HEALTH REPORT

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The Importance of a Balanced Immune Response

Introduction

The immune system is key to human health and is defined as "the bodily system that protects the body from foreign substances, cells, and tissues…." When out of balance, the immune system not only fails to protect the body but can even attack it, mistaking "self" cells for invading pathogens, resulting in debilitating autoimmune diseases such as lupus and rheumatoid arthritis. Allergies can result when the immune system mistakes an innocuous particle (such as pollen) for an invading parasite. In addition, years of chronic low-level inflammation, another indicator of an out-of-balance immune system, can contribute to diseases such as cancer and cardiovascular disease. The immune system is also very sensitive to stresses of normal life; travel, personal problems, strenuous exercise, and change in diet can all cause imbalances in the immune system and affect overall health.

Generally the immune system is described as having two parts: the innate and adaptive immune responses. The innate system is the more primitive (however, from an evolutionary perspective it is quite complex and sophisticated) and less specific. It is the body's first line of defense against foreign substances that may lead to disease.

The adaptive system, found only in vertebrates, is a much more specific, delayed response and requires action from the innate system to be initiated. Though considered separate, each interacts with the other in critical and complex ways. A rudimentary understanding of both responses helps to explain and further substantiate the importance of immune balance.

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Innate Immune Responses

The innate system consists of many parts. It includes physical barriers to infection, such as the skin and mucous membranes. In addition, there are chemical barriers, such as acidic environments that kill cells or prevent their growth, and enzymes, like lysozyme found in tears, that destroy bacterial cells. The complement system, which is a group of serum proteins, is also an important part of innate immunity that can kill pathogens directly (lysis) or mark them (opsonization) for later destruction (phagocytosis) by certain immune cells. These immune cells, called phagocytes, are also an integral part of the innate response that acts by internalizing and killing pathogens. Importantly, these same cells are also able to produce chemical signaling proteins called cytokines and chemokines that have important effects on both the innate and adaptive systems.

Natural Killer (NK) cells are another important part of the innate system. These cells are able to effectively target and kill viral-infected cells as well as tumor cells. The collective response of the innate system gives rise to inflammation at the site of infection. This is an example of "good" inflammation, which promotes the activation of phagocytes and NK cells (enhancing their ability to kill pathogens) and transports them to the site of infection. The innate system is much more vast and complicated than described, but the above gives an indication of how the innate system works.

Adaptive Immune Reponses

The adaptive response is a delayed response and is dependent on the innate system for activation. Although initially a delayed response, the adaptive system has memory, and the second time the body is exposed to the same pathogen, the response is almost immediate. The main cells in the adaptive response are T lymphocytes and B lymphocytes. Most T cells are either cytotoxic T lymphocytes (CTLs) or T helper cells (TH cells). CTLs can recognize virus-infected cells and kill them. TH cells serve to activate other cells in the immune system by producing cytokines. These can help promote an inflammatory response (supporting innate immunity) and can also support an adaptive response by activation of B cells.

It should be noted that there are different subsets of TH cells, their classification is dependent on the types of cytokines secreted. Major subsets include TH1 cells, TH2 cells and TREG cells. For example, when TH1 cells dominate, the body is better able to defend against bacteria and viruses, and when TH2 cells dominate, the cells are better able to defend against parasitic and mucosal infections. A well-balanced immune system will recognize and give the proper response to an immune challenge.

B cells produce antibodies (immunoglobulins). These are proteins that are very specific for a particular antigen (a molecule or part of a molecule). When the antibody binds the antigen on a pathogen, the pathogen can be destroyed. To become effective, T and B cells must first interact with the specific antigen. There are several types of antibodies expressed by B cells. The type of antibody produced is influenced by cytokines.

Immune Balance

An underactive or weakened immune system will expose the body to increased susceptibility to infections and disease. Many things can weaken the immune system, including common everyday physical or emotional stress (Segerstrom and Miller, 2004). Secondary bacterial infections are possible during colds of viral origin since the immune system can be compromised by certain viruses. Biological agents can harm the immune system by killing off T helper cells (also called CD4 cells). UV light can suppress the immune system, resulting in greater susceptibility to cancers (Moodycliffe et al., 2000).

