Biotics Research Corporation

Technical Support

Products #6300 & 6301

Bio-Immunozyme Forte™

The Immune System

The two arms of the immune system, humoral and cell-mediated immunity, work together as an integrated defensive system. Normally, antibodies are produced in response to a foreign material (acquired immunity). Immune complexes form between antibodies and antigens and are scavenged from the circulation or mucosal surfaces. Cell-mediated immunity relies on T and B lymphocytes, mast cells, macrophages and others. T-cells regulate other defensive cells, including macrophages and killer cells. Cells of the immune system, turn over rapidly, hence, their nutrient requirements are high.

In addition, phagocytic cells generate free radicals and other reactive species to attack invaders. These oxidants contribute to the oxidative burden of organs which, if unchecked by the body's antioxidant defenses, can damage membrane lipids, diminish T- cell function and injure mucosal cells. Membranes damaged by lipid peroxidation may offer less resistance to infection. The production of radicals from endogenous and exogenous sources consumes antioxidants. Consequently, a variety of nutrients and factors support immune function.

Vitamins

Vitamin A has long been known to support mucosal cell surfaces and the immune system.[1] Vitamin A helps maintain the integrity of lymphatic tissues, antibody levels (especially sIgA), and responses of cellular immunity to challenge by exogenous stimulatory substances. However, the effects are selective. Possibly a metabolite of retinol regulates lymphocytes.[1] In vitamin A deficient rates, phagocytic activity of circulating polymorphonuclear lymphocytes declined.[2] The integrity of epithelial cells and production of protective agents, such as mucus secretions, are essential for healthy mucosa. In vitamin A deficiency, the mucosa, glands and ducts are susceptible to disease. Vitamin A requirements appear to be only partially met by the consumption of dark, green, leafy vegetables.[3]

Vitamin C scavenges free radicals and is essential for the function of many systems, including the immune system. Vitamin C is required for eicosanoids that regulate inflammation and it combats the effects of oxidative stress. Vitamin C is a major antioxidant in the blood and it works together with vitamin E. For example, supplemental vitamin C and vitamin E decreased the production of reactive oxygen species and of lipid peroxidation in patients with myocardial infarction.[4] During periods of stress, urinary excretion of vitamin C increased.[5] Vitamin C supplemented volunteers exhibited increased natural killer cell activity.[6] B vitamin deficiency is characterized by reduced phagocytic activity. Vitamin B_2, B_6 and pantothenic acid have specifically shown an ability to enhance antibody production. Lack of vitamin B_1 reduces the spleen's ability to produce antigens.[7] Vitamin B_2 is necessary for proper thymic function.[7]

Vitamin B_6 as pyridoxal phosphate, the coenzyme form of the vitamin, is required by transaminases and amino acid decarboxylases in the breakdown of amino acids. As such, vitamin B_6 plays a critical role in all rapidly dividing cell types. Human studies, as well as animal experiments, link vitamin B_6 deficiency to reduced lymphocyte differentiation, reduced delayed hypersensitivity responses and impaired antibody production.[8] Other research suggests that suboptimal vitamin B_6 intake may play a role in a defective immune response in hemodialysis patients.[9]

Pantothenate deficiencies are associated with infections of the upper respiratory tract and pharyngitis.[10] Pantothenic acid is necessary for immunoglobulin production. Proper adrenal function requires pantothenic acid, ascorbic acid and zinc.[11] These water soluble nutrients are necessary during stress.

