientific study of GS progressed, researchers determined it can stimulate the growth of cartilage cells,³² inhibit proteoglycan breakdown, and rebuild cartilage damaged from osteoarthritis.^{5,30,31} In other words, GS does not simply make persons with osteoarthritis feel better; GS actually makes persons with osteoarthritis get better.

GS is the form of glucosamine used in research. It's the sulfate salt of glucosamine and breaks down into glucosamine and sulfate ions in the body.³² The sulfate part of GS plays an important role in proteoglycan synthesis.³⁰

CS also provides cartilage strength and resilience.⁹ CS is an important component of the cartilage proteoglycan of synovial joints. Because CS helps the production of proteoglycans, researchers believe CS works in a similar nature to GS.^{9,10}

Q. Couldn't GS and CS be taken on their own? Is there any benefit in taking them together?

A. Research has discovered GS and CS act synergistically (work well together) in improving joint health. Several studies have investigated this action³²⁻³⁷ and it's recommended that GS and CS be taken together. However, there may be times when your healthcare

practitioner may recommend using one or the other, but not both GS and CS together. Please follow their recommendations to obtain the best results for your own unique health concerns. Low-molecular weight chondroitin sulfate (CS) is the preferred CS form, and the form that has shown the most promise in studies.

Q. Why is it important to take low-molecular weight CS?

A. When CS was first studied, it was given to six healthy volunteers, six patients with rheumatoid arthritis, and six patients with osteoarthritis. Researchers then measured the levels of CS in all study subjects. They found no evidence of CS in any of the subjects.³⁸ This single study led many physicians and scientists to believe CS can't be absorbed, and was not an effective natural treatment.

However, several other studies in healthy volunteers have reported CS can be absorbed.³⁹⁻⁴³ The distinct difference for these findings is thought to be associated with the types of CS used in the studies. Some forms are much more absorbable than others. This was demonstrated in a recent study using CS with lower molecular weight. A higher absorption is observed for low-molecular weight CS.⁴³

This means CS products with a low-molecular weight may be better absorbed, allowing the CS to get into the bloodstream and the synovial fluid of joints where it's needed.

Q. Are there other supplements that can help osteoarthritis?

A. Several vitamins, minerals, enzymes, and natural supplements have benefits for individuals with osteoarthritis. Proteolytic enzymes effectively offer relief of the pain, stiffness, and swelling of osteoarthritis.

Folic acid and vitamin B12 can reduce the number of tender joints and increase joint mobility.⁴³ Vitamins C, D, and E not only may prevent osteoarthritis, but inhibit the disease's progression.^{22,44} Niacinamide improves joint function, range of motion, and muscle strength.⁴⁵ Clinical studies using the herb *Boswellia serrata* have yielded good results in osteoarthritis.⁴⁶

Application of ointments on osteoarthritic joints may be helpful in reducing pain and stiffness. Menthol-based preparations can provide soothing relief to painful joints. Capsaicin ointments and gel made from cayenne pepper also are very beneficial. When applied to the skin, capsaicin first stimulates, then blocks, nerve fibers that transmit pain messages. Capsaicin depletes nerve fibers of a neurotransmitter called substance P. This neurotransmitter transmits pain messages and activates inflammation in osteoarthritis. Capsaicin ointment is very effective in relieving osteoarthritis pain in many individuals.^{47,48}

Q. Is there anything else I can do for joint pain and stiffness?

A. When osteoarthritis occurs in the hands, use of a paraffin dip can be very comforting.¹ A licensed health care practitioner can provide information about how to safely use paraffin dips at home.

Exercise is an excellent way to keep joints mobile, decrease pain, and increase body strength, too. Water aerobics also can reduce the pressure and stress on joints.^{49,50}

The Arthritis Foundation strongly suggests making movement an integral part of your life. When you're in less pain and have more energy, more range-of-motion, and a better outlook on life, you'll reduce stress and be a much healthier person despite your osteoarthritis.

One important last thought. When we don't feel well, we sometimes have a tendency to self-diagnose. If you haven't been evaluated by a licensed health care practitioner for your joint pain and stiffness, you need to do so. These symptoms may be caused by other illnesses and may require much different treatment. Only a licensed health care practitioner can provide a certain diagnosis of osteoarthritis.

Conclusion

Osteoarthritis may be a part of life for many of us as we age; however, constant pain and stiffness need not be. GS combined with absorbable CS can actually improve damage in joints affected by osteoarthritis and significantly reduce pain and stiffness. And it can be an empowering way to improve your health.

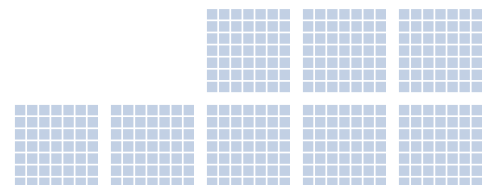
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