

Glyconutrient Food Sources

What are glyconutrients?

The body needs many specific types of sugar and sugar-like substances to work properly. There are over 200 of these sugars which all come from natural sources, research on their benefits have been conducted continuously since the early 1990's. To date, 8 of these sugars have been identified as essential to the body for good health. This group has been given the name "Glyconutrients". This term is not used in scientific textbooks. The term is an invention of a supplement company, 'Mannatech', but the substances included in this group all have specific roles in the human body that are described in scientific literature.

In the simplest sense 'Glyconutrients' are certain types of plant sugars. So they're nutrients comprised of sugar!

'Glyco', is the Greek word for **sweet** and of course 'Nutrients' mean, **nourishing food** or **nourishment**. Strangely, 'Glyconutrients' are not a sweet, sometimes they are bitter and some are virtually tasteless.

The term 'Glyconutrients' however is nothing more than a marketing term. The correct name is 'saccharides' (carbohydrates) although you'll most commonly see this written as 'polysaccharides' (complex carbohydrates) or 'monosaccharides' (simple carbohydrates). These are all different forms of carbohydrates (depending on the chemical structure of the specific sugar that's being referred to).

Their popularity can be credited to 'Mannatech', a large US multi level marketing company (MLM) who produce a range of products containing 'saccharides'.

'Glyconutrients' and 'Glyconutrition' have, in recent years, been presented as a valuable form of alternative and complementary medicine because studies have shown that they have a significant effect on health.

Glyconutrients are found in foods that contain monosaccharides (or simple sugars), something that some nutritionists and healthcare professionals believe have become deficient in today's over-processed and fast-food laden diets.

Health Benefits of Glyconutrients

There have been numerous studies since the early 1980's at reputable institutes worldwide. The results show that saccharides help to:

- Lower cholesterol
- Increase lean muscle mass
- Decrease body fat
- Accelerate wound healing
- Ease allergy symptoms
- Slow the aging process

The following is a short list of health issues where glyconutrient complexes could potentially be of benefit:

- Allergies
- Anti-bacterial
- Anti-viral
- Arthritis
- Cancer
- Chronic fatigue syndrome
- Depression
- Diabetes
- Fibromyalgia
- Heart disease
- Immune system function
- Memory loss
- Multiple sclerosis
- Skin diseases and disorders (Eczema, Dermatitis, Psoriasis)

Bacterial infections often respond extremely well to saccharides, as do many viruses such as the common cold, the flu, herpes and even HIV.

For cancer patients, saccharides lessen the toxic effects of radiation and chemotherapy--while augmenting their cancer-killing effects, resulting in prolonged survival and improved quality of life.

Essential vs Non Essential Nutrients

Nutrients can be classified into two groups, non-essential and essential. Non-essential nutrients are the types of things our body produces naturally, such as cholesterol, that may be present in our diet and utilized by our bodies, but we don't need to eat them in order to enjoy good health. Essential nutrients, on the other hand, are those that our body needs, but cannot produce on its own. Examples of essential nutrients are certain vitamins, minerals, fatty and amino acids that can be obtained either by a proper diet or via supplementation. This is where the debate begins. Are glyconutrients essential or non-essential?

Getting Enough Sugar is not the Problem

The body has naturally occurring enzymes that have the ability to convert carbohydrates back to glucose, their simplest form. Glyconutrient proponents suggest that it is not the lack of sugar in our diets that is the overriding problem, but rather the types of sugars we are lacking. There are 8 simple sugars, known as saccharides, considered necessary for our bodies to function optimally:

- Xylose
- Fucose (not to be confused with fructose)
- Galactose
- Glucose
- Mannose
- N-acetylglucosamine
- N-acetylgalactosamine
- N-acetylneuraminic acid

These sugars work with the fats and proteins in our bodies in order to produce a sort of communication device that exists on the outer membrane of every cell allowing cells to recognize and interact with each other. But in order for this device to work as a high functioning part of the entire bodily system, all eight sugars must be present.

The Eight Essential Glyconutrients

The following description of the eight essential glyconutrients comes in part from 'Sugars that Heal' by Dr Emil Mondo and Mindy Kitei.

