Sample research paper on the immune system: friend or foe

Health & Medicine, Disease

The human immune system is a proverbial double-edge sword. On one had humans depend on the immune system, and on the other hand there are diseases as a result of its improper function. These diseases due to its disorder in its function can range from immunodeficiency states to hypersensitivity . Put in simple terms, the disorders range from doing too little to an overreaction of the system. There disorders will be considered under the following heading: immune mechanism of tissue injury, autoimmune diseases, and immunodeficiency diseases. Before we go into the details of the diseases, we would like to describe what the immune system is made of and how it works. In the end, we will derive a conclusion whether it is a friend of a foe.

Various blood cells are essential components of immune system. To be specific, they would be: T lymphocytes, B lymphocytes, Macrophages, Dendritic and Langerhan’s Cells and Natural Killer Cells. The T lymphocytes are considered as mediators of cellular immunity, and make up for almost 60 to 70% of circulating lymphocytes. The B lymphocytes, which make up of 10 to 20% circulating lymphocytes, are also present in bone marrow, lymph nodes, spleen and tonsils. They are stimulated by antigen, and are transformed into plasma cells, which secrete the immunoglobulins. There are five types of immunoglobulins: IgG, IgM, and IgA, which make up for 95% of serum immunoglobulins, IgE occur in traces and IgB are bound to the B-cell membrane. The macrophages play several roles in the immunity, including: processing and presenting antigen to T cells, and preparation of factors that play role in immunity. The dendritic cells are found in lymphoid tissue and the Langerhan’s cells are found in epidermis. They play the immunological

role at their respective locations. The remaining 10 to 15% of circulating cells are called Natural Killer Cells, and are responsible for the lysing host cells like tumor cells.

In addition to the various cells, there are also certain chemical mediators called cytokines. Among their various functions, cytokines: mediate natural immunity, regulate the growth of lymphocytes, activate inflammatory cells and stimulate hematopoiesis.

Now we would like to describe how the immune system actually works . The response of antigen can typically cause tissue-damaging reactions, which are called hypersensitivity reactions. The resulting tissue lesions are called hypersensitivity disease. These hypersensitivity diseases are classified on the basis of immunological mechanism underlying them, and are named from Type I disease to Type IV. They maybe be called diseases, but in essence they are protective, hence critical to the survival of human beings.

The Type I hypersensitivity (Anaphylactic type) occurs rapidly in response to combination of antigen with antibody, which is previously bound to surface of a Mast cells and Basophils. This kind of reaction typically leads to Anaphylactic reaction and some forms of Bronchial asthma. This type of hypersensitivity may cause systemic or localized infection. The systemic form of disease or systemic anaphylaxis is very important to keep in mind as it is capable of causing death within minutes. The local reactions typically happen on skin and mucosal surface, when they are the sites of exposure. Susceptibility to it seems to be genetically controlled, and is termed as atopy.

In the Type II hypersensitivity (Antibody-Dependent), antibodies are formed

against the targeted antigens. Unlike the Type III hypersensitivity to be discussed later, in the Type II, the antigens are intrinsic to the cell or tissue that is damaged. This type of hypersensitivity is further divided into three types: Complement-mediated cytotoxicity; Antibody-dependent cell-mediated cytotoxicity; and Antibody-mediated cellular dysfunction.

The Type III hypersensitivity (Immune Complex-Mediated), the reaction is initiated by antigen-antibody complexes that lead to acute inflammatory reaction. “ Activation of complement and accumulation of polymorphonuclear leukocytes are important components of immune complex-mediated tissue injury” . This kind of hypersensitivity manifests into two major kind of diseases: Systemic Immune Complex Disease (Serum Sickness) and Local Immune Complex Disease (Arthus Reaction). The latter is a localized area of tissue necrosis due to acute immune complex vasculitis.

Lastly, the Type IV (Cell-Mediated) Hypersensitivity is of two types: Delayed Type Hypersensitivity and T Cell-Mediated Cytotoxicity. The former plays a role in protecting the body against tuberculosis infection. The latter plays a role in graft rejection and helping against virus infection.

On the other side of the spectrum are set of disease where the immune system turns on itself or is insufficient to cope up with the threats. The first categories of diseases are called Autoimmune diseases and the other come under Immunodeficiency diseases.

In Autoimmune diseases , immune reaction occurs against one’s owns antigen or self-antigen. The diseases that come under this category are: self-tolerance, Systemic Lupus Erythematosus, Rheumatoid Arthritis, Sjogen’s

Syndrome, Systemic Sclerosis and Polymyositis.

The Immunodeficiency diseases are further divided into primary and secondary. The primary immunodeficiency diseases are detected early in childhood due to vulnerability to infections. Although they are uncommon, they are almost always devastating, and ultimately fatal. The secondary immunodeficiency diseases are sometimes seen in patients with malnutrition, infection, cancer, renal diseases, Hodgkin’s disease, and sarcoidosis. A major member of this group would be Acquired Immunodeficiency Syndrome (AIDS).

Although they hypersensitivity reactions from Type I to IV have been described as diseases per say, they are actually body’s reaction to wall off threat. Such a thread, if left unchecked can have a devastating impact on the person. One can image the outcome by examining the Primary Immunodeficiency diseases which are fatal in early childhood. The same cannot be said about the Autoimmune disease and the Immunodeficiency diseases. They are diseases in true sense and hard to cure. Also, the hypersensitivity reactions are far more prevalent than the other two categories. This further highlights the fact that immune system is always at guard against foreign antigen.

So, in retrospect, it can be argued that immune system is a friend and not a foe.

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