Beta-glucan

Beta-glucans are a type of soluble fiber derived from the cell walls of algae, bacteria, fungi, yeasts, and plants. They are commonly used for their cholesterol-lowering effects. Beta-glucans have also been used to treat diabetes and for weight loss. Concentrated yeast-derived beta-glucan is more easily incorporated into food products than grain beta-glucans, which are found in cereal grains such as oats and barley. Yeast-derived beta-glucan is also more palatable than oat because it is not soluble in water and does not become viscous in water as beta-glucan from oats does. However, oat derived beta-glucan may have a higher therapeutic benefit potential.

Beta-glucan is a relatively new practice. Practitioners have used beta-glucan as an immunostimulant or as an adjunct cancer treatment. Beta-glucan is also used for its cholesterol-lowering effects and glycemic (blood sugar) control. In 1997, the U.S. Food and Drug Administration (FDA) passed a ruling that allowed oat bran to be registered as the first cholesterol-reducing food at an amount of 3 grams beta-glucan daily.

Scientific Evidence

These uses have been tested in humans or animals. Safety and effectiveness have not always been proven. Some of these conditions are potentially serious, and should be evaluated by a qualified healthcare provider.

Hyperlipidemia
Numerous trials have examined the effects of oral beta-glucan on cholesterol. Small reductions in total and LDL cholesterol ("bad" cholesterol) have been reported. Little to no significant changes have been noted to occur on triglyceride levels or HDL ("good" cholesterol) levels. The sum of existing positive evidence is suggestive and not definitive.

Diabetes
There are several human trials supporting the use of beta-glucan for glycemic (blood sugar) control. Although earl evidence is promising, additional study is needed before a firm recommendation can
be made.

Antioxidant
In patients with high blood pressure, foods containing oat beta-glucan did not appear to have antioxidant effects. More research is needed before a conclusion can be made.

Burns
Beta-glucan collagen matrix, which combines the carbohydrate beta-glucan with collagen, has been used as a temporary coverage for partial thickness burns with good results. Beta-glucan collagen matrix may help reduce pain, improve healing, and lessen scar appearance. However, further study is needed to confirm these results.

Cancer
Treatment with a beta-glucan, called lentinan, plus chemotherapy (S-1) may help prolong the lives of patients with gastric cancer that has returned or cannot be operated on. More research is needed in this area.

Cardiovascular disease
Evidence suggests that reductions in endothelial function induced by a high fat meal may be prevented when a high fat meal is taken along with a beta-glucan-containing cereal or vitamin E. Diabetes, hyperlipidemia (high cholesterol), and hypertension (high blood pressure) data are also promising. Further study is needed in this area.

Diagnostic procedure
Early research suggests that the amount of beta-glucan detected in the body may help doctors diagnose and monitor fungal infections, called candidiasis.

Heart protection during coronary artery bypass grafting (CABG)
Early research suggests that treatment with beta glucan before a heart surgery, called coronary artery bypass grafting (CABG), may help protect against heart damage. More research is needed in this area.

High blood pressure
There is insufficient evidence to recommend for or against the use of beta-glucan for high blood pressure. Better study is needed to determine a relationship.

Immune stimulation
Beta glucan may boost the immune system. Therefore, it has been studied as a possible way to increase the effectiveness of cancer treatments. Although early research is promising, more studies are needed to determine if beta-glucan can help treat breast cancer patients.

Infections
PGG-glucan, an immunomodulator, has been studied in patients undergoing surgery, particularly abdominal surgery. Currently, PGG-glucan appears to have positive results in decreasing postoperative infection. More study is warranted to make a firm recommendation.

Weight loss
Researchers suggest different types of fiber may have an effect on satiety and energy intake. Short-term use of fermentable fiber or nonfermentable fiber supplements does not appear to promote weight loss. More study is needed to confirm these findings.

Tradition/Theory

The below uses are based on tradition, scientific theories, or limited research. They often have not been thoroughly tested in humans, and safety and effectiveness have not always been proven. Some of these conditions are potentially serious, and should be evaluated by a qualified healthcare provider. There may be other proposed uses that are not listed below.