Xylose

Xylose is important for cell to cell communication and also acts as an antibacterial and antifungal. Research has suggested that this essential nutrient may prevent cancer of the digestive tract. Manufacturers often substitute xylose for sugar (table sugar) in chewing gum and toothpaste. Research findings indicate that xylose may help prevent cancer of the digestive tract and it has been shown that xylose absorption is decreased in some patients with intestinal disorders, including colitis.

For diabetics and people watching their sugar intake, companies often substitute xylose for sucrose and corn sweeteners in such things as chewing gum and toothpaste.

Note: Xylose is not to be confused with Xylito which is not an essential sugar but a sugar alcohol.

Dietary Sources of Xylose

Fruit: Guava, Pears, Berries, Blackberries, Loganberries, Raspberries, Goggi Berry

Herbs: Aloe Vera, Echinacea, Boswellia

Seeds: Psyllium Seeds

Vegetables: Broccoli, Spinach, Eggplant, Peas, Green Beans, Kelp, Okra, Cabbage, Corn

Fucose

Fucose is one of the essential sugars the body needs to maintain optimal health and well being through cell to cell communication. It has been shown to influence brain development and helps to create long term memories. It is now also known that Fucose glycoconjugates (glycoproteins and Glycolipids) are a essential part of eliminating such diseases as cancer, inflammation and immunity. Fucose acts as an immune modulator by inhibiting tumour growth and its spread and enhances cellular communication. It also guards against respiratory tract infections and inhibits allergic reactions. High concentrations of fucose are found at the junctions of nerves, as well as in the kidneys, testes, and in the outer layer of skin.

In biological terms, fucose and its glycoconjugates have been found to have a number of important influences on the body such as:

- Neurotransmission
- Immune Modulation
- Inhibition of cancer growth
- Prevention and treatment of respiratory infections
- Possible regulation of collagen production

In humans, fucose is excreted from the urine. Nursing mothers also eliminate fucose from their breast milk. During the latter stages of pregnancy, excretion of Fucose is increased, which is consistent with fetal development and the transfer of immunity to the newborn.

Dietary Sources of Fucose

- Abundant in human breast milk
- Certain mushrooms
- Seaweed - kelp and wakane
- Beer yeast

Galactose

Galactose is found in dairy products and human breast milk. In dairy products the galactose is derived from the disaccharide lactose (combines with Glucose to form Lactose). In animal studies it has been shown that galactose inhibits tumour growth and its spread, particularly to the liver, and to protect from cataracts. Galactose enhances wound healing, decreases inflammation, enhances cell-cell communication, and increases calcium absorption. It has also been shown to trigger long term memory formation.

Dietary Sources of Galactose

(mg of Substance per 100 grams)

Fruit: Apples 800, Apricot 600, Banana 200, Blackberries 1,000, Cherries 400, Cranberries 1,200, Currants 800, Dates 800, Grapes 300, Kiwi Fruit 700, Mango 1,700, Orange 1,600, Nectarine 1,100, Peach 1,300, Pear 600, Pineapple 700, Plums 2,600, Prunes 1,600, Raspberries 900, Rhubarb 1,500, Strawberries 500, Passionfruit 300

Herbs: Echinacea, Boswellia, Fenugreek

Nuts: Chestnuts 2,700

Vegetables: Broccoli 2,700, Brussels Sprouts 4,100, Avocado, Cabbage 4,400, Carrot 3,400, Cauliflower 3,200, Celery 2,700, Cucumber 1,600, Potato 1,800, Eggplant 3,500, Tomatoes 1,600, Leeks 6,600, Asparagus 2,800, Lettuce 2,000, Green Beans 4,100, Mushrooms 1,100, Beetroot 1,100, Onions 4,500, Parsnip 2,200, Green Peas 800, Pumpkin 2,400, Spinach 1,400

Glucose

Glucose is probably the most familiar of all the essential sugars and is a partner with fructose in the common disaccharide Table Sugar (sucrose). Glucose is a simple monosaccharide and one of the most important sources of energy for plants and animals.

