

Communicating with Consumers about Immune Supplements



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THE IMMUNE HEALTH SUPPLEMENT MARKET

- Fear of COVID has motivated many people to use dietary supplement to support immune health
- Immune health represented 15% of global dietary supplement market in 2020
- Immune health supplement sales grew 25% in North America in 2020
- In January 2021, Google searches for “immunity supplement” were three times higher than the same period the previous year
- Even with the growth curve normalizing in the coming years, expecting a lasting increase of \$1.5 billion over pre-COVID forecasts for cold, flu and immunity



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2

CAN'T ADDRESS DIETARY SUPPLEMENTS FOR COVID

- You *can* address supplements in context of problem/solution. For example:

- Research shows your immune response isn't as good during the colder months compared to warmer months.¹
- Chronic stress can cause almost all measures of your immune system function drop across the board.²
- Poor diet can compromise immune response.²
 - Sugary foods have been shown to weaken immune response.³



1. Khoo AL, et al. J Infect Dis. 2011;203(1):122-30. 2. Segerstrom SC, Miller GE. Psychol Bull 2004;130(4):601-30. 3. Sanchez A, et al. Am J Clin Nutr. 1973;26(11):1180-4.

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3

ADDRESS NUTRACEUTICAL'S ROLE IN IMMUNE HEALTH

- *Don't address role in disease—just in immune function*
- **Vitamin C** – Supplementation can positively impact multiple components of immune response.¹
- **Zinc** – Supplementation can decrease oxidative stress markers and other undesirable compounds.²
- **Selenium** – Supplementation has been shown to support immune response associated with a flu vaccine.³
- **Beta 1,3/1,6 glucan** – Supplementation primes and promotes key immune functions w/o overstimulating immune system.⁴
- **Echinacea** – Supplementation promotes the function of white blood cells.⁵

1. Food and Nutrition Board, Institute of Medicine. Vitamin C. Dietary Reference Intakes for Vitamin C, Vitamin E, Selenium, and Carotenoids. Washington D.C.: National Academy Press; 2000:117. 2. Prasad AS. Mol Med 2008; 14(5-6): 353-7. 3. Goldson AJ, et al. PLoS One. 2011;6(3):e14771. 4. Fuller R, et al. Nutrition. 2012 Jun;28(6):665-9. 5. See DM, et al. Immunopharmacol 1997;35:229-35.

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4

EDUCATE YOUR EMPLOYEES ABOUT...

- **The role of nutraceuticals in immune health**
 - Hold internal training sessions
 - Provide third-party literature
- **Regulatory considerations**
 - Speaking in structure/function language
 - Avoiding discussions about disease/drug claims
- **Resources**
 - Appropriate third-party literature can be found at <https://www.huhs.edu/literature-articles/>
 - NANP offers the Certified Dietary Supplement Professional program, which includes training on regulations

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A graphic with the words "Thank You" written in a white, elegant cursive font inside a white oval. The oval is centered on a background split into a blue vertical bar on the left and a dark purple vertical bar on the right.


Thank You

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HERBAL Alternatives to ANTIBIOTICS



An antibiotic might be described as an antibacterial agent that inhibits bacterial growth or kills bacteria. However, colds and many other upper respiratory infections, as well as some ear infections, are caused by viruses, not bacteria. If antibiotics are used too often for things they can't treat—like colds or other viral infections—they can stop working effectively against bacterial infections. This phenomenon is known as *antibiotic resistance*, and is a direct result of antibiotic overuse.¹ As it currently stands, antibiotic overuse represents a significant health risk to modern society. This article will examine antibiotic overuse, as well as the use of herbal medicines that may present a viable alternative to the use of antibiotics or when antibiotics are not indicated.

