

GLUCOSAMINE

*The Nutritional Building
Block of Healthy Cartilage*



Your ability to move freely depends on healthy cartilage in your joints. In order for cartilage to function as the shock-absorbing cushion that enables bone to move against bone, it needs water. In fact, cartilage is composed of more than two-thirds water. Its ability to attract and hold this water is the key to your ability to move easily throughout life.

That's where glucosamine comes in. Glucosamine is the fundamental molecular building block of the macromolecules that attract and hold water in cartilage. Your body makes glucosamine, but under many conditions – including injury and aging – it cannot make enough. Supplemental glucosamine has been shown in studies to support the body's production of healthy cartilage.



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Amino Sugars – the Cellular Connection

Glucosamine is an *amino sugar*: a molecule made from an amino acid and a simple sugar. Our bodies use approximately 10 amino sugars. They are burned for energy and are essential to the manufacture of tissue components. Amino sugars are the basis of virtually all connective tissues and lubricating fluids in the body.

Just as amino acids are the building blocks of proteins, amino sugars are the building blocks of giant molecules called *glycosaminoglycans* (GAGs), also known as proteoglycans and mucopolysaccharides. GAGs are large, spongy, water-holding molecules that form the gel-like matrix of the body's "ground substance," the glue that holds us together. This substance is found in all connective tissue and mucous membranes. Glucosamine macromolecules are the basic substrate of cartilage, ligaments, tendons, and bones.

Your Body Needs to Make Glucosamine

During the course of normal wear-and-tear on the body, connective tissue is constantly broken down, and then replaced or restructured, creating a continuous demand for glucosamine. Since dietary glucosamine is usually low, the body must synthesize it from glucose and the amino acid glutamine. Under normal circumstances, the body is able to meet its needs for glucosamine synthesis, but under a variety of less-than-optimal conditions, production of glucosamine – and its assembly into larger GAGs – may be impaired. These conditions include severe stress, surgery, burns, major injuries, as well as aging.

Glucosamine and the Production of GAGs

In one study of 80 adults, both range of joint movement and comfort increased for the group taking glucosamine supplements, as compared to those only given a placebo. The cartilage samples of the glucosamine group were viewed under an electron microscope; though previously damaged, they now appeared rebuilt and healthy.

In another study, more than 1200 adults were given 1500 mg of glucosamine for five to nine weeks. Ninety-five percent of them demonstrated a "sufficient" or "good" clinical response. Furthermore, the positive results continued for up to three months after supplementation stopped.

N-Acetyl Glucosamine

Most studies have been conducted with **HDH Glucosamine Sulfate**; however, another form of glucosamine is also important: **N-ACETYL GLUCOSAMINE**, or **N-A-G™**. This is because the body often adds an *acetyl* group to the glucosamine molecule before it can be used. Source Naturals N-A-G is glucosamine already in its acetylated form. This may be an advantage for some people because the body's ability to acetylate molecules can diminish with age or stress.

In addition to individual supplements of **GLUCOSAMINE SULFATE** and **N-A-G**, Source Naturals includes both forms of glucosamine in **GLUCOSAMEND™**, an advanced formulation of vitamins, herbs, and other nutrients known to support the reparative process of connective tissue.

References

- Dovanti, A. et al. (1980). *Clinical Therapeutics* 3(4):266-72.
- Tapadinhas, M. J. et al. (1982). *Pharmatherapeutica* 3(3):157-68.

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