



# Thymunose

**DESCRIPTION:** Thymunose delivers plentiful amounts of nutritionals which have been shown to stimulate human immune responses against invasive agents and to help recovery.

**FORMULATION:** 2 tablets contain

Ingredient	Amount	% Daily Value
Vitamin A (as retinyl palmitate)	5000 IU	100%
Vitamin C (as calcium ascorbate)	200 mg	333%
Zinc (from zinc-L-monomethionine)	15 mg	100%
Selenium (from L-selenomethionine)	20 mcg	29%
Melatonin	90 mcg	*
Thymus (bovine, defatted whole, vacuum dried)	200 mg	*
Active Hexose Correlated Compound (AHCC)	80 mg	*
Calcium (from calcium ascorbate)	25 mg	2.5%

**INDICATIONS:** there are several acute indications for suggesting Thymunose to your patients, some of the more common problems with immune deficiencies are

1. Vitamin A deficiencies – are often observed during and after serious infections, including severe diarrhea for many malnourished children and the elderly.
2. Vitamin C deficiencies – common for those on highly restricted diets, alcoholics and people addicted to fast foods. Vitamin C insufficiency is typical of US patients.
3. Zinc deficiencies – a quite common occurrence. In the US, children with poor diets and those of any age suffering chronic diarrhea, renal diseases and sickle cell anemia are often zinc deficient.
4. Selenium deficiencies – selenium deficiency is observed only rarely in the US, but selenium insufficiency is fairly common, especially for strict vegetarians. Those with low serum selenium levels sometimes develop symptoms of immune deficiencies which can often be reversed with adequate selenium.
5. Deficient melatonin biosynthesis - with increasing age the bloodstream concentration of this important effector decreases drastically; chronic decline of sleep duration and quality along with immune system insufficiencies may result.
6. Reduction of thymus constituents in the human immune system – also proceeds with advancing age; the thymus gland at 60 years is about half-sized of young adults. Loss of a functional thymus leads to immunodeficiency and susceptibility to invasive organisms.

**FEATURES:** In addition to the important immune boosting nutrients; vitamins A, C, zinc and selenium, each dose provides liberal quantities of thymus extract, melatonin and the newly discovered Active Hexose Correlated Compound (AHCC). These ingredients reinvigorate insufficient immune systems to fight invasive agents as normally.

**DIRECTIONS:** 2 or more tablets daily, with meals or as directed by the doctor or health professional.

**Other products to help boost immunity** – Vitamin D3 stimulates immunity and extra vitamin C is suggested to keep serum levels high. Zinc and magnesium are both commonly depleted in patients with renal problems and should be supplemented.

## BACKGROUND

**AHCC – Active Hexose Correlated Compound** is the acronym for the extract of the new hybrid mushroom, *Basidiomycete*, containing low molecular weight polysaccharides and proteoglycans. AHCC was shown to enhance the mammalian immune system by stimulating production of many types of T cells (those immune cells responsible for recognizing foreign cells and viruses) and even Natural Killer (NK) cells<sup>1</sup>; hence AHCC is known to broadly stimulate the bodies' innate immune response. Prior to this, AHCC was shown to protect stressed lab mice from the dire results of induced infection through enhanced production of invader-specific immunoglobulins<sup>2</sup>. It is thought that the polysaccharides and proteoglycans of AHCC elicit a response in subjects similar to endotoxins. These are lipo-polysaccharides from the cell walls of killed, gram negative bacteria and these small molecules induce fever and other immune reactions in mammals; important responses required to ward off invasion.

**Melatonin** – this powerful effector is biosynthesized from the important neurotransmitter serotonin. Concentrations of serotonin itself tend to decline with advancing age and are known to be low in the brains of people suffering depression. The biosynthesis of melatonin in the pineal gland, which synthesizes a large portion of this effector, is also inhibited by light (eye and the retinohypothalamic system). Very important receptors for melatonin are expressed by both T and B lymphocytes, those cells key for human immunity<sup>3</sup>, and levels of melatonin affect important cytokines of the immune system, such as the interleukins<sup>4</sup>, and raising melatonin levels tends to return the immune response to normal.

**Selenium** – this element is the component of paramount importance for the primary protective enzyme, glutathione peroxidase (GTX), which protects cells against Reactive Oxygen Species (ROS). In Thymunose, selenium is provided as L-selenomethionine, the natural form of selenium which can be immediately utilized in the body - for instance, quick transformation into selenocysteine for biosynthesis into GTX. L-selenomethionine is also required for proper activity of several deiodinase enzymes which are critical and direct effectors of thyroid hormones. These are the master regulators of metabolism including body temperature<sup>5</sup> and fat metabolism.

**Thymus extract** – the thymus gland and bone marrow are central to production and maturation of immune system T cells from thymocytes (T cell progenitors). The thymus removes those T cell types deemed unnecessary to fight invasion and is largely responsible for self-recognition. This gland also produces important immune factors such as thymosin and prothymosin, which enhance T and B cell maturation<sup>6</sup>.

**Vitamin A** – tests with vitamin A supplementation on mammals have shown increased production of neutrophils and the products of neutrophil-driven oxidation - peroxide and superoxide<sup>7</sup>. These are important reactants which must be quickly synthesized by neutrophils to immediately kill invasive cells and viruses. These findings are consistent with clinical reports that vitamin A deficient infants lack normal levels of immuno-regulatory cytokines<sup>8</sup> and clinical studies show neutrophil activities can be enhanced in humans through direct vitamin A supplementation<sup>9</sup>.

## References

<sup>1</sup> Gao Y. *et al.* (2006). *Active hexose correlated compound enhances tumor surveillance through regulating both innate and adaptive immune responses.* **Canc. Immunol. Immunother.** **55** 1258-1266.

<sup>2</sup> Aviles H. *et al.* *Active hexose correlated compound (AHCC) enhances resistance to infection in a mouse model of surgical wound infection.* (2006) **Surg. Infect.** **7** 527-535 and (2003) **J. Appl. Physiol.** **95** 491-496.

<sup>3</sup> Carrillo-Vico A. *et al.* (2005). *A review of the multiple actions of melatonin on the immune system.* **Endocrine** **27** 189-200.

<sup>4</sup> Carrillo-Vico A. *et al.* (2004). *Evidence of melatonin synthesis by human lymphocytes and its physiological significance: possible role as intracrine, autocrine and/or paracrine substance.* **FASEB J.** **18** 537-539.

<sup>5</sup> Beckett GJ and Arthur JR (2005). *Selenium and endocrine systems.* **J. Endocrinol.** **184** 455-465.

<sup>6</sup> Knight JS. *et al.* (2003). *Epstein-Barr virus nuclear antigen 3C recruits histone deacetylase activity and associates with the corepressors mSin3A and NCoR in human B-cell lines.* **J. Virol.** **77** 4261-4272.

<sup>7</sup> Higuchi H. and Nagahata H. (2000). *Effects of vitamins A and E on superoxide production and intracellular signaling of neutrophils in *Holstein calves.** **Can. J. Vet. Res.** **64** 69-75.

<sup>8</sup> Wieringa FT. *et al.*, (2004). *Reduced production of immunoregulatory cytokines in vitamin A- and zinc-deficient Indonesian children.* **Eur. J. Clin. Nutr.** **58** 1498-1504.

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<sup>9</sup> Bhaskaram P and Rao KV. (1989). *Effects of subclinical vitamin A deficiency and administration of vitamin A as a single large dose on immune function in children.* **Nutr. Res.** **9** 1017-1025.