Glucose is a potent fast-energy source that can be released directly into the bloodstream. Glucose metabolism is disturbed in depression, manic-depression, anorexia and bulimia. It has been shown to enhance memory, stimulate calcium absorption, and enhance cell to cell communication.

Glucose is used in hospitals, by sports people and everyone in between as a fast acting energy source as glucose is absorbed into the bloodstream quickly.

Too much Glucose can also raise insulin levels and lead to such things as obesity and diabetes. Both of these are becoming more and more prominent in today's society due to poor nutritional knowledge and our fast paced lifestyles.

Dietary Sources of Glucose

(mg of Glucose per 100 grams)

Vegetables: Glucose is found in all vegetables but is found in greater concentration in naturally ripened vegetables.

Bee Foods: Honey 33,900

Fruits: Grapes 7,300, Banana 7,000, Mangoes/Cherries 6,600, Strawberries 2,000

Herbs: Cocoa, Aloe Vera, Licorice, Sarsaparilla, Hawthorn, Garlic, Echinacea, Kelp

Mannose

Mannose is found in Gum Ghatti which is obtained from the sap of the Indian sumac. Mannose is involved in many of the fundamental cell activities. Mannose plays a major role in tissue remodelling, cell to cell communication (intelligent interactions between cells), inhibition of tumour growth and spread, and the prevention of bacterial, viral, parasitic and fungal infections. Other functions of mannose include lowering blood sugar and triglyceride levels in diabetics, lowering cholesterol; easing the inflammation in rheumatoid arthritis and may help lupus patients as studies indicate these patients have mannose deficiencies. It is directly utilized for glycoprotein synthesis, especially in components of the immune system. Studies show that mannose is necessary for the production of cytokines which fight invaders. Scientists at the Glycobiology Institute at Oxford have found that macrophages have mannose receptors that activate immune attacks.

The inclusion of Mannose in your Diet can accelerate the processes of cell to cell communication. Its deficiency can lead to physical problems, Mannose is absorbed eight times slower than Glucose and when ingested Mannose goes directly into the bloodstream from the upper gastrointestinal tract. Within an hour Mannose is widely distributed throughout the body tissues and fluids.

Dietary Sources of Mannose

Fruit: Blackcurrants, Red Currants - Red, Gooseberries, Cranberries (D-mannose)

Herbs: Aloe Vera (richest source of Mannose is in the gel of the Aloe Vera leaf), Fenugreek

Legumes: Soybeans

Vegetables: Green Beans, Capsicum (Cayenne Pepper), Cabbage, Eggplant, Tomatoes, Turnip, Shittake Mushrooms and Kelp

N-acetylglucosamine

Glucosamine, a metabolic product of N-acetylglucosamine has become quite a popular remedy for osteoarthritis. It helps repair cartilage, decreases pain and inflammation, and increases range of

motion in osteoarthritis. Human studies have shown that Glucosamine sulfate is almost 98% absorbed. It is then distributed throughout the body primarily to joint tissues. Glucosamine may also help repair the mucosal lining defensive barrier called the glycosaminoglycan layer (GAG) layer. Defects in this layer have been implicated in Crohn's disease, ulcerative colitis, and interstitial cystitis.

About half of the ingested dose of Glucosamine is oxidized and the remainder is distributed into glycoconjugates. These conjugates distribute to the cell surface receptors which are important for cell to cell communication.

Dietary Sources of N-acetylglucosamine

Glucosamine is readily available in such things as Bovine (cow) cartilage, Shark cartilage.

It is also found as the polysaccharide in chitin derived from the shells of crustaceans such as shrimps and Crabs. Chitosan is the modified form of chitin from acid/alkali treatments.

For those who do not eat animal based food the Shitake Mushroom is also a rich source. It is also found in a red Japanese Algae called Dumontiaceae.

N-acetylgalactosamine

Galactosamine is another member of the eight essential sugars and is the least known. Its medical name is N-acetylgalactosamine. This essential sugar is also important for proper cell to cell communication in normal systemic functions in such diseases as cancer, inflammation and immunity. It also appears that it helps with joint function.

