Be Well - Immunity

Talk to anyone and they will tell you that one of the most important aspects to their overall physical health is their ability to fight off microbiological invaders. *Our immune system being one of our most precious commodities, and the first and last line of defense in our bodies, cannot afford to be compromised. Just like soldiers on the battlefield, the cells of our immune system need rations, weapons, and signals from their commanding officers to optimize the defense of their territory. Within the lush greenery of the earth we live in lies an abundance of these military components to be used by the immune cells that defend our bodies.*

Vitamin A is a fat-soluble vitamin that belongs to a family of retinoids known for the roles they play in vision and antioxidation. What is more fascinating about vitamin A is the role it plays in the immune system of humans. Recent research explores the potential of vitamin A in immune system regulation including the activation and proliferation of lymphocytes, supercharged differentiation of helper T cells, chemiosmosis and lymphocyte homing of tissue-specific targets, antibody isotype production, reducing inflammation, and/or treating autoimmunity (Mora JR et al., 2008). Vitamin C is a sugar acid that possesses an almost unmatched array of antioxidant characteristics. Along with the myriads of other health benefits that it yields, immune system enhancing is just another attribute to give it a round of applause for. It is known that a plethora of cells of the immune system can accumulate ascorbic acid and in fact require it to perform normal immunological tasks. This is commonly seen in macrophages and T-cells (Ströhle A, Hahn A, 2009). It appears that a diet deficient in vitamin C can result in reduced resistance against certain pathogens, at the same time diets high in the vitamin increases several immune function parameters.

Vitamin E is a class of phyto nutrients called *tocopherols and tocotrienols.* This class of compounds consists of four tocopherols and four tocotrienols, each existing in the alpha, beta, gamma and delta isoforms. Research suggests that the alpha isoform of tocopherol is the most biologically active in higher mammals (Rigotti A, 2007). This is why Be Well uses the alpha form of the tocopherols. One of the interesting techniques vitamin E uses to protect the immune system via its antioxidant properties is to be the bodyguard of macrophages (the major phagocytes of the body). It does this by hanging out within the membrane of macrophages (the most important part of the macrophage) and protecting them against oxidative stressors, especially peroxidative agents (Kaur G et al., 2009). Zinc, a transition element on the periodic table, is responsible for numerous aspects of human physiology. It is a cofactor for hundreds of enzymes and plays a substantial role in immune function. It appears to be a very involved modulator for the production of immunocytes as well as managing the proper actions of

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leukocytes, namely neutrophils, macrophages, B and T lymphocytes, and monocytes (Veverka DV et al., 2009).

The citrus bioflavanoids include: quercitrin, tangeritin, hesperidin, and rutin (a cousin to quercitin). In addition to their antioxidant properties, citrus bioflavonoids exhibit substantial effects on reducing proliferation of cancer cells and reducing heart disease (Stauth, 2007, Ververidis F et al., 2007). Cancer and inflammation have been shown to be greatly reduced via reduction in NF-kappa B expression in humans (Yamamoto et al., 2001) as well as possessing anti-microbial properties (Cushnie TPT et al., 2005). Bee propolis is considered a powerful natural anti-inflammatory by influencing different types of immune-responses, most notably by its immunoregulation of T lymphocytes. This can be seen in the concentrations of serum cytokines before and after supplementation (Ansorge S et al, 2003). The balance and regulation of T helper 1 (Th1) and Th2-type cytokines are important in the effective immune response to different diseases.

Oral garlic has been demonstrated in recent studies to favor the regulation of these cytokines in humoral immune responses (Zamani A et al., 2009). This is why garlic extract is one of the front line men in immune enhancing supplements. Extracts of Yarrow (alkaloids, terpenoids, and flavanoids) have been used in the natural medicine realm for the treatment of fever, inflammation, asthma, and liver diseases. Recent studies show that these constituents of Yarrow increase humoral antibody responses resulting in the reduction of these conditions (Rezaeipoor R et al., 1999).

Echinacea extracts are used in the production of standardized herbal medicines for the prevention and treatment of various infectious diseases. Preparations of the constituents of this herb have been shown to be capable of activating certain receptor types, playing a role as a potential anti-inflammatory and immune-modulator. In particular, studies show that expression of the anti-inflammatory cytokine IL-10 is significantly superstimulated, while the expression of the pro-inflammatory TNF-alpha protein gets inhibited by supplementation with Echinacea (Chicca A et al., 2009).

The Immune Enhancing Blend also contains mushroom extracts from Maitake, Shiitake, and Reishi. Extracts from the Maitake mushroom have been touted for its cancer preventative properties via activation of macrophages, NK (natural killer) cells, T cells, increasing serum concentrations of interleukin 1, and the superoxide radical in cancer cells (Masuda Y et al., 2008). Maitake also works its anti-cancer actions by inducing apoptosis (programmed cell suicide) within the cancerous cells (Lee JS et al., 2008, Cui Li Xu, 2007).

Shiitake contains a β-glucan that is used as an approved clinical drug in various countries for its anti-cancer properties as well (Terakawa N et al., 2008). It has been shown to increase phagocytosis in macrophages, marked decreases in tumor formation, and increases in gamma interferon (Zheng R et al., 2005). Reishi is known for some of its polysaccharide and terpene components to inhibit cytokine-mediated angiogenesis around neoplastic tissue, cancer cell migration, and to induce apoptosis within cancer cells (Stanley G et al., 2005, Jian J et al., 2004).

Some extracts of the astragalus genus show immune system boosting properties via increasing phagocytosis in macrophages, and increasing concentrations in lysozyme and plasma antibodies (Guobin Z et al., 2009). Goldenseal contains alkaloids from the genus *Hydrastis* which is thought to increase the production of mucous membranes rich in IgA (Bergner P, 1996-1997), thus charging up one of the body's first lines of defense. The berberine found in goldenseal has been shown to contribute to the enhancing of the body's immune system by inducing production of interleukin 12 in macrophages and increasing their ability to produce gamma interferon (Tae S et al., 2003).
Several diterpenoids from Marrubium velutinum (Horehound) are known for their cytotoxic effects against various cancer cell lines and immunomodulating role in human mononuclear cells, as well as their ability to improve selected lymphocyte function (Karioti A et al., 2007). In this sense, Horehound packs a one-two punch serving as an anti-cancer agent as well as an immune system regulator. β-lapachone, a quinone compound obtained from the bark of the lapacho tree (Pau D'Arco), is reported to possess beautiful anti-inflammatory and anti-cancer properties. One study shows its anti-metastasis and anti-invasion abilities of human hepatocarcinoma cell lines, inhibiting cancer cell viability and migration (Kim SO et al., 2007).

An adaptogen is a term used for natural supplements that increase the human body's resistance to stress, trauma, anxiety, and fatigue. Of these adaptogens, Eleutherococcus extract has been added to the Adaptogenic Blend due to recent findings regarding its immunomodulatory effects. Research indicates Eleutherococcus' ability to greatly enhance production of helper T cells, inducer cells, cytotoxic and NK cells, and B lymphocytes (Bohn B et al., 1987). Capsaicin is an alkaloid found in the extracts of cayenne peppers that has demonstrated its immune priming effects by boosting helper T cell production of cytokines such as Interleukin 1,2, and 4 as well as gamma-interferon (Takano F et al., 2007). The proanthocyanadins from grapeseed extract show a magnificent array of biological benefits. In particular to the Be Well formula, proanthocyanadins demonstrate prevention of photocarcinogenesis, immunoprotective characteristics, and greatly reduce oxidative stress, especially in our skin (Kativar SK, 2008).

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