A Historical Perspective

At the beginning of the 20th century, illnesses caused by infectious diseases ranked as the most common cause of death in North America. By the middle of the century, the diagnosis, prevention, and management of infectious diseases had advanced dramatically, raising false hopes that many infectious diseases would be eliminated by the end of the 20th century. Unfortunately, clinicians, public health officials, and microbiologists have confronted an unprecedented number of resurgent and “new” infectious diseases on a global scale, with antibiotic resistance being among the new diseases represents one of the most serious threats to human health, and a serious threat to the treatment of infectious diseases.²

Ramifications Of Antibiotic Resistance

The overuse of antibiotics contributes to the emergence of antibiotic-resistant infections (ARIs) that are costly and difficult to treat.³⁻⁴ Ongoing and consistent use of antibiotics allows microbes the opportunity to evolve, enabling them to efficiently adapt to new environments. A single dose of antibiotics leads to a greater risk of resistant organisms to that antibiotic in the person for up to a year.⁵ Drug-resistant “superbug” infections, such as Methicillin-resistant *Staphylococcus aureus* (MRSA) and *Clostridium difficile*, are a significant cause of mortality. In 2005, more than 95,000 people in the U.S. developed severe MRSA infections, which led to 9,000 deaths.^{6,7} In the U.S., ARIs are responsible for \$20 billion in excess health care costs, \$35 billion in societal costs and \$8 million in additional hospital days. Reducing ARIs by just 20 percent would save \$3.2 to \$5.2 billion in health care costs each year and eliminate up to \$11.3 million in additional in-hospital days for patients with ARIs.⁸ Even mainstream media has recognized the problem.

According to a report by CBS News:

Antibiotic overuse has led to the growth of drug-resistant strains of bacteria. Each year 90,000 Americans die from health care-associated infections, many of which are drug-resistant. And, the number is growing. From 1993 to 2005 the number of hospital stays involving Methicillin-resistant *Staphylococcus aureus* (MRSA)—bacteria that causes severe infections such as bloodstream infections, surgical site infections, or pneumonia—went up from 1,900 to 368,000 in the U.S. alone. Deaths due to *Clostridium difficile*—bacteria commonly known as C. diff that causes several diarrhea and intestinal problems—went up 35 percent each year from 1999 to 2004.⁹

Reasons For Antibiotic Overuse

So why are antibiotics overused in the first instance? The answer is four-pronged. First, determining if an infection is viral or bacterial is expensive and time-consuming and concerns over malpractice lead many physicians to over-prescribe antibiotics.^{10,11} Second, some patients pressure providers to prescribe antibiotics for conditions for which they are inappropriate, such as the common cold or sore throat, or inappropriately save antibiotics for later use, both of which can lead to increased antibiotic resistance.^{12,13} Third, approximately 70 percent of antibiotics used in the U.S. are used in the non-therapeutic (prophylactic) treatment of livestock cattle, swine, and poultry, and although the FDA issued voluntary guidelines in 2010 urging farmers not to use antibiotics for livestock growth, the guidelines are not yet mandatory.^{14,15} Fourth, evidence-based research on appropriate and inappropriate antibiotic use is often lacking in the medical community.¹⁶ A fifth reason may be public ignorance.

An Unfortunate Case Of Ignorance

Part of the growing problem of antibiotic resistance in the United States may be attributed to the fact that many Americans don't know what the drugs should be used for and what they can actually do. The Pew Charitable Trusts in conjunction with the Centers for Disease Control and Prevention (CDC) surveyed 1,004 adults about their understanding about the use of antibiotics. In addition, they asked focus groups of frequent antibiotic users as well as a cross section of adults about their antibiotic-use beliefs and habits. Only 44 percent of surveyed Americans recognized as *somewhat or a big problem* that some diseases are becoming resistant to antibiotics. While 90 percent of Americans recognize that antibiotics can fight

bacterial infections like strep throat, more than one-third falsely believe that they are also effective at fighting viral infections like the common cold. Furthermore, only 47 percent of Americans realize that their overuse of prescription antibiotics can harm others beside themselves.¹⁷

What Is The Goal?

In considering herbal alternatives to antibiotics, it is important to examine the intended goal in using the specific herbal medicine. Is the purpose of the herb to 1) stimulate and promote your body's own healthy immune response, 2) directly do battle with bacteria, or 3) both? From my perspective as a credentialed herbalist and nutritionist, it is important to do both. First and foremost, you should always strive to make your immune system as healthy and functional as possible. This way, when unwanted bacteria and viruses do invade, your immune system will be in a good position to fit back. Following is a discussion of a few key herbs (and a few other dietary supplements) that can help you achieve these goals. Please keep in mind that given the space limitations of this article, it will not be possible to address all immune/antibacterial herbs. However, for a comprehensive treatise on the topic, I recommend *Herbal Antibiotics: Natural Alternatives for Treating Drug-Resistant Bacteria*, by Stephen Harrod Buhner.

