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ASK THE DOCTOR

Answers to Your Health Questions

Michael T. Murray, N.D., is a leading researcher and author in the field of natural medicine. He is co-author of *The Encyclopedia of Natural Medicine*, and sole author of several books, including his latest *Natural Alternatives to Over-the-Counter and Prescription Drugs*, *The Healing Power of Herbs*, and *Natural Alternatives to Prozac*

Natural Relief For Osteoarthritis

by Michael T. Murray, N.D.

The most common form of arthritis is osteoarthritis, which is also known as degenerative joint disease. It is seen primarily, but not exclusively, in the elderly. Surveys have indicated that over 40 million Americans have osteoarthritis, including 80 percent of persons over the age of 50.

The weight-bearing joints, like the knees, hips, and joints of the hands, are those most often affected with osteoarthritis. In affected joints, there is much cartilage destruction followed by hardening and the formation of large bone spurs in the joint margins. Pain, deformity, and limitation of motion in the joint results.

The onset of osteoarthritis can be very subtle; morning joint stiffness is often the first symptom. As the disease progresses, there is pain on motion of the involved joint that is made worse by prolonged activity and relieved by rest.

What causes osteoarthritis?

The cumulative effects of decades of use leads to degenerative changes in joints. This damage is compounded by a decreased ability to repair joint structures. Specifically, with aging, there is a decreased ability to restore and manufacture normal joint structures like cartilage. As we age, the number as well as the activity of

important repair enzymes is greatly reduced, making joint structures especially prone to damage.

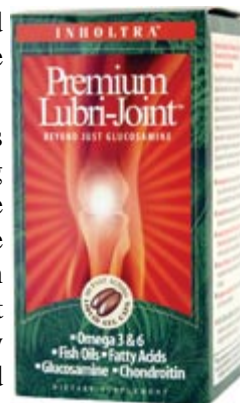
Arthritis medications

Research is indicating that current drugs being used in osteoarthritis may be producing short-term benefit, but actually accelerating the progression of the joint destruction. The first drug used in the treatment of osteoarthritis is aspirin. It is often quite effective in relieving both pain and inflammation, and is also relatively inexpensive. However, since the therapeutic dose required is somewhat high (two to four grams per day), toxicity often occurs. Tinnitus (ringing in the ears) and gastric irritation are early manifestations of toxicity.

Other nonsteroidal anti-inflammatory drugs (NSAIDs) are often used, especially when aspirin is ineffective or intolerable. The following are representative of this class of drugs: ibuprofen (Motrin), fenoprofen (Nalfon), indomethacin (Indocin), naproxen (Naprosyn), tolmetin (Tolectin), and sulan.

What is an arthritis sufferer to do?

A naturally occurring substance found in high concentrations in joint structures appears to be nature's best



remedy for osteoarthritis. This compound is glucosamine sulfate.

When taken as a nutritional supplement, glucosamine sulfate appears to be nature's best remedy for osteoarthritis. In the body, the main action of glucosamine on joints is to stimulate the manufacture of cartilage components. In other words, glucosamine is responsible for stimulating the manufacture of substances necessary for joint repair.

It appears that as people age, they lose the ability to manufacture sufficient levels of glucosamine. The result is that cartilage loses its ability to hold water and act as a shock absorber. The inability to manufacture glucosamine has been suggested to be the major factor leading to osteoarthritis. This link led researchers in Europe to ask an important question, "What would happen if individuals with osteoarthritis took glucosamine?" The results have been astonishing.

Numerous double-blind studies have shown glucosamine sulfate to produce much better results compared to NSAIDs and placebos in relieving the pain and inflammation of osteoarthritis, despite the fact that glucosamine sulfate exhibits very little direct anti-inflammatory effect and no direct analgesic or pain-relieving effects. While NSAIDs offer purely symptomatic relief and may actually promote the disease process, glucosamine sulfate addresses the cause of osteoarthritis. By getting at the root of the problem, glucosamine sulfate not only improves the symptoms, it also helps the body repair damaged joints. This effect is outstanding, especially when glucosamine's safety and lack of side effects is considered.

One thing that must be pointed

out is the beneficial results with glucosamine are more obvious the longer it is used. Because glucosamine sulfate is not an anti-inflammatory or pain-relieving drug, it takes awhile longer to produce results. But once it starts working, it will produce much better results compared to NSAIDs. For example, in one study that compared glucosamine sulfate to ibuprofen (Motrin), pain scores decreased faster in the ibuprofen group; however, by week four, the group receiving the glucosamine sulfate was doing significantly better than the ibuprofen group.

