

Nutrients that boost immunity

Recently, a national Conference on Nutrition and Immunity took place in Atlanta, Georgia, bringing together top scientists in the fields of nutrition and immunology. The participants concluded that "Because nutrition and other factors are critical to the establishment and maintenance of a healthy functional immune system the role of nutrition warrants closer scrutiny."

Scientists now recognize the crucial role that nutrition plays in supporting immune function. Nutrition authorities have long acknowledged the importance of macronutrients—adequate intake of protein and calories in maintaining the body's defenses. Protein-calorie malnutrition, such as occurs with prolonged starvation, stringent self-imposed dieting as in anorexia or in profound disease states such as cancer and AIDS, robs the body of its defensive capabilities, depleting white blood cells as well as crucial immune system proteins.

But the new frontier of nutrition research lies in the application of micronutrients—vitamins, minerals and related cofactors—to immune support. Modulating the immune response with supplements has become a reality.

Vitamin A: The fat-soluble vitamin retinol is crucial for immune defense. Studies in Third-World countries have shown that the administration of Vitamin A to malnourished children confers protection against measles and reduces the death rate associated with this viral infection. The administration of Vitamin A to cortisone-treated animals appears to abolish the immunosuppressive effects of cortisone. Vitamin A enhances white blood cell function, enhances resistance to infection and carcinogens, and helps maintain skin and mucus membrane defenses to infection.

Carotenoids and beta-carotene: Besides being a precursor to vitamin A, beta-carotene has its own unique immune-stimulating properties that vitamin A does not. Beta-carotene also is a potent antioxidant, but there are more than 600 other carotenoids found in nature. Many, such as lycopene and zeaxanthin have potent cancer-preventing effects.

B vitamins: The B vitamins often are thought to work together in concert as a "B complex." For example, in AIDS, more rapid disease progression is seen in patients with deficiencies of the B Vitamins B6 and B12. B6 is particularly important for immune function. Deficiency of B6 is particularly common in teenage girls and young women who are prone to dieting and consumption of sugars and refined foods. It can lead to decreased white blood cell response and shrinkage of the critical immune system organ, the thymus.

B12 also is central to immune processes because it governs cell division and growth. Without adequate B12, white blood cells can't mature and multiply. Folic acid also plays a key role in immune system development and maintenance.

Vitamin C: Championed by Linus Pauling as an antiviral and anticancer nutrient, vitamin C is an immune system booster par excellence. White blood cells use vitamin C to combat infections, and in the face of inflammation or microbial challenge, levels of vitamin C are depleted. Animals—with the exception of guinea pigs—have the ability to manufacture extra vitamin C in their livers to replete their stores, but humans and their distant rodent relatives lack the crucial enzyme that synthesizes C. Thus, when confronted by stress, we need additional outside sources of C. How much C is enough? Recent studies show that tissue levels of C top out at around two to three grams per day of oral intake, but nutritionally oriented physicians sometimes overcome this limitation by administering high intravenous doses of C to

patients with serious infections or cancer.

Vitamin E: Deficiency of this crucial immune booster is not uncommon. A survey of older Americans revealed that more than 40 percent of elderly men and women had intakes of **vitamin E** two-thirds below the RDA, which is a paltry 40 international units! Studies have shown a statistically significant reduction in infections in elderly volunteers with use of from 400 to 800 i.u. of **vitamin E** daily. Lab measurements of immune function also were decisively enhanced. It is worthy of note that megadoses of **vitamin E** may be immunosuppressive. This quality of E may be harnessed in autoimmune conditions, such as rheumatoid arthritis and lupus where overexuberant immune responses need to be restrained.

Chromium: Mostly thought of as a blood sugar regulatory mineral, recent research in animal models shows chromium can enhance the ability of white blood cells to respond to infection.

Copper: A recent study shows that a diet deficient in copper affects the human immune system, reducing the activity of some cells that attack invading bacteria. Plans are underway to see if copper supplementation in non-copper-deficient individuals can further enhance immune function.

Iron: Like **vitamin E**, the effect of iron on immunity is twofold. Iron deficiency paralyzes the immune response. In fact, response to tetanus vaccines can be marginal in iron-deficient individuals. But don't try too hard to emulate Popeye; excess iron is deleterious to immunity. The immune system keeps invading microbes in check by depriving them of iron via a specific immune defense substance called lactoferrin, made in the intestine and found in mothers' milk.

Manganese: Supplementation of manganese has been shown to enhance natural killer cell and macrophage activity.

Selenium: A clue to selenium's crucial role in immune system support is the fact that serum levels of this mineral are the single most important nutrient factor accounting for survival in patients with AIDS. **Selenium** also has been shown to protect humans from the heart-damaging effects of cytomegalovirus (CMV). Researchers now suspect that **selenium** deficiency may allow viruses to mutate into more dangerous pathogens. **Selenium's** role as a partner for the key antioxidant glutathione also helps explain its protective effects.

Zinc: Dr. Ranjit Chandra, one of the world's foremost authorities on the role of nutrition on immunity, has pioneered research on the essentiality of **zinc** for optimum defense. Numerous studies now prove supplemental **zinc** can restore flagging immunity. This may be the basis of the observed benefits of **zinc lozenges** for colds. As with **iron** and **vitamin E**, more isn't necessarily better. Daily doses of 100 mg. or more of **zinc** may actually be immunosuppressive.

Other non-vitamin mineral supplements may have a role in supporting immunity. Here are some of the key players:

Arginine: The amino acid **l-arginine** augments T-cell response and may be helpful in hastening surgical recovery, as well as in cancer and AIDS. But sometimes caution is warranted, because very high levels of arginine can compete with **lysine**, an amino acid that keeps certain viruses in check.

Alkylglycerol: Derived from oil of the liver of the ratfish found in the North Atlantic, **alkylglycerol** promotes white blood cell production. I use **alkylglycerol** to

restore the white blood cell counts of patients undergoing chemotherapy.

Coenzyme Q10: This energy-enhancing nutrient may work to promote immunity by powering the cellular batteries of microbe-devouring macrophages.

Dimethylglycine (DMG): Research on this nutrient has centered on its ability to enhance the efficacy of vaccines that depend on optimal host immune response to take effect.

Phytonutrients: A wide variety of plant-derived substances have specific immune-augmenting capabilities. These include **garlic**, echinacea, arabinogalactan from larch tree bark, cat's claw, astragalus, maitake mushroom and yeast-derived beta 1, 3 D-glucans.

Clearly, then, the way is open to a better understanding of how synergistic application of vitamins, minerals, and other nutrients and plant-derived factors can optimize immune function.