Diet And The Immune System

Before jumping into the herbs, I just want to say a couple of words about your diet. It is important to restrict sugar since sugar interferes with the ability of white blood cells to destroy bacteria. I'm not talking about the type or amount of sugar you get from eating fruit, but rather the amount you get from drinking soda and eating sweets and other junk food. Likewise, alcohol interferes with a wide variety of immune defenses, and excessive dietary fat reduces natural killer cell activity. So just eating a healthy diet can be beneficial for good immune function.¹⁸ Now, onto the herbs.

Echinacea

Arguably, *Echinacea* is the granddaddy of all immune-enhancing herbs. Best known for its use in the treatment of the common cold, there are three species of *Echinacea* commonly used in herbal medicine: *Echinacea purpurea*, *E. angustifolia*, and *E. pallida* (of these, the first two are most popular). The aerial (above ground) parts of the herb and the root contain the medicinal components, including phenolics, caffeic acid esters (e.g., echinacosides), flavonoids, alkylamides, volatile oils, polysaccharides, polyacetylenes.¹⁹

Echinacea is an immune stimulant/supporter. It is excellent in helping to prevent and treat colds and influenza. Research reveals that *Echinacea* supports the immune system by activating white blood cells (lymphocytes and macrophages).²⁰ *Echinacea* also increases the production of interferon, an immune component that is important in responding to viral infections.²¹

Several double-blind, clinical studies have confirmed *Echinacea*'s effectiveness in treating colds and flu.^{22,23,24,25} However, some research suggests that *Echinacea* may be more effective if used at the onset of these conditions.^{26,27} One

study involving 238 subjects confirmed that *Echinacea* was safe and effective in producing a rapid improvement of cold symptoms. In the subgroup of patients who started therapy at an early phase of their cold, the effectiveness of *Echinacea* was most prominent.²⁸ In a similar study, 246 subjects with a cold were treated with *Echinacea* preparations or a placebo. Those treated with the *Echinacea* preparations experienced a reduction of symptoms, significantly more effective than the placebo. The researchers concluded that the *Echinacea* preparations “represent a low risk and effective alternative to the standard symptomatic medicines in the acute treatment of common cold.”²⁹

In a meta-analysis of 14 studies³⁰, researchers found that taking *Echinacea* cut the risk of catching the common cold by 58 percent, and if subjects already had a cold it decreased the duration by 1.4 days. In one of the studies, *Echinacea* taken in combination with vitamin C reduced cold incidence by 86 percent, and when the herbal was used alone the incidence of cold was reduced by 65 percent. The bottom line is that when used appropriately, *Echinacea* is effective in preventing and treating the common cold.

NOTE: A much-publicized study from the July 28, 2005 issue of the *New England Journal of Medicine*¹ concluded that *Echinacea* did not have a significant effect on infection with a rhinovirus (one of the 200 viruses that can cause the common cold), but the methodology has been strongly questioned by herbal experts. One such error in methodology is the fact that the study did not use a commercially available product, and dosage was lower than the dose typically used in research and common practice.

Besides colds and flu, Germany's *Commission E Monographs* (an internationally authoritative source of credible information on the use of herbs for various disorders) indicates that among *Echinacea*'s uses, this herb can be used to treat chronic infections of the respiratory tract.³¹ Other current and evidence based uses of *Echinacea* include, but are not limited to: Vaginal candidiasis, ear, urinary and sinus infections, allergies, herpes, cystitis, bronchitis, prostatitis, tonsillitis, and laryngitis.³²

A good dosage range for *Echinacea* extract is 200–300 mg, jumping up to 900–1200 mg daily (in 3–5 divided doses) for acute infection (e.g. cold or flu).³³ While some sources have suggested that *Echinacea* should not be used with drugs intended to suppress the immune system, such suggestions are speculative and lack clinical documentation.³⁴

At this point it should also be noted there is a popular misconception that *Echinacea* should only be used for a limited period of time, since it will cease its effectiveness otherwise. This misconception was based upon misinterpretations of a specific study on *Echinacea*, which demonstrated decreased immune activity after about 10 days.³⁵ However, if the study is carefully read, it is clear that the *Echinacea* was only administered for five days; after which point it was discontinued. Only when it was discontinued did immune activity begin to decline; and even then it still remained elevated above normal for a few days.³⁶ Furthermore, other research (as well as a history of traditional use) support the effectiveness of *Echinacea* when used for extended periods of time.¹¹