Glucosamine sulfate products are available at health food stores or through nutritionally oriented physicians. Be sure to use glucosamine sulfate versus glucosamine hydrochloride or N-acetylglucosamine, as the scientific studies were performed with the sulfate form. The standard dose for glucosamine sulfate is 500 mg three times per day.

As mentioned earlier, glucosamine sulfate is extremely well-tolerated. In addition, there are no contraindications or adverse reactions when used with drugs. Glucosamine sulfate may cause some gastrointestinal upset (nausea, heartburn, etc.) in rare instances. If this occurs, try taking it with meals.

Glucosamine sulfate vs. cartilage extracts

Cartilage extracts, including purified chondroitin sulfate, sea cucumber, green-lipped mussel, and shark cartilage, are popular nutritional supplements in health food stores that may also help osteoarthritis by improving cartilage function. These compounds differ in their degree of purity and effectiveness in osteoarthritis compared to glucosamine sulfate.

Shark cartilage, sea cucumber, and green-lipped mussel contain a mixture of molecules known as glycosaminoglycans (GAGS) or mucopolychondroitin sulfate. One of the key GAGS is chondroitin sulfate. Chondroitin sulfate is composed of repeating units of glucosamine sulfate with attached sugar molecules. The difference between glucosamine sulfate, cartilage extracts, and chondroitin sulfate products is similar to the difference between crude ore (shark cartilage or chondroitin sulfate) and pure gold (glucosamine). While there is gold in crude ore, it is better to use the pure gold. If you are trying to restore cartilage and joint structures, it is best to use glucosamine sulfate rather than chondroitin sulfate or shark cartilage.

The major reason is the improved absorption of glucosamine sulfate. Cartilage extracts, shark cartilage, green-lipped mussel, sea cucumber, and chondroitin sulfate products are composed of large molecules that are extremely difficult to absorb. The absorption rate for chondroitin sulfate, the smallest molecule in these products, is estimated to be between zero and eight percent. In contrast, 98 percent of orally administered glucosamine sulfate is absorbed intact. Since chondroitin sulfate is 200 times larger than glucosamine sulfate, the difference in absorption is similar to trying to swallow a watermelon whole (chondroitin sulfate) versus a sesame seed (glucosamine sulfate). After glucosamine sulfate is absorbed, it is preferentially taken up by cartilage and other joint structures where it stimulates the manufacture of chondroitin sulfate and other mucopolysaccharides. Glucosamine sulfate is extremely effective

when given orally. In contrast, the effectiveness of oral chondroitin sulfate, green-lipped mussel, sea cucumber, and shark cartilage in osteoarthritis is a subject of considerable debate. Most of the positive clinical studies with glycosaminoglycans preparations have utilized injectable forms. The use of pharmaceutical grade cartilage preparations and chondroitin sulfate injections, according to established protocols, has well-documented benefit. Unfortunately, this therapy is currently not available in the United States.

When all is considered, it is quite easy to see why glucosamine sulfate is preferred to cartilage extracts in the treatment of osteoarthritis.

Summary

The case of osteoarthritis is a classic example where current medical treatment simply suppresses symptoms. And, since it doesn't address the underlying cause, it actually promotes the disease process.

The use of glucosamine sulfate is a classic example of how a natural substance improves a condition by addressing the underlying cause and supporting the body's ability to heal itself.

To clarify the difference between glucosamine sulfate and other forms of glucosamine, we decided to ask Dr. Murray a series of questions.

HC: Dr. Murray, companies selling N-acetylglucosamine, commonly referred to as "NAG," have stated in product literature that NAG is better absorbed, more stable, and is better utilized than glucosamine sulfate. What are your feelings regarding these claims?

Dr. Murray: These contentions are without support in the scientific literature. Glucosamine sulfate is clearly the preferred form. Detailed human studies on the absorption, distribution, and elimination of orally administered

glucosamine sulfate have shown an absorption rate as high as 98 percent. Once absorbed, it is then distributed primarily to joint tissues, where it is incorporated into the connective tissue matrix of cartilage, ligaments, and tendons. In addition, there have been over 20 double-blind, placebo-controlled studies on glucosamine sulfate as a nutritional aid to humans.

HC: Are you saying that the body may not absorb NAG?

