



Promoting a Strong, Healthy Immune System

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Literature Education Series On Dietary Supplements

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Are you frequently the victim of the common cold or the flu? If so, you're not alone. Each year there are one billion cases of the common cold in the United States,¹ and each year 5 to 20 percent of the population is infected with the flu.² 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. In part, this can be achieved through the use of specific nutraceuticals. 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.³

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.⁴

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 responses.⁵

Ideally, in promoting a strong, healthy immune system, the goal should be to support both innate and adaptive immunity. Vitamin C,^{6 7 8} zinc,^{9 10 11} selenium,^{12 13} beta 1,3/1,6 glucan^{14 15} and *Echinacea*^{16 17} 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.¹⁸ 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.¹⁹ In one randomized, controlled 5-year trial,²⁰ those who took 500 mg/day of supplemental vitamin C had a 66% 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,²¹ 500 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% of the U.S. population does not meet the estimated average requirement for vitamin C.²²

Zinc

Zinc is essential for the integrity of the immune system, and inadequate zinc intake has many adverse effects.²³ 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.²⁴ Furthermore, in both young adults and elderly subjects, zinc supplementation decreased oxidative stress markers and generation of inflammatory cytokines.²⁵ According to the U.S. Department of Agriculture, 12% of the U.S. population does not meet the estimated average requirement for zinc.²⁶

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.²⁷ 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.²⁸ Of particular interest is a 12-week human intervention study²⁹ 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

Wellmune WGP[®] is yeast beta 1,3/1,6 glucan derived from the cell wall of a proprietary strain of *Saccharomyces cerevisiae*. As an immune boosting

ingredient, the mechanism of action for Wellmune beta 1,3/1,6 glucan is 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% 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 overstimulating the immune system. Also, multiple human clinical studies have shown that Wellmune WGP[®] is effective in the treatment of upper respiratory tract infections (URTI) such as the common cold.

In a randomized, double-blinded, placebo-controlled trial,³⁰ 250 mg/day of Wellmune WGP[®] or placebo was given to 100 healthy individuals during peak URTI season. The results were that Wellmune decreased the total number of days with URTI symptoms by about 20% compared to the placebo group, and the ability to “breathe easily” was significantly improved in the Wellmune group as well. Likewise, additional studies^{31 32} have shown that 250 mg/day of Wellmune WGP[®] 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 study³³ with 182 men and women examined if 250 mg/day of Wellmune WGP[®] could positively affect the immune system of individuals undergoing intense exercise stress, and reduce URTI symptomatic days. The results were that Wellmune WGP[®] was associated with a 37% reduction in the number of cold/flu symptom days post- strenuous exercise compared to placebo, and was also associated with a 32% increase in specific immune cells. Other research^{34 35} has shown similar benefits with Wellmune WGP[®] in association with intense exercise. Also, in a study³⁶ with firefighters, there was a lower incidence of URTI symptoms with perceived overall health significantly higher when supplementing with 200 mg/day of Wellmune WGP[®] compared to placebo.

In addition, a randomized, placebo-controlled, double-blind study³⁷ found that 250 mg/day of Wellmune WGP® for 4 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).³⁸ *Echinacea* also increases the production of interferon, an immune component that is important in responding to viral infections.³⁹ 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^{40 41} 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 Canada⁴² (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.⁴³

^{44 45} However, some research suggests that *Echinacea* may be more effective if used at the onset of these conditions.^{46 47} In a meta-analysis of 14 studies,⁴⁸ 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. If URTI symptoms arise, however, it is important 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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