Andrographis and Eleutherococcus senticosus

Andrographis paniculata has a history of use in both Ayurvedic and traditional Chinese medicine.³⁷ It contains a number of bitter constituents, which appear to have both immune-stimulating and anti-inflammatory activity.³⁸ Double-blind studies have found that *Andrographis* may help reduce the severity of symptoms in individuals suffering from the common cold.^{39, 40, 41, 42}

In the very recent past, *Eleutherococcus senticosus*, or Eleuthero for short, was commonly called “Siberian Ginseng.” This name was botanically incorrect since Eleuthero is not even in the same genus (plant family) as *Panax ginseng*. Nevertheless, like *Panax* species, Eleuthero shows excellent adaptogenic activity (an adaptogen is an agent that helps the body adapt to stress). Russian explorers, divers, sailors, and miners also used Eleuthero to prevent stress-related illness.⁴³ In addition, evidence also suggests that Eleuthero may prove valuable in the long-term management of various diseases of the immune system, including HIV infection and chronic fatigue syndrome.⁴⁴ In Chinese medicine, it was used to prevent respiratory tract infections, colds and flu.

Of particular interest is using a combination of *Andrographis* and Eleuthero to treat upper respiratory infections. In two randomized, parallel-group clinical studies⁴⁵, patients diagnosed with influenza (540 patients and 66 patients, respectively) were treated with a combination of *Andrographis* and Eleuthero, or nothing at all (in the control group). In both studies, the differences in the duration of sick leave (7.2 days versus 9.8 days in the control group) and frequency of post-influenza complications indicated that the *Andrographis*/Eleuthero combination contributed to quicker recovery and reduced the risk of post-influenza complications. The results showed that in *Andrographis*/Eleuthero-treated patients the symptoms had become less pronounced and the temperature had returned more rapidly to normal values, and symptoms such as headache, muscle pain, and conjunctivitis disappeared sooner than in patients of the control group.

In addition, two randomized double-blind, placebo-controlled parallel group clinical trials⁴⁶ were performed to investigate the effect of an *Andrographis*/Eleuthero combination in the treatment of uncomplicated upper-respiratory tract infections. This includes common cold, rhinitis, nasopharyngitis (Inflammation of the nasal passages and of upper sore throat) and pharyngitis (sore throat). There were 46 patients in one study, and 179 patients in another. In both studies, the total symptom score and total diagnosis score showed highly significant improvement in the *Andrographis*/Eleuthero group as compared with the placebo. Throat symptoms/signs, were found to show the most significant improvement. There was a 55 percent better improvement in the symptom score for the treatment group as compared with the placebo group.

Also, a double-blind, placebo-controlled, parallel-group clinical study⁴⁷ was carried out to evaluate the effect of an *Andrographis*/Eleuthero combination in the treatment of acute upper respiratory tract infections, including sinusitis. Ninety-five individuals in the treatment group and 90 individuals in the placebo group completed the study according to the protocol.

Temperature, headache, muscle aches, throat symptoms, cough, nasal symptoms, general malaise and eye symptoms were taken as outcome measures with given scores. The total score analysis showed a highly significant improvement in the *Andrographis*/Eleuthero combination group versus the placebo. The individual symptoms of headache and nasal and throat symptoms together with general malaise showed the most significant improvement while cough and eye symptoms did not differ significantly between the groups. Temperature was moderately reduced in the *Andrographis*/Eleuthero combination group. The authors of the study concluded that the *Andrographis*/Eleuthero combination had a positive effect in the treatment of acute upper respiratory tract infections and also relieved the inflammatory symptoms of sinusitis.

Doses of *Andrographis*/Eleuthero should be in the range of in the range of 340 mg *Andrographis paniculata* extract (providing 21 mg andrographolide and deoxyandrographolide), 39 mg Eleuthero extract (providing 2 percent total Eleutheroside B and Eleutheroside E).

