



# SUPPLEMENT

## *Can They Boost the Immune System?*

Primary immunodeficiency patients often turn to supplements to help boost their immune systems, but there is little proof that they have any beneficial effect, and they are not regulated by the U.S. Food and Drug Administration.

By Mindy Hermann, MBA, RDN

**PRIMARY IMMUNODEFICIENCY (PI)** patients are more susceptible to a wide range of infections and infectious symptoms. Some fall under the specter of contagious illness and include infections of the ear, sinus, lungs and skin. Others, such as bowel disorders, may or may not be infectious and often are accompanied by inflammation. Because finding effective medications to prevent and manage many of the problems experienced not just by PI patients but also by the general public can be challenging, manufacturers and marketers have stepped in with a wide array of supplements that claim to help treat, prevent and manage inflammation and boost immunity.

A visit to the supplement section of any of the dozens of online and brick-and-mortar drugstores can be overwhelming. A single search on one chain's website for products with immune system benefits generated nearly 300 different nutrient and herbal supplements. For pneumonia alone, the site recommends

alpha-linolenic acid, fish oil, flaxseed oil, green tea, iodine, lactobacillus, larch arabinogalactan, schisandra, vitamin A, vitamin C and zinc, while the list for bronchitis names choline, cowslip, English ivy, gaba (gamma-aminobutyric acid), ginseng, great plantain, n-acetyl cysteine, serrapeptase, sorrel, South African geranium, thyme and vitamin C.

Supplement labels and accompanying materials describe the product's relationship to health, but most claims are neither scientifically supported nor approved by the U.S. Food and Drug Administration (FDA). Indeed, labels are required to state that their claims have not been evaluated by FDA and that products are not intended to diagnose, treat, cure or prevent any disease.

For the most part, supplements have not been shown to boost immunity. The immune system is quite complex, with many interdependent processes that are not yet fully understood. Not only are single supplements or supplement combinations unlikely



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to positively impact the immune system, but some supplements taken in high doses have been associated with negative side effects, including increased rates of tumor growth.

The reality, however, is that people with chronic conditions often take supplements despite the lack of scientific proof. This overview summarizes research and other information on some of the most popular supplements, including vitamins and minerals, being marketed for boosting immunity.

## Supplements Marketed to Boost Immunity

**Vitamin A** impacts T cells and B cells that play a role in the health of the mucosa, and vitamin A deficiency negatively affects the immune system. Supplement manufacturers recommend vitamin A for a wide range of skin and other disorders, including acne and eczema. But, it is unknown whether vitamin A supplements aid recovery from infections, enhance immunity or boost wound healing.

**Vitamin B2** claims regarding immune system enhancement are not supported by sufficient evidence in humans. The vitamin has been shown to increase resistance to certain infections in mice, however.

**Vitamin B6** deficiency is extremely rare. Like a deficiency of vitamin A, it suppresses certain immune responses involving T and B cells. Supplementation corrects the deficiency and relieves

deficiency symptoms but does not enhance immunity or prevent infections in people who are not deficient.

**Vitamin C** is a popular remedy for preventing and treating the common cold. Some people also take vitamin C for bronchitis and bladder infections. Evidence suggests that vitamin C may help shorten the duration of the common cold but does not prevent it.

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**Vitamin D** has been shown to stimulate the body's response against the bacterium that causes tuberculosis. Vitamin D also may alleviate some of the skin symptoms associated with autoimmune diseases such as scleroderma and lupus, particularly when vitamin D supplements are taken to correct a disease-related deficiency of vitamin D in the body.

**Zinc** plays an important role in the health of the immune system, specifically related to proper functioning of T cells. While it is widely used to treat colds, prevent respiratory infections, boost

the immune system and treat certain skin conditions, evidence to support such uses is extremely limited. Zinc lozenges appear to shorten the length of a cold but do not prevent it. Additionally, zinc has not been shown to help treat the joint symptoms and inflammation of psoriatic arthritis or rheumatoid arthritis.

**Aloe vera** is more commonly used on the skin than as an oral supplement. Topical aloe vera appears to aid skin healing for minor conditions, but oral supplements have not been shown to have an effect on the immune system.

**Andrographis paniculata** is one of a group of Chinese herbs with suggested anti-inflammatory and anti-microbial properties. It has not been adequately studied in humans.

**Astragalus** is popular in Chinese medicine for supporting and boosting the immune system. Two of the more than 2,000 species, *Astragalus membranaceus* and *Astragalus mongholicus*, are most commonly used for such purposes as treating colds and upper-respiratory infections. High-quality human trials and scientific evidence for the benefits of astragalus are lacking.

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**Black elderberry extract** made from the berries and flowers of the elder tree is a popular remedy for infections, colds and flu. A handful of studies support its ability to relieve symptoms of flu and, in combination with antibiotics, sinus infections, but additional evidence is still needed to confirm the benefits of this supplement.

**Echinacea purpurea** is one of nine known species of this popular plant that is native to the United States. It is heavily promoted

as an immune stimulant that prevents and treats colds and upper-respiratory infections. Few studies have been well-designed, and results on the benefits of Echinacea against the common cold have been inconsistent. The National Institutes of Health (NIH) National Center for Complementary and Alternative Medicine (NCCAM), recently renamed the National Center for Complementary and Integrative Health (NCCIH), is studying the potential benefits of Echinacea in treating upper-respiratory infections and boosting immunity. Echinacea may cause allergic reactions in people who are allergic to ragweed.

**Garlic** enjoys a long history of use for boosting the immune system, fighting infections and preventing illness. While laboratory research supports the ability of garlic to suppress certain bacteria, viruses and fungi, these actions have not been proven in humans.

