

The skeleton, made up of all the body's bones, provides strength, stability, and a frame for muscles to work within to produce movement. Bones come together to form joints, most of which are in constant motion. The ends of bones are covered with cartilage, a smooth, tough, protective tissue that acts as a shock absorber and reduces friction. The skin acts as a protective barrier to the outside world. Skin also helps to regulate body temperature, senses painful and pleasant stimuli, and shields us from the sun's harmful effects.

Today, we are seeing increasing incidences of problems with the musculoskeletal system. We can help ourselves maintain our "body frame" health through nutrition and supplements. One of the most powerful musculoskeletal supplements is glucosamine.



absorber, buffering our bones and body from the wear and tear of making thousands of movements per day. Cartilage is also slippery—five to eight times more slippery than ice. Thus, when two bones do meet, the cartilage at the ends of each bone allows them to slide off each other, adding to the buffering effect.

### The cartilage matrix

Cartilage is made up of three main components: Water (70 to 80 percent), collagen (10 to 15 percent), and proteoglycans (10 to 15 percent). Combined, these are called the cartilage matrix. The cartilage matrix is where new cartilage is born.

As we have seen, water provides cartilage with buffering qualities, and also helps shape the "cartilage" sponge. It also feeds the cartilage. Cartilage contains no blood vessels, so the soaking up and squeezing out of water is what provides cartilage with nutrients.

Collagen also plays a role in giving cartilage its shape and resiliency, and it also absorbs shock. Think of collagen as super strong threads that create the framework to hold the third component of cartilage: proteoglycans.

Proteoglycans are large water-soluble molecules. They are woven in among the collagen threads, forming a kind of netting. This netting traps the water. Proteoglycans also act like magnets. The individual molecules push away from each other, again allowing for space and a buffering effect.

Finally, tiny factories called chondrocytes are located throughout this netting. They produce new collagen and proteoglycans, as well as enzymes that dispose of older, past-their-prime collagen and proteoglycans.

### The role of glucosamine

Glucosamine stimulates chondrocytes to produce more collagen and proteoglycans. The more glucosamine there is, the more collagen and proteoglycans there are, and the more water can be absorbed. The end result is healthier cartilage. Because of these properties, glucosamine can help the body help itself repair damaged or eroded cartilage. It works at the cellular level to reinforce our natural "repair" ability.

## Glucosamine

Glucosamine is an aminosugar. It is made in the body from the simple carbohydrate glucose (sugar) and the amino acid glutamine. Although our bodies generally use glucose to produce energy, the aminosugars found in glucosamine are incorporated into the structure of body tissue. Glucosamine is involved in the formation of cartilage, nails, tendons, skin, eyes, bones, ligaments, and heart valves. It also plays a role in the mucous secretions of the digestive, respiratory, and urinary tracts. Of particular interest is its role in cartilage.

### Cartilage

Cartilage is connective tissue at the ends of bones (where it is known as articular cartilage). It separates bones so that they do not grind together, causing stiffness and pain. Cartilage also serves as a shock absorber. Briefly put, cartilage protects our bones from the wear and tear of movement.

One way to think of cartilage is as a super sponge. It soaks up water (more accurately, synovial fluid) when a joint is at rest, and squeezes out the water when a joint moves. As the joint rests again, it again soaks up water. This spongelike effect of cartilage makes it a shock

## When things go wrong

As we age, the millions of movements we have made in our lives begin to wear and tear on cartilage. Cartilage begins to deteriorate, and our bones begin to rub together. This becomes noticeable around age 45, and often happens in the fingers, knees, hips, neck, and lower back. Cartilage can also be destroyed through trauma, injury, and repetitive actions.

When cartilage is damaged, the chondrocytes go into high gear, manufacturing more proteoglycans and collagen. Unfortunately, these replacements may be of inferior quality, or be overproduced, resulting in bumpy joint surfaces. Chondrocytes also produce more of the enzymes that “eat away” old matter. These enzymes may begin attacking the new, inferior cartilage, with an end result of diminished cartilage, not more cartilage. This also may result in fewer proteoglycans, which means the cartilage cannot hold water well. The cartilage can then dry out and wear out more quickly.

The result is that we begin to feel our bones rubbing together during movement. We experience pain and stiffness.

## What to do

One way to counter the deterioration and destruction of cartilage is to increase the amount of glucosamine your body has—remember, glucosamine helps the body build and repair damaged cartilage. Glucosamine is not only a “builder” but also a painkiller. In sum, it improves joint function and reduces pain.

## Proof positive

Many clinical trials have demonstrated that glucosamine results in less pain due to cartilage deterioration and a wider range of movement.

The first studies were performed in the 1960s, using injectable forms of glucosamine sulfate. When glucosamine sulfate became available in pill form, research switched to this. Up to the present, most glucosamine studies have been performed outside of North America. In all of these studies, glucosamine sulfate proves to maintain joint health.

- An early study in Italy found that 20 percent of those using glucosamine sulfate became “symptom-free.” Nearly 25 percent had no restriction of active or passive movement. The researchers

concluded that glucosamine sulfate rebuilt damaged cartilage. *Clinical Therapeutics* 3, no. 4 (1980): 226-272.

- A large-scale study looked at over 1,200 patients with osteoarthritis. Results show that pain decreased throughout the trial, that both active and passive movement improved, and that glucosamine worked for six to 12 weeks after treatment. *Pharmatherapeutica* 3, no. 3 (1982): 157-168.
- In a study comparing glucosamine sulfate to the pain reliever ibuprofen, the ibuprofen proved more effective the first two weeks, but then faded. After eight weeks, the glucosamine sulfate group reported better results. *Current Medical Research and Opinion* 8, no. 3 (1982): 145-149.
- More recently, Italian researchers found glucosamine to be more effective than placebos or traditional NSAIDs (nonsteroidal anti-inflammatory drugs) in treating osteoarthritis. *Osteoarthritis and Cartilage* 5, supplement A (1997): 82.