Berberine

Berberine is a bitter-tasting, yellow, plant alkaloid found in the roots of various herbs, including goldenseal (*Hydrastis canadensis*), barberry (*Berberis vulgaris*), Oregon grape (*Berberis aquifolium*), goldthread (*Coptis chinensis*) and tree turmeric (*Berberis aristata*). This compound has a long history of medicinal use in Chinese and Ayurvedic medicine. Berberine containing plants may help promote immune response by increasing the production of antigen specific immunoglobulins,⁴⁸ and may also have a direct effect against bacteria.^{49, 50} For example, berberine may help fight urinary tract infections since it inhibits bacteria from adhering to the wall of the urinary bladder.⁵¹ One possible mechanism by which this takes place is that berberine might inhibit bacterial sortase, a protein responsible for anchoring bacteria to cell membranes.⁵² Berberine was also shown to be effective in an integrative treatment against patients with chloroquine-resistant malaria⁵³ and bacterial-induced diarrhea.⁵⁴

In addition, berberine has activity against *Candida* yeast.⁵⁵ In fact, berberine was demonstrated to be effective in reducing the growth of the invasive mycelial form of *Candida albicans*.⁵⁶ In addition, extracellular enzymes secreted by *Candida albicans* are considered to be responsible for penetration of the yeast into host cells, and general overgrowth. Berberine has been shown to reduce these enzymes and the consequent adherence of *Candida* to epithelial cells. Furthermore, berberine was able to suppress symptoms of *Candida* overgrowth and accelerated elimination of the yeast.⁵⁷

Regardless of the herbal source, try to get 400 mg berberine daily.

Shiitake and AHCC

For thousands of years, mushrooms have been used as both food and medicine in various cultures. One of those mushrooms, Shiitake (*Lentinula edodes*)⁵⁸, is currently used for promoting healthy immune function⁵⁹, healthy liver function⁶⁰ and modulating the unwanted growth of mutated stomach⁶¹ and pancreas cells⁶², and has been validated in scientific literature for these purposes.

Active Hexose Correlated Compound (AHCC) is an extract derived from Shiitake, as well as other species of Basidiomycete family of mushrooms. AHCC is a mixture of polysaccharides, amino acids, lipids, and minerals. Oligosaccharides make up about 74 percent of AHCC.⁶³ Like its predecessor, AHCC has antioxidant effects, and is thought to act as a biological response modifier. It seems to promote the activity of natural killer (NK) cells in patients with unwanted growth of mutated cells. In animal models, it also seems to protect against carbon tetrachloride-induced liver damage, promote healthy blood glucose levels within a normal range, and decrease apoptosis (i.e., programmed cell death) of the thymus.⁶⁴

AHCC demonstrated early clinical promise in promoting healthy immune response. This was shown in animal research where AHCC helped restore immune response that had been negatively affected by trauma, infection, and food deprivation.⁶⁶ In humans, the effect of AHCC on immune response was investigated by measuring the number and function of circulating dendritic cells (DCs), a type of immune cell, in healthy volunteers. Twenty-one healthy volunteers were randomized to receive placebo or AHCC for four weeks. The results were that the AHCC group had a significantly higher number of total DCs compared to when they first started the study, and compared to the control subjects. Other types of immune cells were also significantly increased in the AHCC group compared to controls.⁶⁷

The effects of AHCC in a clinical setting were examined in patients who had surgery for the undesirable growth of mutated liver cells. A total of 269 patients participated in the study, with 113 receiving AHCC. The results were that the AHCC group had a significantly longer period of no recurrence of mutated liver cells, and an increased overall survival rate when compared to the control group.⁶⁸

A prospective cohort study was performed with 44 patients with undesirable growth of mutated liver cells. All of the patients underwent supportive care. Survival time, quality of life, clinical and immunological parameters related to liver function, cellular immunity, and patient status were determined. Of the 44 patients, 34 and 10 received AHCC and placebo (control) orally, respectively. Patients in the AHCC treated-group had a significantly prolonged survival when compared to the control group, and quality of life in terms of mental stability, general physical health status, and ability to have normal activities were significantly improved after three months of AHCC treatment.

An effective daily dose is 3–6 grams AHCC daily.

