



Defiance In The Body's Defence System

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Abstract

Nature has provided immune system to protect the body from the invasions of Non-self-biological and/or chemicals including toxins. These non-self-items, called as antigens produce immune response in the body which in turn produce antibodies. These antibodies inactivate antigens by making antigen antibody complexes. Due to various reasons, both genetic and environmental, the components of the lose the regulatory control and go in wrong assortment and instead of protecting the self they attack on the self itself. Sometimes due to attack of "non- self" immune system overreacts and produces "cytokine storm".

Keywords: Antigen; Antibody; Inflammation; Infection; Autoimmune diseases; Cytokine storm

Immune System

The immune system is provided by nature to protect the body from any external invasion like army for a nation. It recognizes biological components including the microbiota (living in our body) as "self" and "non self" such as infectious organisms, cancers and their metabolic products (toxins) and other chemicals (acts as antigens) are quickly detected by the immune system and mounts an attack that is strong enough to kick them out, and promptly backs off when the job is done [1]. The immune system is a complex network of cells, tissues, and organs and together they help the body to fight infections and other diseases. The skin mucous membranes white blood cells organs and tissues of the lymph system, such as the thymus, spleen, tonsils, lymph nodes, lymph vessels, and bone marrow, antibodies, the complement system, are the ranks of the defence system. When the immune system recognizes an antigen (biological or/and chemical), it attacks them. This is called an immune response. Due to the antigen action new protein is synthesized named as antibodies which weaken and react with antigen and destroy them by making antigen -antibody complex, which is ultimately removed from the body. The human body also makes other cells to fight the antigen [2].

What goes wrong with the immune system?

Following are the possible causes of causes of Immune system disorder

- Be born with a weak immune system. This is called primary immune deficiency.
- Get a disease that weakens immune system. This is called acquired immune deficiency.
- Have an immune system that is too active, may be due to allergic reaction
- Have an immune system that turns against you. This is called autoimmune disease.

Sometimes a person may have an immune response even though there is no real threat or when system overreacts when there is a threat under such situations system goes astray. Because of this one may suffer allergies, asthma, and autoimmune diseases. The causes of Autoimmunity are yet not clear however with recent finding it is surmised that changes in autologous antigens or alterations in immune regulation Are the modes of action. Autoimmune

disease, the pathological consequence of an autoimmune response, depends principally upon the stimulation of helper/inducer T cells reactive with self-antigens. In such situations the body's immune system attacks healthy cells. Because the incidence of autoimmune diseases is rising, researchers suspect environmental factors like infections and exposure to chemicals or solvents might also be involved [3]. Other immune system problems happen when the immune system does not work correctly. These problems include immunodeficiency diseases. Patients with Immunodeficiency disease will get sick more often. Chronic infections are troublesome and harder to treat. They are often genetic disorders [4].

There are other diseases that can affect the immune system. For example, HIV is a virus that harms the immune system by destroying white blood cells. Chronic HIV infection results in AIDS (acquired immunodeficiency syndrome) and due to AIDS immune system is badly damaged [5]. There are more than 80 types of autoimmune diseases. Like many other diseases autoimmune diseases also show gender differences. Autoimmune diseases can affect any part of the human body and one disease leads to another. For instance, to begin with a person suffers with alopecia areata later, he develops autoimmune disease of the skin that causes hair loss, autoimmune hepatitis affects the liver. In type 1 diabetes, the immune system attacks the pancreas. In majority of cases, patient of rheumatoid arthritis also suffers with one or many diseases such as joints pain, pulmonary parenchymal disease in lungs, and dry eye, scleritis, or uveitis in eyes. They are mostly syndromic diseases [6]. Autoimmune diseases do tend to run in families, however, viruses, certain chemicals, and other things in the environment may trigger an autoimmune disease if one already has the genes for it.

Autoimmune disease

Autoimmune disease usually develops in middle-aged adults but may also appear during childhood or late in life. Patients who are diagnosed between ages 16 and 65 are considered young onset and after 65, late onset with each of them having different signs and symptoms. Some autoimmune diseases are more common in certain ethnic groups. Certain autoimmune diseases such as, lupus may not affect Caucasians, but African-American and Hispanic people suffer, it was also found out that every family member will not necessarily have the same disease, but they inherit a susceptibility to an autoimmune condition. According to a 2014 study, women get autoimmune diseases at a rate of about 2 to 1 compared to men — 6.4 percent of women vs. 2.7 percent of men. Often the disease starts during a woman's childbearing years (ages 15 to 44) [7].