**Ginger root** is best known as a remedy for stomach upset and nausea. It also is taken to relieve joint and muscle pain, as well as symptoms of rheumatoid arthritis, but it has not yet been proven to be effective.

**Ginkgo biloba** is a tree whose leaf extract has been recommended for treating bronchitis and other respiratory illnesses. More evidence is needed on the effectiveness of the leaf extract and seeds, which can be toxic when consumed in large amounts.

**Ginseng** is generally categorized as American or Siberian/Chinese/Asian. American ginseng differs from the Asian varieties. It is promoted for immune stimulation and prevention and treatment of colds and flu. Evidence suggests that certain American ginseng products might reduce risk of getting the flu or colds and shorten their duration. Side effects can include diarrhea, nervousness and heart-related symptoms. Siberian ginseng supplements have been shown to improve cold symptoms when taken in a product that also contains the herb andrographis. NCCIH supports research to study ginseng and notes that additional large-scale studies are needed to prove its efficacy. Patients should discuss ginseng with their doctors before using it as a supplement since it may interact with certain prescription medications.

**Glycyrrhiza glabra** (licorice root) has been studied in combination with other herbs, and evidence is lacking on licorice root alone. A common folk remedy for bronchitis and sore throat, licorice root interacts with numerous medications and should be avoided or used only with extreme caution.

**Goldenseal**, and its active compound berberine, is a traditional folk medicine for treating colds and other respiratory tract infections, eye infections and stomach and intestinal disorders.

Goldenseal is sold as an extract, in capsules or combined with Echinacea for treating colds. Few studies support its effectiveness against any health conditions or its safety. Several of the potentially active compounds in goldenseal, including berberine, are poorly absorbed from the gastrointestinal tract when goldenseal is taken by mouth.

Goldenseal may interfere with the way that the liver processes a large number of drugs, speeding up or slowing the rate at which the liver breaks them down. This can change the effects and side effects of the particular medications. Medications that are activated in the liver include amitriptyline (Elavil), clarithromycin (Biaxin), clozapine (Clozaril), codeine, desipramine (Norpramin), donepezil (Aricept), fexofenadine (Allegra), fentanyl (Duragesic), flecainide (Tambocor), fluoxetine (Prozac), indinavir (Crixivan), itraconazole (Sporanox), ketoconazole (Nizoral), lovastatin (Mevacor), meperidine (Demerol), methadone (Dolophine), metoprolol (Lopressor, Toprol XL), olanzapine (Zyprexa), ondansetron (Zofran), sildenafil (Viagra), tramadol (Ultram), trazodone (Desyrel) and others. PI patients who are considering taking goldenseal should talk first with their healthcare provider.

**Mushrooms** and fungi are thought to confer benefits to the immune system by interacting with bacteria and other microorganisms in the gut. In Asia, a parasitic fungus called cordyceps produces compounds that may stimulate the immune system and also prevent cancer. Further study is needed on the potential relationship between health status and mushrooms in general and certain fungi in particular.

**Probiotics** are beneficial bacteria cultures that establish a stronghold in the large intestine and benefit health by crowding out harmful bacteria, boosting immune function in the intestine and possibly strengthening the body's immune system. In addition to common probiotic strains such as Lactobacillus and Bifidobacterium, probiotics supplements provide any number of lesser-known strains. Some supplements also contain inulin or other types of fiber that serve as food for the bacteria. These are called prebiotics. Research results on probiotics are promising but not yet conclusive.

## Benefits of Supplements

Should PI patients take supplements? Supplements are not monitored or regulated by FDA, which means that the dose of the active compounds may be inaccurate or sometimes unknown. It also means that they may contain other substances not listed on the ingredients. In February, New York's attorney general directed four major retailers — GNC,

Target, Walmart and Walgreens — to stop selling some of their store-brand herbal supplements because they did not contain ingredients they claimed to and they contained ingredients not listed on their labels. Seventy-nine percent of the products tested had no DNA of the plants listed on the labels or were contaminated by other material, including rice, beans, pine and wheat. While instances like these are rare, there have been cases of people harmed by toxic or pharmacologic contamination of over-the-counter supplements. And, just like medication, supplements can cause hypersensitivity reactions. Furthermore, supplement-drug interactions are a very important issue. Lastly, there is tremendous finan-

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cial cost often associated with these products, which have no proven benefit in nearly all cases.

Patients with PI should consult with their physician and check the excellent resources provided by NIH before adding supplements to their daily regimen. Nothing takes the place of a healthy lifestyle for supporting the immune system as best as possible. Positive actions include not smoking, eating a healthful and balanced diet, incorporating physical activity when possible, maintaining a healthy weight, getting enough sleep, managing other health conditions, practicing food and personal safety to avoid infections, and seeing a doctor regularly. ■

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### Resources

- Harvard Health Publications/Harvard Medical School: [www.health.harvard.edu](http://www.health.harvard.edu)
- MedlinePlus/Herbs and Supplements: [www.nlm.nih.gov/medlineplus/druginfo/herb\\_All.html](http://www.nlm.nih.gov/medlineplus/druginfo/herb_All.html)
- NIH National Center for Complementary and Integrative Health (NCCIH): [www.nccam.nih.gov](http://www.nccam.nih.gov)
- NIH Office of Dietary Supplements: [www.ods.od.nih.gov](http://www.ods.od.nih.gov)
- Khouri, A. 4 Big Retailers Accused of Selling Herbal Formulas Containing No Herbs. *Los Angeles Times*, Feb. 3, 2015. Accessed at [www.latimes.com/business/la-fi-herbal-supplements-probe-20150203-story.html](http://www.latimes.com/business/la-fi-herbal-supplements-probe-20150203-story.html)