Pomegranates

Pomegranates are high in polyphenolic compounds, making its juice higher in antioxidant activity than red wine and green tea.⁷⁰ The most abundant of these compounds is ellagic acid, which has been shown in research to be the antioxidant responsible for the free-radical scavenging ability of pomegranate juice.⁷¹ According to some researchers⁷², the actions of pomegranate's components suggest a wide range of clinical applications for the treatment and prevention of cancer, as well as other diseases where chronic inflammation is believed to play an essential developmental role, suggesting immune modulatory activity. Of

particular interest where ARIs are concerned, one study⁷³ found that pomegranate had specific antibacterial activity against MRSA. The authors of that study suggest a beneficial effect from the daily intake of pomegranate “as dietary supplements to augment the human immune system’s antioxidant, antimalarial and antimicrobial capacities.”

The consumption of 2–8 ounces of pomegranate juice is a good daily dose.

Other Dietary Supplements For General Immune Response

In terms of dietary supplements, there are some general immune-promoting nutrients, which may have benefit promoting immune response:

- Vitamin A—Plays an important role in immune system function and helps mucous membranes, including those in the lungs, resist invasion by microorganisms.⁷⁴ Daily dose: 5,000-10,000 IU.
- Vitamin C—Stimulates the immune system by both elevating interferon levels and enhancing the activity of certain immune cells.⁷⁵ Daily dose: 500-1000 mg. Increase to 1000 mg every other waking hour during acute infection.
- Zinc—Marginal deficiencies result in impairments of immune function.⁷⁶ Supplementation with zinc has been shown to increase immune function in healthy people.⁷⁷ Daily dose: 15 mg. Increase to 15 mg, three times daily in lozenge form during acute infection.
- Probiotics—Probiotics are well established for their role in immune health, and have been shown to have efficacy in the treatment of bacterial vaginosis^{78, 79} and irritable bowel syndrome.⁸⁰ Daily dose: 5–10 billion CFU of *Lactobacillus* and/or *Bifidobacteria* species.

Conclusion

In addition to those listed, there are many other herbs with value to the immune system and/or with antibacterial properties. These include *Astragalus membranaceus*, *Picrorrhiza kurroa*, *Thuja occidentalis* and Green tea, just to name a few. If it wasn't included in this article, don't assume it doesn't have value. The fact is, it most likely does but I could only choose a few to discuss here. In any case, use of the herbs and other supplements discussed in this article may help you support and maintain a healthy immune system, which is your best defense against any bacteria and viruses. Likewise, some of these herbs may also have direct effects against specific microorganisms. Nevertheless, if you are sick you should see your doctor to have your individual situation assessed. ■

For references click here: [HTTP://TOTALHEALTHMAGAZINE.COM/REFERENCES/JANUARY.PDF](http://totalhealthmagazine.com/references/january.pdf)



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Keeping Your Immune System Healthy During the Holidays and Beyond

Gene Bruno, MS, MHS, RH(AHG)



Staying well and maintaining a healthy immune system can sometimes be challenging. These challenges can be even more significant during the holiday season, for three distinct reasons. The first is that immune response does not tend to be as effective during the colder months of fall and winter compared to warmer months.¹ Secondly, chronic stress can cause almost all measures of immune system function to drop across the board²—and who doesn't have increased stress during the holidays? The third reason is that poor diet can compromise immune response³—and poor diet is also not unusual during the holidays. In fact, the intake of fruit and vegetables drops by about 12 percent in the winter months,⁴ and this is exacerbated around holiday times during which overeating patterns are well established and are commonly seen to involve protein foods, starchy foods and sugary desserts.⁵ And speaking of sugary desserts, research in which blood drawn from normal human subjects after they consumed glucose, fructose, sucrose,

honey, or orange juice demonstrated a weakened immune response (significantly reduced capacity of certain white blood cells to battle bacteria).⁶ Of course the last thing you want is to get sick during the holidays, yet upper respiratory tract infections (e.g., colds, flu, etc.) occur more frequently during the cold winter months.⁷

Oh well, that's life. Nothing much you can do about it, right? In fact, there is a great deal you can do about it if you focus on promoting a strong, healthy immune system during the holidays and beyond. Besides taking care to maintain a healthy diet, the use of specific nutraceuticals can make a significant difference. This article will address those nutraceuticals.