It should be noted that although there are positive results in all of these studies, not all participants experience them. Thus, although glucosamine works for many people, it does not necessarily work for all people.

## AIM Frame Essentials®

AIM Frame Essentials® contains two types of glucosamine—glucosamine sulfate and glucosamine hydrochloride (HCL)—with methylsulfonylmethane (MSM) and boswellin extract. This unique formula provides you with an all-around product to maintain healthy joints and promote ease of movement.

## Glucosamine

Both glucosamine sulfate and glucosamine HCL are forms of glucosamine. Glucosamine makes up 63 percent of glucosamine sulfate and 83 percent of glucosamine HCL. Most human studies have used glucosamine sulfate. This is because the company that paid for the research developed this form. Glucosamine HCL has not been evaluated as extensively, but clinical experience from a variety of health practitioners indicates that glucosamine HCL works just as well. Many health practitioners recommend trying one, and if that does not work, trying the other. AIM Frame Essentials® gives you both of these at once.

## MSM (methylsulfonylmethane)

MSM is a biologically active form of the mineral sulfur. Sulfur is the fourth most plentiful mineral in the body and is found in every cell of the body. Sulfur plays a particularly important role in tissue structure. MSM is naturally present in foods and the human body. MSM has been used by veterinarians for more than 15 years, and use by humans goes back some 20 years.

The formation of MSM begins when marine algae release sulfur compounds that are transformed in ocean water into a substance known as dimethyl sulfide (DMS). DMS rises into the atmosphere where it is transformed into DMSO (dimethyl sulfoxide) and MSM. These compounds are returned by rainwater to the earth, where they are absorbed by plants.

MSM contributes to healthy joints because, as a form of sulfur, it adds to the benefits of glucosamine. It may aid glucosamine in its role in maintaining healthy cartilage as well as in helping to maintain joint flexibility and mobility. Many glucosamine users experience increased benefits when adding MSM to their supplement regimen.

## Boswellin extract

*Boswellia serrata* (Indian frankincense) has been used for centuries in the Indian Ayurvedic system of medicine to maintain healthy joints. This is still one of its main uses.

Boswellic acids improve blood supply to the joints and maintain the integrity of blood vessels. At least one study has indicated that they may open up collateral blood circulation to provide adequate blood supply to the joints.

Boswellic acids have been known to reduce joint swelling, maintain blood supply to inflamed joints, maintain mobility, and reduce pain due to stiffness in the joints. They also have no side effects.

## How to use AIM Frame Essentials®

- For optimal benefits, take 2 capsules in the morning and 2 capsules in the evening, for a total of 4 capsules per day. Best taken with meals. After experiencing the desired results, take 1 capsule in the morning and 1 capsule in the evening for maintenance.

- Shelf life is 2 years, sealed. Close tightly after opening and store in a cool, dry, dark place (70-75 °F; 20.1-23.8 °C). Do not refrigerate.

## Q & A

*May children and pregnant women take AIM Frame Essentials®? If so, in what amounts?*

There should be no reason for children to be using this product. Pregnant women should consult a health practitioner.

*What is the source of the glucosamine in AIM Frame Essentials®?*

The source of the glucosamine is marine shellfish.

*May I take AIM Frame Essentials® with other AIM products?*

Yes, you may. You may experience positive synergy between AIM Frame Essentials® and other AIM products.

*May I take AIM Frame Essentials® with other medications?*

There are no indications that glucosamine interacts with other medications. Of course, you should always consult a health practitioner when adding new substances to your regimen.

*Is glucosamine actually absorbed?*

Yes, in one study on glucosamine sulfate in pill form, 90 percent of the glucosamine was absorbed.

*How does glucosamine compare to products such as Tylenol® and ibuprofen?*

There is no doubt that products such as these provide rapid relief. However, studies have shown that after four weeks of use, glucosamine is as effective or more effective than these products in providing relief from joint problems.

*Does AIM Frame Essentials® have any side effects?*

Glucosamine is safe. A few people have reported stomach upset and nausea. In a year of formal testing of glucosamine, no significant side effects were found.

## Suggested Reading

Mindell, Earl. *The MSM Miracle*. New Canaan, CT:  
Keats Publishing, Inc., 1997.

## Ask About

AIM Endurance Athletes audio/CD

## References

Foerster K et al. "Efficacy of Glucosamine Sulfate on  
Symptoms of OA at Different Joint Localizations."  
*Arthritis Rheum* (2000): no. 42 (suppl): 1613

Piperno M et al. "Glucosamine Sulfate Modulates  
Dysregulated Activities of Human Osteoarthritic  
Chondrocytes in Vitro." *Osteoarthritis Cart.* (2000):  
8:20712.

## Benefits & Features

### *Benefits*

- Maintains musculoskeletal health
- Provides building blocks for healthy joints
- Improves joint function
- May help to reduce pain

### *Features*

- 1,730 mg of glucosamine complex, 400 mg of boswellin extract, and 390 mg of methylsulfonylmethane (MSM) per daily 4-capsule serving
- Includes both glucosamine sulfate and glucosamine hydrochloride (HCL)
- Formulated by naturopathic physician
- 120-count vegetarian capsules

*AIM Frame Essentials® is a Body Frame Health product. Use it to help maintain your joint health.*

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