N-Acetyl Glucosamine

(Hypoallergenic)

Item # 71140
Available in bottles of 90 capsules

The Possible Benefits of N-Acetyl Glucosamine, a Dietary Supplement

- Supports gastrointestinal function by enhancing mucosal integrity
- Provides a key building block molecule for connective tissue formation
- Better tolerated than glucosamine sulfate for those sensitive to sulfur

Description

NAG (N–Acetyl–D–Glucosamine) is a simple amino sugar, a monosaccharide with an amino group as part of its structure. NAG is a nutrient, an intermediary metabolite, and a component of the glycocalyx "coat" carried by all the body's cells. The glycocalyx is a layer of carbohydrate and proteins complexed together, sometimes also with lipid components, and anchored in the outer cell membrane. As a major contributor to the glycocalyx, NAG is involved in cell-to-cell attachment, contributes to the cell surface antigen patterns, and augments receptor functions. Although located on the cell's exterior surface, NAG is important for cell function and so very much a part of the life of the cell.

In addition to sugar-coating our cells, NAG is also a building block for large, supra–molecular complexes, the extracellular cements that add bulk and strength to the non–cellular connective tissues. NAG is a metabolic jumping–off point for a complex, enzyme–regulated polymerization process that generates "glycosaminoglycans" (GAG), which in turn become further organized into cartilage, bone, ligaments, tendons, sclera, and other specialized connective tissues. GAG are found inside cells, but their main fates seem to be extracellular. GAG are major structural contributors to the basement membranes of the skin and internal epithelia, the intima of the blood vessels, the heart valves, and the lens and sclera of the eye, as well as synovial fluid and the linings of the joints.

Among the major known GAG are chondroitin sulfate, dermatan sulfate, heparan sulfate, heparin, and keratan sulfate. [As the research in this area has matured, the biochemical complexity has increased, and with it the semantic complexity.] These GAG are enzymatically polymerized primarily from NAG, then subsequently become attached to protein chains. These serve rather as a "scaffolding" for the GAG. The "proteoglycans" (PG) that result then become further organized and aggregated into the matrix materials for the diverse connective tissues.

Cells, just like people, must work together to get things done. As research has now demonstrated, the "extracellular matrix" materials that surround the cells of solid tissues are integrated into the homeostatic mechanisms that support tissue and organ functions. The biological roles of GAG, both as cell surface glycocalyx and polymerized into PG, range from relatively straightforward mechanical support for the connective tissues, to effects on more dynamic and complex processes such as cell adhesion, motility, and aggregation; tissue morphogenesis and renewal, growth factor effects; angiogenesis; and the initiation, amplification, and termination of inflammatory cascades.

NAG and the Gastrointestinal Mucosa

NAG is important for intestinal function. It is prominent both in the glycocalyx of the absorptive cells of the intestinal mucosa, and in the mucus that is secreted from other cells of the mucosa. NAG is therefore a major constituent of the (glycocalyx + mucus) "barrier layer" that protects the living epithelium from digestive enzymes and other potentially damaging intestinal contents. For this barrier layer to be

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adequately maintained, its rate of replacement must match or exceed the rate at which it is being worn away.

Insufficiency of NAG can limit the synthesis of PG for mucus production. NAG is further along the critical pathway for GAG formation than is glucosamine:
D–glucosamine—>N–acetyl–D–glucosamine (NAG)—>GAG—>PG
The enterocyte cells should have the enzyme capacity to make NAG from glucosamine, but two of the necessary enzymes (glucosamine–6P–synthetase and acetyl–CoA–synthetase) can be blocked by alcohol, and by non-steroidal anti-inflammatory drugs, including aspirin and other salicylates. [Such inhibition of enzyme activity may well contribute to the well–known adverse side effects of aspirin on the GI tract.] By supplying preformed NAG as a nutritional supplement, this vulnerable step in the pathway for mucus synthesis can be bypassed.

Integrity of the gastric mucosa is a prerequisite for healthy digestive and absorptive patterns, as well as for normal discrimination between "self" and "non–self" particles in the intestinal contents. Renewal of the glycocalyx and associated mucus is critical for mucosal integrity. Preliminary research results indicate that some individuals may be less well equipped with the enzymes needed to transform glucosamine to NAG. Burton and Anderson (American Journal of Gastroenterology, vol 78, 1983) have suggested that adverse influences such as bacterial and viral infection, alcohol intake, and the use of salicylate drugs may further compromise mucus production in these individuals.

NAG and Joint Function
NAG is a major component of several GAG that are prominent in the linings of the joints. The joints include the zones of friction between moving bones, and are sites where connective tissues are worn away most rapidly. Therefore the joints place a high demand on the capacity of their lining epithelia to produce new cartilage and other connective tissues. Anti–inflammatory drugs relieve joint pain, but inhibit joint PG synthesis.

Glucosamine as its sulfate salt has been shown from several studies to be of clinical importance in joint maintenance and renewal. However, it was not until relatively recently that NAG became available in sufficient quantities for studies of this type. As with the production of mucus by the intestinal lining, in the connective tissues of the joints NAG is further along the same metabolic pathway towards GAG and PG production than is glucosamine. Further, NAG appears to participate in the homeostatic regulation of immune cell activity in the joint. There is good reason to expect that an objective comparison of glucosamine with NAG for joint renewal would demonstrate the latter to be superior.

Each capsule contains:	N-Acetyl-D-Glucosamine	500 mg
Other ingredients:	Cellulose, stearic acid.	
Suggested Use:	As a dietary supplement, 1 capsule three times daily, or as directed by a healthcare practitioner.	

Selected References

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July - 2003