THE IMMUNE SYSTEM

A good place to start the discussion is by defining the immune system. According to the National Institute of Allergy and Infectious Diseases:

The immune system is a network of cells, tissues, and organs that work together to protect the body

from infection. The human body provides an ideal environment for many microbes, such as viruses, bacteria, fungi, and parasites, and the immune system prevents and limits their entry and growth to maintain optimal health.⁸

Immune defenses may be divided into two broad categories: innate and adaptive. *Innate immunity* is the early phase of host response to infection, in which innate mechanisms recognize and respond to the presence of a pathogen. Innate immunity is present in all individuals at all times, does not increase with repeated exposure to a given pathogen, and discriminates between a group of related pathogens.⁹

Adaptive immunity is the response of antigen-specific lymphocytes to antigen, including the development of immunological memory (e.g. antibodies). Adaptive immune responses are generated by clonal selection of lymphocytes. Adaptive immune responses are distinct from innate and nonadaptive phases of immunity, which are not mediated by clonal selection of antigen-specific lymphocytes. Adaptive immune responses are also known as acquired immune responses¹⁰.

Ideally, in promoting a strong, healthy immune system, the goal should be to support both innate and adaptive immunity. Vitamin C,^{11, 12, 33} zinc,^{14, 15, 16} selenium,^{17, 18} beta 1,3/1,6 glucan^{19, 10} and *Echinacea*^{20, 21} are nutraceuticals that can help you to do that.

VITAMIN C

Consider that vitamin C has been shown to affect various components of the human immune response, including antimicrobial and natural killer cell activities, and lymphocyte proliferation. For the most part, the studies involved healthy, free-living populations who supplemented with 200 mg–6 g a day of vitamin C in addition to dietary vitamin intake. Hence, the results relate largely to the pharmacological range of vitamin C intakes rather than the nutritional range of intakes usually provided from food alone.²³ It should also be noted that immune competent cells accumulate vitamin C, with a close relationship between the vitamin and immune cell activity, especially phagocytosis activity and T-cell function. Accordingly, one of the consequences of vitamin C deficiency is impaired resistance to various pathogens, while an enhanced supply increases antibody activity and infection resistance.²⁴ In one randomized, controlled 5-year trial,²⁵ those who took 500 mg/day of supplemental vitamin C had a 66 percent lower risk of contracting three or more colds in a five-year period compared to those who took 50 mg/day of supplemental vitamin C. In another study,²⁶ 500 mg/day of vitamin C increased the SOD and catalase activities (powerful antioxidants) of immune cells known as lymphocytes. According to the U.S. Department of Agriculture, 31 percent of the U.S. population does not meet the estimated average requirement for vitamin C.²⁷

ZINC

Zinc is essential for the integrity of the immune system, and inadequate zinc intake has many adverse effects.²⁸ The immunologic mechanisms whereby zinc modulates increased

susceptibility to infection have been studied for several decades. It is clear that zinc affects multiple aspects of the immune system, from the barrier of the skin to gene regulation within lymphocytes. Zinc is crucial for normal development and function of cells mediating nonspecific immunity such as neutrophils and natural killer cells. Zinc deficiency also affects development of adaptive immunity.²⁹ Furthermore, in both young adults and elderly subjects, zinc supplementation decreased oxidative stress markers and generation of inflammatory cytokines.³⁰ According to the U.S. Department of Agriculture, 12 percent of the U.S. population does not meet the estimated average requirement for zinc.³¹

SELENIUM

Selenium is incorporated into a number of selenium-dependent antioxidant enzymes, also known as selenoproteins. These selenoproteins include glutathione peroxidases, which offer antioxidant protection against free radicals and other damaging reactive oxygen species.³² As such, there is much potential for selenium to influence the immune system. For example, the antioxidant glutathione peroxidases are likely to protect neutrophils from oxygen-derived radicals that are produced to kill ingested foreign organisms.³³ Of particular interest is a 12-week human intervention study³⁴ in which 119 volunteers took either a selenium supplement or a placebo daily to examine the response to an influenza vaccine. The results were that there was a heightened immune response in the selenium group (compared to placebo), further supporting the relationship between selenium status and immune function.