Cytokine Storm

Due to antigenic stimulation sometimes immune response flare up and does not stop after neutralizing antigen such situation it is termed as cytokine storm. On a basic level, one can think of it like setting off a bomb in the house because instead of getting rid of a few infections and inflammations, the system overreacts and can be a cause of death. But the real problem isn't just that the response is too strong; it is that it keeps going when it shouldn't. This is not a problem of 'too good' an immune response, but rather a subtle

defect in the immune system that doesn't let it ramp back down [8,9]. When everything is working as it should, pro-inflammatory cytokines and anti-inflammatory cytokines work together to kill off an invader and then settle down, so the immune system isn't perpetually in attack mode. When things go awry, however, the immune system stays on the attack and one can end up with a cytokine storm. It's important to know that's cytokine storm is not the same thing as a disease flare. During a flare there is certainly too much pro-inflammatory immune activity, but it only goes so far in a controlled manner. A cytokine storm, however, is like an out-of-control brush fire that picks up more power as it continues to spread.

Some autoimmune patients end up with cytokine storms. This is most apt to occur in children with juvenile idiopathic arthritis (JIA). "About 10 percent of patients with JIA will experience it; in some cases, multiple times," says Dr. Cron. Adults with lupus, Still disease, and other inflammatory/autoimmune conditions may also develop a cytokine storm (Figure 1).

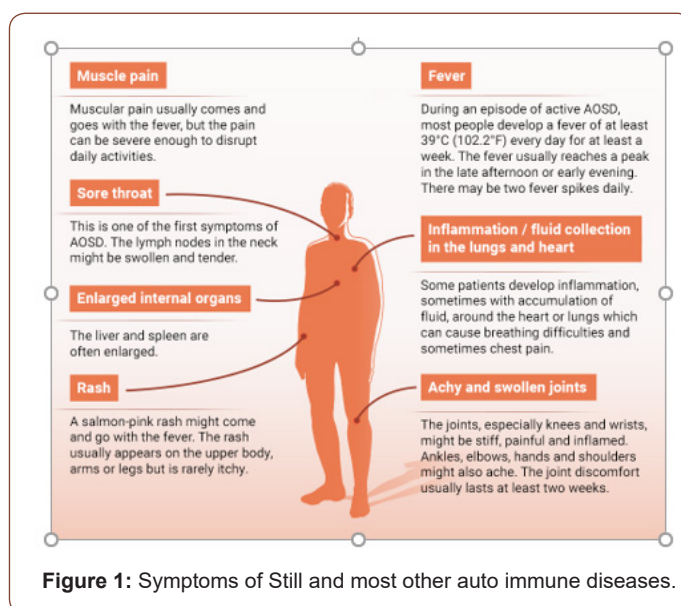


Figure 1: Symptoms of Still and most other autoimmune diseases.

In autoimmune disease patients, cytokine storms are believed to occur because of a genetic defect, though the presence of an infection often serves as a trigger. When it comes to COVID-19, the coronavirus likely coupled with a previously unknown defect in the immune system is what leads the inflammatory cytokines to go haywire and essentially multiply. They "recruit and activate additional immune cells and amplify the immune response" so much so that the immune response starts killing off healthy cells in the body, says Dr. Cron. "If left untreated, this can result in multi-organ failure and eventual death.

Conflict of interest

None.

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None.

References

1. Gonzalez S, González Rodríguez AP, Suárez Álvarez B, López Soto A, Huergo Zapico L, et al. (2011) Conceptual aspects of self and nonself discrimination. *Self Nonself* 2(1): 19-25.
2. Marshall JS, Warrington R (2018) An introduction to immunology and immunopathology. *Allergy Asthma Clin Immunol* 14(Suppl 2): 49.
3. Genetics and Immune Disorders?
4. Javier Chinen, William T (2002) Shearer Molecular virology and immunology of HIV infection. *J. Allergy And Clinical Immunology* 110(2): 189-198.
5. Noel R (2017) Autoimmune Diseases, in *International Encyclopedia of Public Health* (Second Edition).
6. Angum F, Khan T, Kaler J, Siddiqui L, Hussain A (2020) The Prevalence of Autoimmune Disorders in Women: A Narrative Review. *Cureus* 12(5): e8094.
7. Gupta P D (2020) Cytokines: The Game Changer in Pathogenesis of Covid-19. *J Clin Exp Immunol* 5(6): 283.
8. Gupta P D (2020) Cytokine storm chapter 7 in *Corona Gyan*. Capricorn Publishing House, Jaipur India.
9. Cron RQ (2021) COVID-19 cytokine storm: targeting the appropriate cytokine. *Lancet Rheumatol* 3(4): e236-e237.