



# Immunity

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The immune system is the body's defence system, protecting it from invasion by damaging organisms. The immune system is made up of a network of cells, tissues, and organs that work together.

White blood cells called **leukocytes** are the main actors in the immune response. Leukocytes are produced or stored in various locations throughout the body. There are two different types of leukocytes, called **phagocytes** and **lymphocytes**.

**Phagocytes** engulf invaders, they are associated with fighting bacterial infection; neutrophils and macrophages are types of phagocytes. Neutrophils are normally found in the bloodstream and are the most abundant type of phagocyte, normally representing 50% to 60% of the total circulating leukocytes.

**Lymphocytes** start out in the bone marrow and either stay there and mature into B cells, or they leave for the thymus gland, where they mature into T cells. B lymphocytes detect foreign organisms (antigens) and make antibodies, which lock onto the antigen, while T-cells destroy the antigen. Special T-cells called helper T-cells do not attack pathogens but are vital as directors of the immune response.

Cytokines are secreted by immune cells that have encountered a pathogen, thereby activating and recruiting further immune cells to increase the system's response to the pathogen.

Inflammatory mediators are synthesized from omega-6 fatty acids found in the membranes of cells; these include leukotrienes and prostaglandins, which are responsible for the redness, swelling and pain characteristic of inflammation.

The most obvious facets of the immune system are skin and mucus, these are part of our innate immunity. Once a pathogen has successfully been eradicated the body will instantly recognise it on being exposed again and will fight it very swiftly; this is called "acquired" immunity. To a limited extent immunity can be passive, the term is used to describe the process whereby immunity is transferred from mother to infant; breast milk is rich in immunoglobins (antibodies).

White blood cells produce oxygen free radicals, this is important for the efficient killing of antigens; free radicals however are highly reactive substances. Free radical damage is linked to a wide variety of diseases and underlies aging; antioxidant nutrients provide the antidote to free radicals.

## Key Nutrients For Immunity:

- ✓ Zinc
- ✓ Selenium
- ✓ Vitamin C
- ✓ Aged Garlic
- ✓ Echinacea

## What Effects the Strength of the Immune System?

Immunodeficiencies occur when one or more of the components of the immune system are inactive. The immune system deteriorates naturally with age. Strenuous exercise and stress result in immune suppression via the hormone cortisol. A 100g portion of sugar significantly affects phagocytosis (the process whereby phagocytes engulf a pathogen); maximum immune suppression of approximately 50% occurs one to two hours after consumption but the effect can last as long as 5 hours. Alcohol consumption above 1-2 glasses of wine has a similar effect to sugar. Obesity also reduces the efficacy of the immune system.

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## Nutrition and the Immune System

A number of nutrients are essential to immune function.

**Zinc:** Adequate zinc intake is essential in maintaining the immune system, zinc-deficient individuals are known to experience increased susceptibility to infection. Zinc is part of an antioxidant manufactured by the body called superoxide dimutase.

**Selenium:** Selenium deficiency has also been associated with impaired immune function; the mineral appears to have a role in regulating cytokines. Selenium is part of a powerful antioxidant manufactured by the body called glutathionine peroxidase.



**Vitamin C:** Vitamin C is used widely to manage colds. Vitamin C is a powerful antioxidant, it also recycles vitamin E, another antioxidant. Phagocytes and lymphocytes are 100 times more concentrated in vitamin C than blood plasma (the liquid part of blood). There is some evidence that vitamin C enhances the immune response. In a recent study the risk of contracting three or more colds over a five-year period was decreased by 66% by daily intake of 500-mg of vitamin C. Up to 3g of vitamin C can be used short term, most of the prevention trials used a dose of 1 g/day.

## Aged Garlic Extract

AGE contains sulphur compounds including S-allyl mercaptocysteine and S-allyl cysteine. The process of aging substantially increases the antioxidant levels in the garlic, meaning that consuming AGE can help neutralise free radicals. AGE enhances the activity of natural killer cells (NK), stimulates T lymphocyte proliferation, increases lymphocyte toxicity against cancer cells and boosts the activity of macrophages and other phagocytic cells. AGE has been found to ameliorate psychological stress induced immune suppression.

## Echinacea

Echinacea has been found to be an immunostimulant that can reduce the frequency and duration of colds (one study found that Echinacea reduced the frequency of colds by as much as 58%). For 5-10 days take 300 mg of standardized extract containing 4% phenolics during high risk periods such as early winter or at the onset of a cold.

**Consuming a nutritious diet combined with key supportive supplements as required can help keep your immune system fighting fit.**