There are a host of pharmaceuticals and nutraceuticals developed and sold as immune boosters. It is generally believed that the immune system should not stay in a constant state of stimulation such as would occur through prolonged, daily use. In discussing the need for "achieving immunobalance," in a recent paper Percival and Milner stated, "By lowering cancer risk with excessive supplementation

use, there may be ill consequences. Thus, it is conceivable that whereas cancer risk may be reduced, the risk of other diseases may be increased; for example, over stimulated T cells may enhance the pathology associated with inflammatory bowel disease," (Percival and Milner, 2005). Logically, this concern may extend to sufferers of allergies, autoimmune and other inflammatory conditions.

The other side of the immune balance equation is an overactive or hyper-responsive immune system. Sufferers of autoimmune disease, inflammatory disease and allergies may benefit by suppressing their overactive immune response. A dysfunctional (overactive) immune system may result in allergies by mistaking harmless environmental substances such as pollen for an attacking parasite. In this case a stimulated TH2 response could cause B cells to increase antibody production (IgE) and cause an allergic response by interacting with mast cells, basophils and eosinophils, which in turn release histamine causing the allergic reaction (and the need for Over-the-Counter antihistamine products).

Why would the immune system become overactive and cause allergies? One widely accepted theory is called the "hygiene hypothesis." Basically, this states that people growing up in today's clean environment are not exposed to microorganisms as they were in decades past (and still are in third world nations, where allergies are much more rare). Therefore, their immune systems have not been properly trained, allowing them to become stimulated inappropriately as adults. As stated in a recent article, "The induction of a robust anti-inflammatory regulatory network by persistent immune challenge offers a unifying explanation for the observed inverse association of many infections with allergic disorders" (Yazdanbakhsh et al., 2002).

Much worse, a dysfunctional immune system could recognize "self" cells as foreign cells and initiate an attack. This would result in an autoimmune disease. Autoimmune diseases, sometimes called inflammatory diseases, are also caused by an overactive immune system that is out-of-balance. For example, when the immune system attacks the body's joints, the result is rheumatoid arthritis (RA). Immunosuppressant drugs are standard treatments for RA, but may produce undesired side effects. Anti-inflammatory steroids are often prescribed to treat diseases such as asthma, arthritis and psoriasis.

Unfortunately, long-term use of corticosteroids is known to produce complications such as cataracts, weight gain, increased cholesterol and brittle bones. Even severe allergies may need long-term treatment with intranasal corticosteroids, although the potential complications and their severity are not as significant.

Therefore, there is a need to balance the immune system; not to boost or to suppress it. Natural products have a chance of maintaining balance in healthy individuals. Unfortunately, claims and research for nearly all natural products focus only on immune boosting.

The all-natural product, EpiCor®, manufactured by Embria Health Sciences, LLC, has been clinically shown to balance immune system response. Several published studies show EpiCor's capability to help keep a healthy immune system in balance. In two randomized double-blinded, placebo controlled human clinical trials, EpiCor reduced the incidence and duration of cold and flu symptoms (Moyad et al., 2008 and Moyad et al., 2010). To show balance, the same product was shown in a subsequent randomized double-blinded placebo controlled trial to also reduce certain symptoms associated with seasonal allergies (Moyad et al, 2009). Finally, EpiCor was shown to reduce inflammation in two well established animal models (Evans et al, 2012). Therefore, since EpiCor has been shown to both support immune defense and reduce inappropriate immune responses (including excess inflammation), it can be said to be a true immune balancing product.

In summary, keeping the immune system in balance is crucial for maintaining health. The immune system is very complex and care should be taken to ensure it stays in balance. Ideally, one should lead a healthy life style. A diet rich in vegetables, fruits and whole grains, while low in red meat and processed foods, should be the goal. This should be combined with regular exercise, reduced stress, and for those without optimal diets, nutritional supplementation including a multivitamin and EpiCor.

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