



## Glyco Essentials

Stock #876-5 (90 capsules)

Although there are more than 200 different sugars found naturally occurring in fruits, vegetables and other plants, preliminary research suggests that 8 specific sugars (or saccharides) play an integral role in the healthy functioning of the human body. These 8 sugars—fucose, galactose, glucose, mannose, N-acetylgalactosamine, N-acetylglucosamine, N-acetylneuraminic acid, and xylose—combine with other molecules in the body, such as fats and proteins, to form complex sugar compounds collectively referred to as glycoconjugates. Glycoconjugates perform essential roles in the biochemical communication that takes place in and between cells. This cellular communication is necessary for healthy cell and tissue development, immune system function, brain and nervous system activity, tissue repair, and even the functions of enzymes and hormones. Likewise, cellular communication also affects disease processes, including cancer development, chronic inflammation, cardiovascular disease, viral and bacterial infection, and autoimmunity.<sup>1-22</sup>

Glycobiology—defined in the broadest sense as the study of sugars and their roles in health and disease—is one of the more rapidly growing fields of research, due to recent advances in technology. According to an article published in the journal, *Explore: The Journal of Science and Healing*, glyconutrients—defined as nutraceuticals (foods that provide medical or health benefits) that are based on simple, biologically important sugars—may offer wide-ranging benefits for both promoting health and managing disease. Yet, because the science of glyconutrients is still in its infancy, much of the research on the clinical use of glyconutrients is preliminary. However, the authors of the article, Dr. Victor Sierpina, MD and Dr. Robert Murray, MD, PhD, predict that as the field of glycobiology evolves and as more research is conducted and published in peer-reviewed journals "more evidence for a wide variety of clinical applications, as well as wellness support by glyconutrients" will be discovered.<sup>10,21,23,24</sup>

**Glyco Essentials** is a nutritional supplement that provides 8 important sugars used by the body in the transmission of vital cellular communication. Glyco Essentials is designed to provide a convenient source of these specific sugars that naturally occur in various fresh fruits, vegetables and other foods, but which are often lacking in the typical diet. Each capsule of Glyco Essentials contains:

**Short Chain Fructooligosaccharides** (scFOS) are naturally-occurring simple carbohydrates that are neither digested nor absorbed by humans. Instead, scFOS encourage the growth of bifidobacteria—one of several beneficial strains of colonic bacteria—while suppressing the growth of potentially harmful pathogens (disease-causing organisms) in the colon. ScFOS also help promote intestinal immunomodulation and may help reduce the risk of colon cancer. Furthermore, scFOS have been shown to enhance calcium and magnesium absorption in the colon.<sup>25-34</sup>

**Cordyceps** is a rare and highly-prized edible fungus (mushroom) that is known for its ability to stimulate immune function. Cordyceps polysaccharides, which contain galactose, glucose and mannose, are primarily responsible for the mushroom's immunostimulant effects and have been found to enhance macrophage and lymphocyte (two types of white blood cells) activity, as well as provide protection against damage from chemotherapy and radiation. Cordyceps also contains substances that demonstrate anti-tumor activity and the ability to stimulate antibody-forming cells (immunoglobulins G and M). Successful animal studies indicate the possible use of cordyceps as an anti-tumor agent in the treatment of lymphoma and other cancers, while in vitro studies show that cordyceps polysaccharides can significantly inhibit the proliferation of human leukemic cells by 78-83%. In addition, in vitro and in vivo studies have found that cordyceps stimulates the activity of natural killer (NK) cells, indicating its potential for use as an immunopotentiating agent in the treatment of cancer (including adult leukemia) and immunodeficient patients. Furthermore, a clinical study of 36 individuals diagnosed with advanced breast and lung cancer showed that a pharmaceutical preparation providing similar active principles as found in cordyceps restored cellular immunological function and improved the patients' quality of life.<sup>35-46</sup>

**Shiitake mushroom** has been studied since the 1960's for its anti-tumor and immune-potentiating properties. Shiitake is the source of polysaccharides containing galactose, glucose, mannose and xylose. Shiitake polysaccharides have exhibited proven pharmacological effects, including strong anti-tumor activity in both animals and humans. Shiitake polysaccharides achieve their anti-tumor effects by enhancing immune system function, rather than by attacking tumor cells directly. For example, shiitake polysaccharides have been shown to stimulate the activity of T-cells and natural killer (NK) cells and increase production of interferon, interleukin-1 and 2, and tumor necrosis factor (TNF), all of which play a critical role in the destruction of tumor cells. In addition, recent research has shown that shiitake contains lenthionine, a major sulfuric compound that has demonstrated inhibitory activity against platelet

aggregation (which can lead to blood clots) in vitro.<sup>35,36,47-50</sup>

**Maitake mushroom** is a medicinal mushroom that enhances immune function by stimulating cell-mediated immunity. In other words, maitake increases the activity of immune cells such as macrophages, T-cells and natural killer (NK) cells, which have significant cancer-fighting properties. Maitake also enhances production of interleukin-1, which in turn activates T-cells. Maitake does not kill cancer cells directly, but rather activates immune cells that fight the cancer and tumors. In addition, researchers have extensively investigated a powerful ingredient in maitake, beta-D-glucan (also known as maitake D-fraction), and have found that it stops normal cells from becoming cancerous, helps prevent cancer from metastasizing (or spreading), inhibits tumor growth, and even reduces the side effects of chemotherapy. A recent human study confirmed that maitake D-fraction, given to cancer patients not receiving anti-cancer drugs, slowed metastatic progress, decreased tumor markers and increased NK cell activity.<sup>35,51-54</sup>

