NUTRITION SCIENCE NEWS

November 1998

Thymic Protein May Enhance Immunity

By Ken Babal, C.N.

Many natural substances can help strengthen resistance to infection and disease. Vitamins, minerals, botanicals, lipids, amino acids and certain carbohydrates, such as the polysaccharide compound beta-glucan, have shown value in the battle against invading bacteria, viruses and fungi.

Similarly, many factors contribute to a person's overall immunity. For example, healthy mucous membranes lining the respiratory tract resist viruses and allergens. Hydrochloric acid secreted by the stomach sterilizes food that may have been exposed to pathogens. In general, coordination among all glands and organs contributes to a strong and unified immune system. The most important immune function, however, occurs on a cellular level and involves the thymus gland.

The thymus gland is known as the master gland of the immune system. Located just behind the breastbone, it produces 30 distinct proteins that program infection-fighting white blood cells. In humans, the thymus grows until age 3, then maintains its size until puberty, at which time it begins to shrink. By age 40, it is typically only one-sixth its largest size. Because of its relatively small size in adults, the thymus was thought to have little importance until its role was discovered in the 1960s.

Initial Immune Response

One technique researchers used to determine its function was to remove the thymus gland from young animals and observe the resultant changes. They found the animals exhibited a profound wasting disease characterized by an increased incidence of infection and cancer (immune suppression), failure to grow, allergies, neuromuscular paralysis, and autoimmune diseases (immune dysfunction). Further investigation revealed that the thymus produces hormonelike proteins that, when supplied, prevent many wasting syndrome symptoms.

Research during the past 30 years shows that the thymus gland programs white blood cells through the production of these proteins. White blood cells are produced in the bone marrow. Some migrate to the thymus and are called T cells (*T* for *thymus*). The programming given to these cells enables them to distinguish between self and nonself. T cells kill and devour invading pathogens such as bacteria, viruses and cancer cells, or control the production or attack of other T cells. Some types of T cells signal B cells (from bone marrow) to produce antibodies to a particular antigen. However, upon arrival in the thynus, the white blood cells are initially immature and do not perform their functions until programmed by a thymic protein.

T cells, which attack invading bacteria and viruses, will not perform their functions until programmed by thymic protein A.

One recent discovery with positive implications for immunity is thymic protein A—a polypeptide that is naturally produced by human thymus cells and commercially provided as a single, isolated protein extracted from cultured bovine thymus cells—which has been shown to enhance cell-mediated immune function.

Thymic protein A was discovered by Terry Beardsley, Ph.D., at the Baylor College of Medicine, Houston, who also developed a procedure to produce the purified protein in the laboratory. In vitro and animal experiments show that this specific protein causes T-4 lymphocytes to mature, thereby initiating a cell-mediated immune response.[1]

Human thymus cells have been transplanted into athymic mice, a special breed lacking a thymus gland and therefore lacking immunity. Because the mice have no immunity, they must be kept in a sterile environment. After transplant, however, they demonstrate immunity outside the sterile environment without rejection of the human tissue.[2] This shows that human thymic protein has immune-enhancing activity.

Laboratory and clinical experiments also show that thymic protein A is an effective immune regulator. Published clinical observations by Las Vegas physician James Lapcevic, M.D., report successes with patients suffering from herpes, shingles and hepatitis infections. One of the protein's actions, says Lapcevic, is to stimulate the bone marrow to manufacture more white and red blood cells.[3] In animal studies, both flu virus and feline immunodeficiency virus (FIV, the equivalent of HIV in cats) are suppressed.[4,5] (One study was detailed in an unpublished report used for applying for a USDA animal drug license.) SmithKline Beecham, a pharmaceutical company in Philadelphia, became interested in thymic protein A when the company's animal health research division found that an extremely small quantity of thymic protein A added to the rabies vaccination for dogs doubles the potency of

the vaccine and its immune protection.[5]

In a human pilot study completed this year under the direction of Hugh Riordan, M.D., at the Center for Improvement of Human Function in Wichita, Kan., the effects of thymic protein A on Epstein-Barr virus (EBV) were studied.[7] EBV is the causative agent of infectious mononucleosis; EBV activation is also common in chronic fatigue syndrome patients, but that association has not been borne out with additional research. In the study, six patients with chronically elevated EBV antibodies were treated with thymic protein A for 60 days. The result of the treatment was a statistically significant reduction of antibody titers—a measure of the amount of antibody relative to a particular antigen present in the blood. Also, in symptom questionnaires, participants reported increased energy. Although this was a nonblinded pilot study, the fact that a significant reduction of EBV antibody titers ($p < 0.03$) occurred in a group of patients who had elevated titers for longer than six months suggests that thymus protein A may play a role in modulation of EBV infection.

Indications and Usage

The practical implication of this research is that commercial thymic protein A shows potential for fighting infections as well as cancer and immune-deficiency diseases such as HIV. Physicians report it to be clinically effective against a variety of infections including colds, flu, herpes, shingles, sinusitis and hepatitis.[6] Cancer trials are under way, and there is anecdotal evidence of positive results with thymic protein A.[6]

When subjected to toxic therapies such as chemotherapy and radiation, the immune system often becomes severely damaged, which results in opportunistic infections. In fact, many cancer patients do not die directly from cancer but from infections against which they cannot mount a sufficient immune response. Some physicians are now recommending thymic protein A be taken during radiation and chemotherapy to maintain white blood cell levels.

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Thymic protein A may be used in any situation in which strengthening the immune system is desirable. It is contraindicated, however, when large doses of steroidal hormones are administered, such as with hormonal treatment of prostate cancer. High steroid levels are known to interfere with the adherence of the protein to lymphocyte surfaces—though not a concern with hormone replacement therapy for menopausal women.

Thymic protein A may also be useful as a preventive agent to counter the effects of aging, such as from declining hormone levels. One approach to maintaining vitality and resistance in old age is to restore natural substances, such as hormones and enzymes, to youthful levels. Thymic protein may soon join the list of natural products, including Co-Q10, melatonin and DHEA, older people are taking to boost tapering hormone levels.

Until the introduction of thymic protein A, only whole thymus glandular extracts and the drug thymosin were available, which contained fragments of the whole molecule. Since only the whole 500-amino-acid peptide chain fits the proper receptor site on the T-4 cell and programs it, only the whole thymic protein A biomolecule would be expected to have full biological activity. In other words, thymic protein A may have greater activity than glandular extracts and thymosin in stimulating immunity.

Thymic protein A comes as a powder in individual packets. Each packet contains 4 mcg of thymic protein in a maltodextrin base. The usual dose is one to three packets per day taken sublingually. Because the protein is identical to human thymic protein, it has a low potential for toxicity. To date, there are no reports of allergic reactions—but by the same token, there is little research about it reported in the scientific literature.

Strengthening the immune response may well be the single most important goal of anyone who wishes to become well or stay well. We are exposed to microorganisms every day of our life, and environmental carcinogens mutate our DNA all the time, yet infections and cancer do not always develop. What protects us is a healthy immune system.

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