- Allergies, anti-aging, antibacterial, antiparasitic, antiviral, asthma, atherosclerosis (hardening of the arteries), bedsores, bladder sphincter disorders (sphincter deficiency), colorectal adenocarcinomas, common cold, constipation, Crohn's disease, dermatitis, diabetic ulcers, diarrhea, diverticulitis (colon), ear infections, eczema, fibromyalgia, hepatitis, HIV/AIDS, immunomodulator, immunostimulant, influenza, lung tumor, Lyme disease, multiple sclerosis (MS), radiation burns, respiratory infections, rheumatoid arthritis, shock, skin care, skin conditions, ulcerative colitis, wounds, wrinkle prevention.
Dosing

The below doses are based on scientific research, publications, traditional use, or expert opinion. Many herbs and supplements have not been thoroughly tested, and safety and effectiveness may not be proven. Brands may be made differently, with variable ingredients, even within the same brand. The below doses may not apply to all products. You should read product labels, and discuss doses with a qualified healthcare provider before starting therapy.

Adults (18 years and older)

- Beta-glucan has been taken by mouth for a variety of conditions. Cereals containing beta-glucan or concentrates containing fiber (typically 8-15 grams of beta-glucan) are the most common forms. For hyperlipidemia, 3-16 grams of beta-glucan daily have been studied and found moderately effective in reducing HDL ("bad" cholesterol) levels. For high blood pressure, 5.52 grams of beta-glucan daily have been studied. For cardiovascular disease, 4 servings daily of two dietary fibers, beta-glucan (0.75 grams per serving) and psyllium (1.78 grams per serving), have been studied. For diabetes, 50-90 grams carbohydrate portions of barley grain with meals have been studied for up to 12 weeks. Higher amounts of fiber and beta-glucan may result in a stronger effect. In addition, 10 grams of a barley beta-glucan fiber supplement (Cerogen®) that contained 6.31 grams of beta-glucan has been added to foods and drinks. For breast cancer, patients have taken 1-3, 1-6, D-beta glucan daily for 15 days. For heart protection during coronary artery bypass grafting (CABG), 700 milligrams or 1,400 milligrams of beta-1,3/1,6-glucan has been taken for five days in a row before surgery.
- Beta-glucan has also been applied to burns on the skin as a collagen matrix for 24 hours.
- Injections of beta-glucan forms have also been studied, and these should only be given under the guidance of a qualified healthcare professional, including a pharmacist.

Children (younger than 18 years)

- There is no proven safe or effective dose for beta-glucan in children, and use is not recommended.

Safety

The U.S. Food and Drug Administration does not strictly regulate herbs and supplements. There is no guarantee of strength, purity or safety of products, and effects may vary. You should always read product labels. If you have a medical condition, or are taking other drugs, herbs, or supplements, you should speak with a qualified healthcare provider before starting a new therapy. Consult a healthcare provider immediately if you experience side effects.

Allergies

- Avoid in individuals with a known allergy or hypersensitivity to beta-glucan.

Side Effects and Warnings

- Taken by mouth, both yeast and fungal beta-glucans seem to be well tolerated with minimal adverse effects. Beta-glucan has a generally regarded as safe (GRAS) status in the United States. Lentinan and schizophyllan have been safely used in studies. Although not well studied in humans, the co-administration of aspirin and/or non-steroidal anti-inflammatory drugs (NSAIDs) with beta-glucan can lead to severe gastrointestinal damage resulting in enteric-induced bacterial peritonitis.
• There is insufficient information regarding the safety of beta-glucans when used topically (applied on the skin) or subcutaneously (injected under the skin).
• Most studies that have evaluated the parenteral use of beta-glucans have used specific forms including PGG-glucan from a proprietary strain of *Saccharomyces cerevisiae* and certain fungal-derived beta-glucans lentinan and schizophyllan (SPG). PGG-glucan has been safely used in studies when given at the appropriate times under the guidance of a qualified healthcare professional.
• When given intravenously, beta-glucans may cause dizziness, headaches, nausea, vomiting, diarrhea, constipation, hives, flushing, rash, high or low blood pressure, or excessive urination.
• Beta-glucan has also been associated with inflammatory airway disease and lung inflammation.
• Particulate beta-glucan may not be safe. Preliminary evidence suggests intravenous beta-glucans in the microparticulate form may cause serious side effects such as hepatosplenomegaly, granuloma formation, and microembolization.
• Use cautiously in AIDS or AIDS-related complex (ARC) patients. Keratoderma of the palms and soles may develop in these patients who are receiving yeast beta-glucans. The condition may begin during the first two weeks of therapy and resolve 2-4 weeks after discontinuation of beta-glucans.