Co-Factors

Mixed natural carotenoids, isolated from plants, include alpha and beta carotenes and oxy-carotenoids, such as zeaxanthin, lutein and cryptoxanthin. Carotenoids complement vitamin E as lipid-soluble antioxidants. The natural mixed carotenoids are better absorbed and are more effective antioxidants than synthetic beta carotene *in vivo*.[12] By acting as antioxidants, carotenoids can limit lipid peroxidation.[13] As example, beta carotene supplementation reduced lipid peroxidation in smokers[14] beta carotene has long been known to have a protective impact on the immune system. Healthy male nonsmokers supplemented with beta carotene revealed increased CD4-CD5 ratio after 9 months compared to controls who had taken a placebo.[15] After supplementation with beta carotene, there were significant increases in monocytes expressing major histocompatibility complex molecules, adhesion molecules and TNF secretion in a similar group of subjects.[16]

Coenzyme-Q_{10} functions both as an essential mitochondrial electron carrier for energy production and as a lipid-soluble antioxidant[17], and dietary coenzyme-Q_{10} can decrease plasma production of lipid peroxides.[18] Although coenzyme-Q_{10} can be synthesized by the body, the levels in membranes of mitochondrial and other structures may be lower than needed for optimal function. Thymic coenzyme-Q_{10} levels declined in mice with increasing age.[19] Coenzyme-Q_{10} together with vitamin B_6 supported the production of T4-lymphocytes and immunoglobulins.[20]

Minerals

Selenium is a trace mineral that is converted to selenocysteine, which plays a catalytic role in glutathione peroxidase production. In this sense, selenium can be considered an antioxidant. Selenium has a major impact on the immune system. Selenium deficiency can lead to depressed immunity and reduced T-cells.[21] Glutathione peroxidase activity was significantly higher in younger people than in elderly subjects.[22]

Copper, Manganese and Zinc: Superoxide dismutase (SOD) is the only family of enzymes that specifically inactivate free radicals, namely, the superoxide radical. Excessive superoxide production, as well as excessive amounts of other oxidants, is linked to chronic, oxidative stress.

Mitochondrial SOD requires manganese as an essential cofactor, while the cytoplasmic form of SOD requires both copper and zinc. Manganese SOD and copper-zinc SOD activities in lymphocytes and neutrophils were not inducible by cytokines in elderly subjects, although these activities were readily inducible in nonaged subjects.[22] These results suggested an age related alteration in the regulation of these defensive enzymes. Erythrocyte copper-zinc SOD activity tends to reflect copper status, and this has been used in laboratory assessment.[23] In addition, supplementation with superoxide dismutase of Biotics Research Corporation's vegetable culture may increase erythrocyte superoxide dismutase activity *in vivo*.[24]

Zinc plays an important role in maintaining the health of the immune system. It is a required cofactor for DNA polymerase and RNA polymerase, essential for cell proliferation. Rapidly dividing cells, including mucosal cells and immune cells, require

zinc. Zinc deficiency leads to atrophy of lymphatic tissues, decreased skin delayed hypersensitivity response, impaired phagocytes, decreased T-cell function and lowered IgA and decreased thymic hormone activity.[25, 26] Zinc supports granulocyte chemotaxis *in vitro*.[27]

Bio-Immunozyme Forte™ contains bovine neonatal thymus, spleen, liver, pancreas, in addition to bovine parotid gland, lymphatic and placental tissues. These glandular preparations are processed to maintain nutrients, enzymes and associated factors. Biotics Research uses bovine neonatal tissues where possible. The newborn animal has not been subjected to environmental factors to which the adult animal is subjected. The thymus is most active within a few days after birth, when it populates lymph nodes and the spleen. The effects of preparations of thymic factors after oral administration have been studied.[28] Thymus extract supported thymic function during environmentally-induced physical stress.[29] Spleen extracts can specifically modulate phagocytic activity in vitro.[30] Healthy endocrine pancreatic glands are also important. They secrete glucagon, insulin and somatostatin. Somatostatin regulates growth hormone secretion. Healthy adrenal glands support normal immune function. They produce hormones that adapt the body to stress, including epinephrine and glucocorticoids. Cortisol stabilizes mast cells to inhibit inflammation. It also decreased capillary permeability to limit neutrophil infiltration and it reduces phagocytosis. Laboratory analysis of Biotics Research's adrenal glandulars did not detect the presence of the steroid hormones. Salivary glands produce factors that can enhance lymphocyte proliferation and support thymus, spleen and lymph nodes in animal models.[31] The major salivary glands also produce antimicrobial factors.