Research into this saccharide has been limited, yet it has been shown to be essential for cell to cell communication, and that it inhibits tumour spread. Patients with heart disease have lower than normal levels of N-acetylgalactosamine.

Dietary Sources of N-acetyl-galactosamine

Bovine cartilage, Shark cartilage, a Red Algae called Dumontiaceae (as a constituent of dextran sulphate)

N-acetylneuraminic acid (Sialic acid)

Neuraminic Acid has been found to be particularly important for development and learning. And not surprising it is found in breast milk. Its medical name is N-acetylneuraminic acid .

It is an immune modulator that affects the viscosity of mucus, which in turn repels bacteria, viruses and other pathogens. The saccharide influences blood coagulation, and cholesterol levels, lowering LDL. Animal studies indicate that N-acetylneuraminic acid improves both memory and performance, and levels of this saccharide decrease with age.

In studies it has been found that this essential saccharide may improve both memory and performance.

Dietary Sources of N-acetylneuraminic acid or sialic acid

Dairy foods, whey protein isolate and the eggs of hens

Educational Videos on Glyconutrients

The following are short videos that will help you to understand the purpose and function of Glyconutrients.

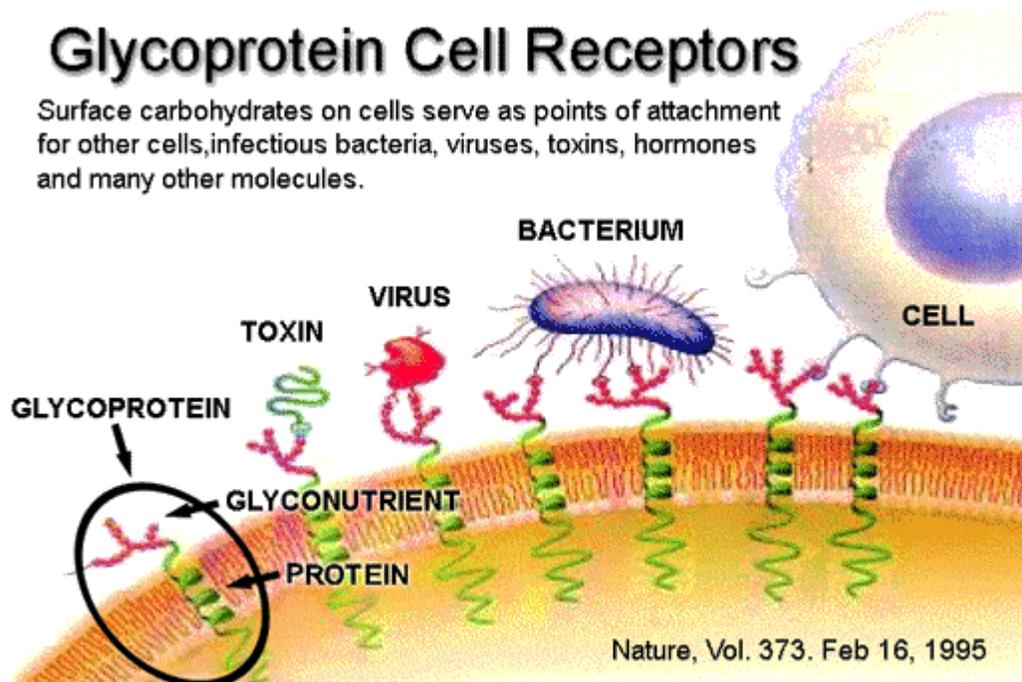
Glyconutrients Video 1:

<http://www.youtube.com/watch?v=S9uBbRXtWc8>

Glyconutrients and cell to cell communication:

<http://www.youtube.com/watch?v=BYByLHnBcE4&feature=related>

Glyconutrient Synergy



The body has the ability to make all the glyconutrients, but there are claims that this production tend to be too slow, so that the body may get too little of them if they are not supplied through the diet. These claims are not yet definitely proven scientifically. However, many persons report health gains after having applied a supplement of glyconutrients.