BETA 1,3/1,6 GLUCAN

A yeast beta 1,3/1,6 glucan derived from the cell wall of a proprietary strain of *Saccharomyces cerevisiae* has been well researched, and its mechanism of action for this beta 1,3/1,6 glucan well documented. Once swallowed, immune cells in the gastrointestinal tract take up beta 1,3/1,6 glucan and transport it to immune organs throughout the body. While in the immune organs, immune cells called macrophages digest beta 1,3/1,6 glucan into smaller fragments and slowly release them over a number of days. The fragments bind to neutrophils, which are the most abundant immune cells in the body, via complement receptor 3 (CR3). In fact, neutrophils account for 40–60 percent of all immune cells. Beta 1,3/1,6 glucan primes and strengthens the key immune function of neutrophils that now move more quickly throughout the body. It is important to note that beta 1,3/1,6 glucan boosts immune function without over stimulating the immune system. Also, multiple human clinical studies have shown that this beta 1,3/1,6 glucan is effective in the treatment of upper respiratory tract infections (URTI) such as the common cold.

In a randomized, double-blinded, placebo-controlled trial,³⁵ 250 mg/day of this beta 1,3/1,6 glucan or placebo was given to 100 healthy individuals during peak URTI season. The results were that beta 1,3/1,6 glucan decreased the total number of days with URTI symptoms by about 20 percent compared to the placebo group, and the ability to “breathe easily” was significantly improved in the beta 1,3/1,6 glucan group as well. Likewise, additional studies^{36, 37} have shown that 250 mg/day

of Wellmune WGP® this beta 1,3/1,6 glucan reduced URTI symptoms and improved mood state in stressed subjects, compared to placebo.

Since strenuous exercise is known to suppress immunity for up to 24 hours, another study³⁸ with 182 men and women examined if 250 mg/day of this beta 1,3/1,6 glucan could positively affect the immune system of individuals undergoing intense exercise stress, and reduce URTI symptomatic days. The results were that it was associated with a 37 percent reduction in the number of cold/flu symptom days post-strenuous exercise compared to placebo, and was also associated with a 32 percent increase in specific immune cells. Other research^{39, 40} has shown similar benefits with this beta 1,3/1,6 glucan in association with intense exercise. Also, in a study⁴¹ with firefighters, there was a lower incidence of URTI symptoms with perceived overall health significantly higher when supplementing with 200 mg/day of this beta 1,3/1,6 glucan compared to placebo.

In addition, a randomized, placebo-controlled, double-blind study⁴² found that 250 mg/day of this beta 1,3/1,6 glucan for four weeks improved allergy symptoms, overall physical health, and emotional well-being compared with placebo in "moderate" ragweed allergy sufferers during ragweed allergy season.

ECHINACEA

Arguably, *Echinacea* is the granddaddy of all immune-enhancing herbs. It is excellent in helping to prevent and treat colds and influenza. Research reveals that *Echinacea* supports the immune system by activating white blood cells (lymphocytes and macrophages).⁴³ *Echinacea* also increases the production of interferon, an immune component that is important in responding to viral infections.⁴⁴ There are three species of *Echinacea* commonly used in herbal medicine: *Echinacea purpurea*, *E. angustifolia*, and *E. pallida*. This article will feature *E. purpurea* root.

Two different studies^{45, 46} have examined the effects of short term use of *E. purpurea* root extract, equivalent to 930 mg/day. Results showed significant increases in T-cells (a type of immune cell). This is the type of quick response desired if you have a cold or the flu. This is also well within the approved dosage range of *E. purpurea* root approved by Health Canada⁴⁷ (Canada's version of the FDA) for use to help to fight off infections (especially of the upper respiratory tract), help relieve cold symptoms and shorten the duration of upper respiratory tract infections.

Several double-blind, clinical studies have confirmed *Echinacea*'s effectiveness in treating colds and flu.⁴⁸ However, some research suggests that *Echinacea* may be more effective if used at the onset of these conditions.^{51, 52} In a meta-analysis of 14 studies,⁵³ researchers found that taking *Echinacea* cut the risk of catching the common cold by 58 percent, and if subjects already had a cold it decreased the duration by 1.4 days. In one of the studies, *Echinacea* taken in combination with vitamin C reduced cold incidence by 86 percent, and when the herb was used alone the incidence of cold was reduced by 65 percent. The bottom line is that when used appropriately, *Echinacea* is effective in preventing and treating the common cold.

CONCLUSION

These nutraceuticals can help support innate and adaptive immunity, and may help stave off URTI, or reduce their symptoms and duration during the holiday season and throughout the entire year. If URTI symptoms arise, however, it is important to be aggressive, using the full amounts of vitamin C, beta 1,3/1,6 glucan and *Echinacea* discussed in this article, ideally in about three doses divided throughout the day.



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