Lactobacillus

Lactobacillus acidophilus, a member of the normal gut flora, which produce vitamins, stimulate the immune system, and produce factors that inhibit growth of less desirable organisms. By occupying an ecological niche in the intestine, they further limit the growth of opportunistic organisms.[32] Lactobacillus can be depleted by an imbalanced diet and the long term usage of broad-spectrum antibiotics. The effectiveness of supplemental Lactobacillus acidophilus in normalizing GI function has been demonstrated.[33] DDS-1 strain developed at the University of Nebraska, has proven to be a superior strain in terms of its compatibility with the human GI tract and its stability. Therefore, the DDS-1 strain is used in Biotics Research supplements.

For more information, contact our Client Services Department or one of our Technical Consultants

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Supplement Facts

Serving Size: 2 Tablets — **Servings Per Container: 45**

	Amount Per Serving	% Daily Value
Vitamin A (as palmitate and natural mixed carotenoids)	6,667 IU	133%
Vitamin C (as calcium and magnesium ascorbates)	200 mg	333%
Vitamin E (as d-alpha tocopheryl acetate)	30 IU	100%
Thiamin (B_1) (as cocarboxylase chloride)	10 mg	667%
Riboflavin (B_2) (as riboflavin-5-phosphate)	15 mg	882%
Niacin (as niacinamide)	20 mg	100%
Vitamin B_6 (as pyridoxal-5-phosphate)	15 mg	750%
Pantothenic Acid (as calcium pantothenate)	25 mg	250%
Zinc (as zinc gluconate)	30 mg	200%
Selenium (from vegetable culture † and selenomethionine)	50 mcg	71%
Copper (as copper gluconate)	1 mg	50%
Manganese (as manganese gluconate)	2 mg	100%
Neonatal Adrenal Complex (bovine)	20 mg	*
Neonatal Thymus (bovine)	60 mg	*
Neonatal Spleen (bovine)	60 mg	*
Neonatal Liver (bovine)	60 mg	*
Neonatal Pancreas (bovine)	60 mg	*
Parotid (bovine)	40 mg	*
Lymph (bovine)	60 mg	*
Placenta (bovine)	20 mg	*
Trypsin & Alpha Chymotrypsin (porcine)	25 mg	*
L-Lysine HCl	100 mg	*
Coenzyme Q_{10} (emulsified)	1 mg	*
Citrus Bioflavonoids	50 mg	*
Superoxide Dismutase (from vegetable culture †)	60 mcg	*
Catalase (from vegetable culture †)	60 mcg	*
Proprietary Blend	110 mg	
Echinacea (Echinacea angustifolia) (root)*, Cayenne Pepper (Capsicum annuum) (fruit)*, Chlorophyllins*, Œrganik-15™*, Lactobacillus acidophilus (DDS-1)*		

***Daily Value not established**

Other ingredients: Cellulose, stearic acid (vegetable source), magnesium stearate (vegetable source), modified cellulose gum and food glaze.

† Specially grown, biologically active vegetable culture containing **Phytochemically Bound Trace Elements™** and naturally associated phytochemicals including polyphenolic compounds with SOD and catalase, dehydrated at low temperature to preserve associated enzyme factors.

RECOMMENDATION: Two (2) tablets each day as a dietary supplement or as otherwise directed by a healthcare professional.

Caution: Not recommended for pregnant or lactating women.

KEEP OUT OF REACH OF CHILDREN

Keep container tightly sealed and store in a cool, dry area away from direct sunlight.
Sealed with an imprinted safety seal for your protection.

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Product Information

Bio-Immunozyme Forte™ is available in bottles of 90 and 180 tablets.

Product Adjuncts: IAG™

BIOTICS® RESEARCH CANADA
"The Best of Science and Nature"

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