Dr. Murray: The absorption of NAG is questionable in humans for several reasons: NAG is quickly digested by intestinal bacteria, NAG is a known binder of dietary lectins in the gut with the resultant lectin-NAG complex being excreted in the feces, and a large percentage of NAG is broken down by intestinal cells.

HC: How is NAG different from glucosamine sulfate?

Dr. Murray: NAG differs from glucosamine sulfate in that, instead of a sulfur molecule, NAG has a portion of an acetic acid molecule attached to it. Glucosamine sulfate and NAG are entirely different molecules and appear to be handled by the body differently. The body preferentially utilizes glucosamine sulfate compared to NAG. There are mechanisms in the body which are designed specifically for the absorption and utilization of glucosamine sulfate. No such mechanisms exist for NAG.

HC: Another form of glucosamine that is now being marketed is glucosamine hydrochloride. What are your opinions on this form?

Dr. Murray: As with NAG, the research simply does not support the use of glucosamine hydrochloride. It appears that the sulfur component of glucosamine sulfate may be critical to the beneficial effects noted. Sulfur is an essential nutrient for joint tissue, where it functions in the stabilization of the connective

tissue matrix or cartilage, tendons, and ligaments. Therefore, it appears the sulfur portion of glucosamine sulfate is extremely important and is another reason why glucosamine sulfate is the preferred form of glucosamine.

HC: In light of the tremendous evidence favoring glucosamine sulfate over NAG, it is puzzling how distributors of NAG or glucosamine hydrochloride can claim superiority. How do they justify their statements?

Dr. Murray: The marketing information on NAG will often use the term slow acetylators to describe a very small group of individuals with Crohn's disease and ulcerative colitis who are unable to convert glucosamine sulfate to NAG as fast as individuals without these diseases. Glucosamine and NAG are necessary in the manufacture of mucin. Let's take a closer look at the study distributors of NAG use as evidence that NAG is better. The study demonstrated that when intestinal cells from patients with Crohn's disease or ulcerative colitis were bathed in a solution containing ten NAG molecules to one glucosamine molecule, the cells incorporated more NAG than the cells from individuals without these diseases. How distributors of NAG can then use this information to their benefit is puzzling, since the significance of this test tube study is unclear.

HC: Is there anything else that our readers should know about glucosamine sulfate?

Dr. Murray: Yes. In order for people to gain the benefit from many natural products, they must use the right form.

For example, I have talked to hundreds of men who have read my material on the use of Saw palmetto in the treatment of benign prostate enlargement who are either satisfied or dissatisfied. When I ask the dissatisfied men what product they are using, invariably they have not used the right form of Saw palmetto. It seems that even though I spell it out clearly that they need to be using the liposterolic extract of Saw palmetto standardized to contain 85 to 95 percent fatty acids and sterols at a dosage of 320 mg per day, many men will simply buy crude dried Saw palmetto berries in capsule form.

How does this relate to glucosamine? If people with osteoarthritis want to gain the benefits of glucosamine noted in the scientific studies, they had better make sure they are taking

500 mg of glucosamine sulfate three times daily.

Glucosamine sulfate and arthritis

According to a 1994 study featured in the British journal, *Osteoarthritis Cartilage*, glucosamine sulfate was as effective as ibuprofen in the treatment of osteoarthritis of the knee without side effects.

The study was a randomized, double-blind clinical trial featuring 200 hospitalized patients who had active osteoarthritis of the knee. Although improvement was quicker with the ibuprofen group, by the second week of treatment, both groups had similar improvements. While none of the patients taking the glucosamine sulfate reported any side effects, 35 percent of the group taking the ibuprofen experienced adverse reactions, with the most common being gastrointestinal upset.

Dosage of the ibuprofen was 400 mg twice a day and 500 mg of glucosamine sulfate twice a day for a four-week period. The

researchers concluded that their data confirms glucosamine sulfate is a safe alternative for the treatment of osteoarthritis.

Glucosamine sulfate is available without a prescription. It is also an ingredient in a variety of nutritional supplement formulations.

—*Osteoarthritis Cartilage* (United Kingdom), 1994, Vol. 2, No. 1

Look at the Evidence:	Glucosamine Sulfate	NAG	Glucosamine HCL
Active intestinal transport	YES	NO	YES
Detailed absorption studies	YES	NO	NO
Detailed clinical studies	YES	NO	NO
Contains sulfur molecule	YES	NO	NO
Long history of use	YES	NO	NO
Over 20 double-blind studies	YES	NO	NO