



Obesity: The Major Cause of Immune Suppression in North America

Throughout history, the biggest contributors to disease and suffering have been hunger, starvation and malnutrition. That includes causes of impaired immune function and increased susceptibility to infection. However, since the dawn of the 21st century, obesity is now a bigger health crisis globally than hunger, and the leading cause of disease and illness around the world. Obesity is also now the biggest contributor to low immune function.

Currently, it is estimated that eight out of 10 adults over the age of 25 are overweight and about 38 percent of the adult population meet the clinical criteria to be classified as obese. It is estimated by 2020—now just seven years away—that 60 percent of adults over the age of 40 will be obese and 50 percent of this population in the United States will suffer from type 2 diabetes. With these statistics, let's examine how this clear crisis is linked to immune suppression in North America.

Obesity & Immune Function

Many different types of investigations have demonstrated the link between obesity and decreased immune function. For example, several recent reports demonstrated a greater severity of illness in obese patients who devel-

oped influenza during the 2009 H1N1 pandemic. These reports have led to several review articles in medical journals highlighting that obesity results in a compromised immune system.

On a very basic level, obesity is associated with a reduced ability of white blood cells to destroy bacteria, viruses and other microorganisms. As a result, obesity is associated with higher infection rates. It is also associated with an increased risk for certain cancers. Further, obesity increases the risk of asthma and autoimmune diseases by inducing decreased immunological tolerance as a consequence of changes in immune functions caused by hormones known as adipokines and cytokines secreted by fat cells.

Obesity is associated with both an increased morbidity (sickness) and mortality with viral infections. There are several central changes in human function that lead to this association. For example, obesity is linked to altered response to vaccinations to influenza and other viruses. A recent study published in the February 26, 2013 issue of the *International Journal of Obesity* showed that this altered response is the result in changes in human dendritic cell number and function. Dendritic cells are key immune system sentinels linking the innate (non-specific) and specific (T-cell and antibody mediated) immune response. Dendritic cells recognize

when an infection is taking place and effectively mounts the response. The number of circulating dendritic cells is significantly decreased in obese individuals compared to those that are of normal body weight. And, following immune stimulation, there is a significant decrease in immune responses that fight viral infections.

Blood Sugar, Lipids & Immune Function

Elevations in blood sugar are associated with impaired immune function and increased susceptibility to infection. Elevations in blood sugar levels virtually paralyze white blood cells and keep them from doing their important jobs in fighting infections. These elevations can occur after consumption of high glycemic foods and chronically as the result of increased body weight, especially abdominal obesity.

In addition, another factor that comes into play in obese individuals is that obesity is also associated with elevations in blood cholesterol, free fatty acids, triglycerides and/or bile acids. An elevation in any one of these factors can inhibit various immune functions, including:

- Formation of new white blood cells
- Response to infectious agents
- Antibody response
- Movement of white blood cells to areas of infection

• Phagocytosis (the ability of white blood cells to engulf and destroy organisms)

Optimal immune function, therefore depends on control of these serum components. Interestingly, carnitine, even at minimal concentrations, has been shown to neutralize lipid-induced immunosuppression. This effect is probably due to carnitine's role as a rate-limiting factor in the removal of fatty substances from the blood. Individuals with elevations in blood lipids experiencing frequent infections may want to supplement with carnitine (900-1,500 mg per day) to boost immune function

Products to Overcome Obstacles

The ability of carnitine to improve immune function associated with elevations in blood lipids may be the result of improved mitochondrial function.

Mitochondria are the energy factories of the cell as they are responsible for producing 97 percent of the body's ATP (adenosine-5'-triphosphate), or chemical energy. Mitochondria also play an essential role in other cellular processes, including immune function. In addition to low immune function, there is a growing list of health conditions thought to be the result of impaired mitochondrial function including accelerated aging due to increased free radical damage, Alzheimer's disease, Parkinson's disease, chronic fatigue syndrome, cardiovascular disease, diabetes and migraine headaches.

To optimize cellular function in general it is critical to promote proper mitochondrial function and maintain production of ATP. To accomplish this goal a three-part strategy is recommended:

1. Provide nutrients needed for optimal mitochondrial function by taking a high potency multiple vitamin and mineral formula.

2. Supplement with the key mitochondrial nutrients:

- Carnitine: 900-1,500 mg daily
- Coenzyme Q10: 100-200 mg daily
- Alpha-lipoic acid: 200-400 mg daily
- One of the following flavonoid-rich

extracts: grape seed, pine bark or green tea extract at a daily dosage of 100-300 mg

3. Reduce exposure to factors that damage mitochondria such as cigarette smoke and elevated blood sugar levels.

The Take-Away Messages

One of the primary goals in naturopathic medicine is removing obstacles to a

cure. I wanted to bring up this issue of obesity and immune function to place attention where it needs to be. Yes, there are phenomenal natural products that impact the immune system. But obesity is likely an obstacle impairing the ability of many of these gifts from nature from fully impacting the immune system to their full effect.

Furthermore, the immune system is a complex integration of parts that are continuously protecting the body from microbial and cancerous attack. There really isn't any single magic bullet that can immediately restore proper immune function. The immune system is truly "holistic," as evidenced by the close association of psychological, neurological, nutritional, environmental and hormonal factors with immune function. Supporting the immune system is critical to good health. Conversely, good health is critical to supporting the immune system. The best approach to supporting immune function is a comprehensive plan involving lifestyle, stress management, exercise, diet and proper nutritional supplementation.

In regard to supporting the immune system with proper nutritional supplementation, it is important to point out that the deficiency of any single essential vitamin or mineral can lead to significantly reduced immune response. Given the widespread problem of multiple marginal (subclinical) nutrient deficiencies in Americans based upon data from National Health and Nutrition Examination Surveys, it can be concluded that many people are suffering from impaired immunity that is entirely amenable to proper nutritional supplementation.

This statement is particularly true in

the elderly. Almost all elderly Americans are deficient in at least one nutrient and most are deficient in several. Likewise, numerous studies show that taking a multivitamin and mineral supplement enhances immune function in elderly subjects (whether they suffer from overt nutritional deficiency or not). These findings have considerable public health significance and once again attest to the important role the natural products industry plays in working to help improve health. **VR**



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