**Pregnancy and Breastfeeding**

• Beta-glucan is not recommended in pregnant or breastfeeding women due to a lack of available scientific evidence.

**Interactions**

*Most herbs and supplements have not been thoroughly tested for interactions with other herbs, supplements, drugs, or foods. The interactions listed below are based on reports in scientific publications, laboratory experiments, or traditional use. You should always read product labels. If you have a medical condition, or are taking other drugs, herbs, or supplements, you should speak with a qualified healthcare provider before starting a new therapy.*

**Interactions with Drugs**

• Lentinan may interfere with the way the body processes certain drugs using the liver's "cytochrome P450" enzyme system. As a result, the levels of these drugs may be increased in the blood and may cause increased effects or potentially serious adverse reactions. Patients using any medications should check the package insert and speak with a qualified healthcare professional, including a pharmacist, about possible interactions.
• For wound healing after surgery, evidence suggests beta-glucans may reduce inflammation and speed the repair of surgical wounds. Severe gastrointestinal damage has been associated with intake of beta-glucan and most non-steroidal anti-inflammatory drugs, such as ibuprofen (Motrin®, Advil®) and aspirin. Caution is advised.
• Preliminary study suggests that a BCNU/beta-glucan combination may help to improve current chemotherapy treatment efficacy.
• Barley may lower blood sugar levels. Beta-glucan from other sources may alter blood glucose levels. Caution is advised when using medications that may also lower blood sugar. Patients taking drugs for diabetes by mouth or insulin should be monitored closely by a qualified healthcare provider. Medication adjustments may be necessary.
• Theoretically, beta-glucans may decrease the effects of immunosuppressants because of purported immunostimulant effects.
• Beta-glucan-containing sources have been used to treat hyperlipidemia and may act additively with other cholesterol-lowering agents.
• Although not well studied in humans, beta-glucan may alter blood pressure. Caution is advised in patients with low blood pressure or taking medications for high blood pressure. Consult with a qualified healthcare professional, including a pharmacist, before combining therapies.

• Fiber may affect the absorption of other oral agents by reducing gastrointestinal transit time.

• Hordenine, a chemical in the root of germinating barley, is a sympathomimetic and combination use may theoretically result in additive effects. Sympathomimetic effects include increased heart rate, sweating, and increased blood pressure. Check with a qualified healthcare professional, including a pharmacist, before combining therapies.

Interactions with Herbs and Dietary Supplements

• Lentinan may interfere with the way the body processes certain herbs or supplements using the liver's "cytochrome P450" enzyme system. As a result, the levels of other herbs or supplements may become too high in the blood. It may also alter the effects that other herbs or supplements possibly have on the P450 system.

• Beta-glucan-containing sources have been used to treat hyperlipidemia and may act additively with other cholesterol-lowering herbs and supplements, such as red yeast rice. The cholesterol-lowering effects of beta-glucan may increase when taken with plant stanol esters.

• Beta-glucan may reduce inflammation and speed the repair of surgical wounds. Severe gastrointestinal damage has been associated with intake of beta-glucan and most non-steroidal anti-inflammatory drugs (NSAIDs) or aspirin. Caution is advised when taking anti-inflammatory herbs and supplements in combination with beta-glucan.

• Barley may lower blood sugar levels. Beta-glucan from other sources may alter blood glucose levels. Caution is advised when using herbs or supplements that may also lower blood sugar. Blood glucose levels may require monitoring, and doses may need adjustment.

• Fiber may affect the absorption of other oral agents by reducing gastrointestinal transit time.

• Quercetin, selenium, vitamins A, C, and E, or alpha lipoic acid may enhance the antiviral qualities of beta-glucan.

• Although not well studied in humans, beta-glucan may alter blood pressure. Caution is advised in patients taking herbs or supplements for high blood pressure or those with low blood pressure. Consult with a qualified healthcare professional, including a pharmacist, before combining therapies.

Author Information

• This information is based on a systematic review of scientific literature edited and peer-reviewed by contributors to the Natural Standard Research Collaboration (www.naturalstandard.com).

References

Natural Standard developed the above evidence-based information based on a thorough systematic review of the available scientific articles. For comprehensive information about alternative and complementary therapies on the professional level, go to www.naturalstandard.com. Selected references are listed below.


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