The sugar type glucose is the most central glyconutrient. Glucose is used as an energy source, and it is used to produce other important substances, for example the other glyconutrients. Glucose should be supplied in a manner that allows it to be absorbed evenly through the whole day. Such an even absorption is secured by eating food that will release glucose gradually during the digestive process. Such a food is said to have a low glycemic index. Examples of such food types are beans, peas, full corn cereals or bread, and to a less extent potatoes and sweet fruit in natural form. Many of these foods contain starch that will gradually be broken down to free glucose when digested.

Most people get enough glucose, but some popular low carbohydrate diets may cause a deficiency. Many other glyconutrients are used as working tools in the body. The body can produce these from glucose, but the production may be so slow that one may get deficient if these substances are not supplied in the diet. These glyconutrients are: Mannose, xylose, fucose, N-acetylglucosamine, N-acetylgalactosamine, N-acetylneuraminic acid.

Glyconutrients work together as a group in many important bodily functions:

- They are tools used to regulate tissue growth, organ development, and organ maturation and to regulate repair and regrowth after injury and disease.
- They are used as tools by the nervous system and the sensorial organs, for example in the retina of the eyes.
- They are used as tools by the immune system, especially to regulate the functions within the immune system and by the recognition of foreign elements that shall be destroyed.
- They are important building blocks in intracellular structures, especially in cartilage, tendons and connective tissues. N-glucosamine is the most important structural glyconutrient.
- They help to hinder microorganisms to fasten themselves to body structures and thereby help the body to wash away bacteria, fungi or viruses. Mannose and xylose are the most important of the glyconutrients for this function.

Since all the glyconutrients tend to participate in many processes, lack of any of them will give problems of many kinds.

Lack of glyconutrients will make a person generally more susceptible for any disease, make it difficult to fight diseases and make it difficult to recuperate once the disease is over. A person lacking glyconutrient will also more easily get physically hurt, and have difficulties of repairing the damage.

Glyconutrient deficiency is believed to cause or aggravate diseases like: Infections, rheumatic diseases, allergies and asthma, heart problems, stroke, failure to thrive and cancer.

A diet containing sufficient glyconutrients or supplements of glyconutrients may help to prevent or overcome the listed diseases. Enough supply of glyconutrient may also increase the general resistance against disease and the general wellbeing

A way of getting needed glyconutrients is to include vegetable and fruit in the daily diet and vary between different types.

On the market you can also find special supplements that furnish the body with glyconutrients you may get too little of by the daily diet.

Arthritis

What are glycoproteins?

Saccharides form the core for a carbohydrate-protein bond (known as glycoproteins and glycopeptides) in the human body. Glycoproteins are sugar molecules attached to protein molecules. Glycoproteins are essential molecules to the correct functioning of your body and for the maintenance or recovery of your good health.

They facilitate all (intra and inter) cell to cell communication - so it's very important to have an adequate and steady supply of them in you so that your cells can optimally communicate with one another through this 'sugar code'.

For example, when you cut yourself your skin knows how to fill in the gap and seal itself because your cells communicate correctly with one another!

All your processes, substance conversions, absorptions and secretions are managed by these biologically active sugars!

But here's the problem - of the 10 essential saccharides only 2 (glucose and galactose) are common in our 'every day' diets.

The best sources of the essential saccharides are the inner leaf of the aloe vera plant, beta 1,3 Glucan, tea polysaccharides, goji berries and seaweed (phytoplankton).

How do Glyconutrients help with joint problems?

Since 1980 major studies have shown that the symptoms of osteoarthritis respond to glyconutrition. 1-2 (glyconutrients and arthritis)

The most effective professional standard natural arthritis formulas in the market contain chondroitin and glucosamine both of which are glyconutrients.

Glucosamine is required for the synthesis of glycoproteins, glycolipids and glycosaminoglycans. Clinical evidence shows that glucosamine stimulates metabolism of chondrocytes in the articular cartilage and of synovial cells in the synovial tissues. Preliminary research suggests that glucosamine inhibits protein N-Glycosylation and cytokine-stimulated production of mediators of inflammation and cartilage degradation.