**Concentrated Acetylated Mannans** - The polysaccharide acemannan, an acetylated mannan derived from aloe vera, has been shown to enhance immune system function by stimulating the production of various white blood cells, as well as interferon—a powerful immune substance that fights viral infection by inhibiting viral growth. Acemannan has also demonstrated antiviral activity, including activity against human immunodeficiency virus type 1 (HIV-1) in vitro.<sup>55-59</sup>

**Beta (1,3/1,6) Glucans chains** - Beta glucan has been recognized by researchers since the 1940s for providing immune benefits. Beta glucan stimulates the immune system to enhance immunity and protect the body against infection. Beta glucan is a naturally occurring polysaccharide found in algae, baker's yeast, barley, mushrooms and oats. According to research, beta glucan potentiates the immune system, specifically activating macrophages to fight bacteria, viruses and other foreign invaders. Beta glucan also facilitates the transmission of cellular information among the macrophages, T-cells, B-cells, antibodies and interferons and interleukins, thus enhancing overall immune response. In addition, researchers have examined beta-glucan's lipid-lowering effects. A recent study found that the addition of barley to a healthy diet significantly lowered total cholesterol in both men and women, compared to diets containing no beta-glucan. Furthermore, in 2006, the Food and Drug Administration (FDA) amended the health claim regarding the relationship between beta-glucan soluble fiber and reduced risk of coronary heart disease to include barley, as well as whole oats, as sources of beta-glucan soluble fiber.<sup>60-65</sup>

**Glucosamine Sulfate** - Glucosamine is a key component of articular (joint) cartilage production and maintenance. Studies show that glucosamine improves joint mobility and helps relieve pain, swelling and other symptoms of arthritis, even up to several weeks after discontinuing use. Beneficial clinical effects of glucosamine sulfate in the treatment of osteoarthritis have also been documented. Recent research suggests that glucosamine may actually slow the progression of osteoarthritis by improving the degenerative condition of the joint—glucosamine helps improve the integrity of connective tissue and joint space lubricant, which promotes healing and regeneration of the affected joint.<sup>66-71</sup>

**Tragacanth gum**, derived from the branches and tap roots of a low-growing, thorny shrub native to the mountainous regions of the Middle East, is used extensively in foods and salad dressings and to thicken ice cream. Tragacanth gum is a natural source of several sugars, including fucose, galactose, glucose, mannose, and xylose. Preliminary evidence suggests that tragacanth gum may help moderate blood sugar levels in patients with diabetes when consumed with a high sugar meal. As with other water-soluble fibers, tragacanth gum increases stool weight and decreases gastrointestinal transit time to help relieve constipation. Tragacanth gum has also been shown to protect against copper-induced oxidation of LDL cholesterol (a process which can lead to atherosclerosis) in vitro.<sup>72-75</sup>

**Arabinogalactan**, a galactose-containing polysaccharide found in echinacea and in concentrated amounts in the Western larch tree, is believed to be the constituent primarily responsible for echinacea's effective immune-stimulating properties. A study published in the *Journal of the National Cancer Institute* showed that arabinogalactan activated macrophages to cytotoxicity (toxicity to specific cells) against tumor cells and microorganisms, as well as stimulated macrophages to produce tumor necrosis factor (a protein that destroys cancerous tumor cells), interleukin-1 (an immune system hormone that stimulates T-cell function), and interferon-beta 2 (a substance that fights viral infection). Arabinogalactan has also been shown to enhance beneficial gut microflora, specifically increasing the presence of anaerobes such as Bifidobacteria and Lactobacillus in the gastrointestinal tract.<sup>76-80</sup>

**Aloe vera extract** - Use of the aloe vera plant for medicinal and therapeutic purposes dates back over 4,000 years. Numerous health benefits have been attributed to aloe vera use, including anti-inflammatory, hypoglycemic (blood sugar-lowering) and lipid-lowering effects. In one study, oral aloe vera taken for 4 weeks was shown to provide clinical remission and improvement more often than placebo in patients with mildly to moderately active ulcerative colitis. In

addition, naturally occurring polysaccharides in aloe vera exhibit immunostimulating, antibacterial, antiviral and antitumor properties. Aloe polysaccharides are also a source of galactose, glucose and mannose.<sup>55,81-91</sup>

**Gum Ghatti** (*Anogeissus latifolia*) is a water-soluble gum obtained from *Anogeissus latifolia* trees, which are harvested primarily in India. Gum ghatti is a high molecular weight polysaccharide that is a source for several sugars, including galactose, mannose and xylose. Gum ghatti is also used as a source of dietary fiber.<sup>74-92</sup>

**Guar Gum** (*Cyamopsis tetragonoloba*) is used in Indian medicine as a digestive tonic. Guar gum is comprised of approximately 86% water-soluble mucilage (a type of dietary fiber), which enables it to help soothe irritated mucosal tissues of the gastrointestinal tract. Guar gum's high content of mucilage also makes it an effective bulk laxative, with properties similar to that of psyllium. In addition, guar gum may have therapeutic value in lowering cholesterol and improving glucose metabolism.<sup>93-98</sup>

**Rice Starch** is a natural source of glucose and is commonly used as a thickener in many low- and non-fat foods, as well as in ice cream and other dairy products.<sup>99-101</sup>

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