Chondroitin sulfate (CS) belongs to a class of very large molecules called glucosaminoglycans (GAGs), which are made up of glucuronic acid and galactosamine. CS is itself a glycoprotein. It is used to treat osteoarthritis because it is found in cartilaginous tissues of most mammals and plays a function in the formation of the joint matrix structure.

Rheumatoid arthritis has proved to be a much more difficult form of arthritis to treat.

Rheumatoid arthritis (RA) involves glyconutrients in peculiar ways. Certain cells in RA patients secrete abnormal IgG (immunoglobulin) glycoforms (various forms of molecules containing glyconutrients). In particular, IgG glycoforms in RA patients are missing required galactose molecules. The less galactose, the more severe the disease.

The lack of galactose on the IgG molecule exposes N-acetyl glucosamine (a glyconutrient), which is capable of binding to mannose-binding-protein, MBP, circulating in blood plasma, and which subsequently causes a cascade of inflammation reactions.

RA patients have been shown to have low levels of a further glyconutrient called Fucose. As with galactose, the less fucose, the more severe the disease.

Glyconutrients and arthritis - So does supplementation with glyconutrients help people inflicted with RA?

Studies say yes. Studies are demonstrating that glyconutrients suppress arthritic symptoms - hence the current popularity of glyconutrients and arthritis. Several studies have demonstrated that blocking the mannose receptor with extra dietary mannose, or mannose injections, or aloe vera extract prevents arthritic flares in rats.

Recently there are reports of beneficial use of collagen administration in RA patients - collagen is rich in glyconutrients! (glyconutrients and arthritis)

Scientists have also started to take a closer look at well known anti inflammatory herbs whose anti inflammatory properties have been recorded for thousands of years. Analyzes of the constituents of some of these herbs show they contain glyconutrients so this is an area where ongoing research is expected to further confirm the benefits of glyconutrients and arthritis.

Glyconutrient Supplement – Q & A

Glyconutrients have become widely known today because of their beneficial effects on our health. However, if you search the Internet for some information on these essential saccharides, you may find a lot of false or inaccurate statements about them. Here are some questions and answers that will hopefully dissipate any doubts about glyconutrients.

Q - Do glyconutrients heal?

A - No. Strictly talking, glyconutrients do not cure or heal any of your wounds of diseases by themselves. They are saccharides, not miracles. However, they can greatly help in increasing the efficiency of your immune system, and in the production of adult stem cells. You must not expect to drink a glyconutrient-rich supplement at night and wake up cured the next morning, so don't believe anyone who claims that Glyconutrients are "magical" or immediate healers. Rather allow for 3-6 months, after adding glyconutrients to your diet, for your body to build new healthier tissue.

Q - Do glyconutrients reduce aging?

A - Certainly, glyconutrients are very effective in eliminating free radicals from your body, thus delaying the cellular aging process. However, eliminating free radicals is just half the work: you must also stop producing them in order for glyconutrient's anti aging effects to be fully effective. For instance, if you are a heavy smoker glyconutrients' ingestion will be innocuous on you, because nicotine produces way more free radicals than your nutritional supplement can help you eliminate. So, as a rule of thumb, taking glyconutrients can help fighting aging only if you eliminate other harmful habits.

Q - Have Glyconutrients any undesired side effects?

A - As they are natural elements, they have no harmful effects.

Q - Can I get all the glyconutrients I need just by changing my diet?

A - Well, not in today's world. Theoretically, it is possible to carefully design a diet plan that provides you with all the necessary glyconutrients in the right amounts, but this diet is unpractical and almost impossible to follow by a person who lives in today's fast world. That's why professionals prefer to design and implement a more realistic and practical diet, and complement it with glyconutritional food supplements.

Q - I am currently taking a certain medicine to fight a certain disease I have. Will glyconutrients interact in some way with this medication?

A - Glyconutrients are just saccharides (also called "sugars"), therefore they are completely natural. For this reason, they have no interactions with any known drug. However, you can always ask your supplier about consuming glyconutrients. A trained consultant will not only inform you about them, but also will recommend the right amount for you.

Sources:

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