Autoimmune Diseases
A Rising Epidemic

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The Immune System and Autoimmunity

An immune system is a highly regulated biological mechanism that identifies and reacts to antigens from various foreign substances found in an organism’s body and reacts to these possible pathological threats by producing certain types of lymphocytes such as white blood cells and antibodies that have the ability to destroy or neutralize various germs, poisons and other foreign agents. Typically, the immune system is able to distinguish the foreign agents from the organism’s own healthy cells and tissues. Autoimmunity, on the other hand, describes a diseased condition in which an organism fails to recognize its own cells and tissues, thereby enabling the immune system to trigger a response against its own components. A low degree of autoimmunity is an integral part of an effective immune system. For example, low-level autoimmunity has been demonstrated to be a possible factor in reducing incidence of cancer through versatile CD8+ T cells, which kill target self-cells by releasing cytokines capable of increasing the susceptibility of target cells to cytotoxicity, or by secreting chemokines that attract other immune cells to the site of autoimmunity.

Autoimmune Diseases

Autoimmune diseases occur when there is interruption of the usual control process, thereby allowing the system to malfunction and attack healthy cells and tissues. A common example of autoimmune disease is Type 1 Diabetes, which affects nearly a million people in the United States. It is a condition in which the pancreas does not produce enough insulin to control sugar blood levels due to the autoimmune destruction of the insulin-producing pancreatic β cells. Some other common autoimmune disorders include rheumatoid arthritis, systemic lupus erythematosus (lupus), and vasculitis.

Autoimmune disorders typically fall into two categories: systematic and local. Systemic autoimmune diseases are associated with autoantibodies, which are not tissue specific, and the spectrum of damage may affect a wide range of tissues, organs, and cells of the body. Localized autoimmune diseases are associated with organ-specific conditions that affect a single organ or tissue. However, the boundary between systematic and non-systematic disorders becomes blurred during the course of the disease as the effect and scope of localized autoimmune disorders frequently extend beyond the initially targeted areas.

The onset of autoimmune disease is associated with a trigger, which can be pulled in numerous ways. In one possible example, certain substance in the body that is normally confined to a specific area may be released into another area due to internal trauma; the translocation may stimulate the
immune system to recognize a natural body component as foreign and trigger an autoimmune response. In another scenario, a normal component of the body may be altered via virus, a drug, sunlight or radiation; the altered substance may then appear foreign to the immune system. Very rarely, a foreign substance resembling a natural body component may enter the body, thereby inducing the immune system to target both the similar body substance and the foreign substance (11).

Just as the triggers for autoimmune disorders are wide and varied, so are their effects. The debilitating effects of various autoimmune disorders include the destruction of a specific type of cell or tissue, stimulation into excessive growth, or interference in function. Organs and tissues affected by more common autoimmune disorders include components of the endocrine system, such as thyroid, pancreas, and adrenal glands; components of the blood, such as red blood cells; and the connective tissues, skin, muscles, and joints (9).

**Treatments for Autoimmune Diseases**

Since cures are currently unavailable for most autoimmune disorders, patients often face a lifetime of debilitating symptoms, loss of organ and tissue function, and high medical costs (5). For many autoimmune disorders, the goals of treatments are to reduce chronic symptoms and lower the level of immune system activity while maintaining the immune system’s ability to fight foreign contaminants. Treatments vary widely and depend on the specific disease and the symptoms. For example, those afflicted with Type I Diabetes must replenish their insulin levels, usually through injections. In autoimmune diseases like Type I Diabetes, patients may need supplements to provide a hormone or vitamin that the body is lacking. If the autoimmune disorder either directly or indirectly affects the blood or the circulatory system, such as autoimmune hemolytic anemia (AIHA), lupus, and antiphospholipid antibody syndrome (AAS), patients may require blood transfusions. In autoimmune disorders that affect the bones, joints, or muscle, such as multiple sclerosis (MS) and rheumatoid arthritis, patients often require assistance to maintain mobility or medication to suppress pain and reduce inflammation in affected areas (12). In many cases of autoimmune diseases, medicine is often prescribed to control or reduce the immune system’s response. Such medicine may include corticosteroids and immunosuppressant drugs, such as azathioprine, chlorambucil, cyclophosphamide, cyclosporine, mycophenolate, and methotrexate (11).

**Autoimmune Disorders: Women’s Disease?**

Approximately one-third of the risk of developing an autoimmune disease can be attributed to heritable factors, especially gender. Women account for about 75% of the estimated 23.5 million people in America afflicted by autoimmune diseases, and autoimmune diseases constitute some of the leading causes of death and disability in women below 65 years of age (5, 13). While the relationship between sex and prevalence of autoimmune disorders remains unclear, researchers have noted that women have higher levels of antibodies and mount larger inflammatory responses than men when their immune systems are triggered, possibly increasing the risk of autoimmunity (3, 13). Autoimmune diseases tend to fluctuate in accordance with hormonal changes, such as during pregnancy, menstrual cycle, menopause, aging and usage of birth control pills (3). Autoimmune diseases fluctuate by racial lines as well, since two gene variants were found that are related to an increased risk of lupus among African American women (5). Despite the prevalence of female patients,autoimmunity is rarely discussed as a women’s health issue (7).

**Environmental Triggers**

Besides genetic factors, pathological and environmental factors play a role in initiating or exacerbating certain autoimmune disorders. For example, the product of a human gene that confers susceptibility to Crohn’s disease recognizes components of certain bacteria, and viral infections have long been suspected as triggers of Type 1 Diabetes. Conversely, other research suggests that the numbers of regulatory T cells that normally hold potentially destructive immune responses in check are reduced by viral infections (5).

Exposure to various synthetic chemicals and metals in the initiation of autoimmune disease may also increase susceptibility to autoimmune disorders. Generally, metals inhibit immune cell proliferation and activation; mercury, gold, and silver, for example, can induce lymphocyte proliferation and subsequent autoimmunity. A broad range of synthetic chemicals, including hormone supplementation, hormone blockers, pesticides, insecticides, fungicides, and food and herbal products, may elicit estrogenic or anti-estrogenic activity (5).

**A Rising Epidemic and Challenges in Combating Autoimmune Disorders**

In 2005, in a report to the US Congress, the National Institutes of Health (NIH) released *Progress in Autoimmune Disease Research*, which reported that more than eighty known autoimmune diseases, such as multiple sclerosis, Type 1 Diabetes, rheumatoid arthritis, Crohn’s disease and myasthenia gravis, affect anywhere from 14.7 to 23.5 million people in America (4, 5). While a significant portion of Americans suffer from autoimmunity disorders, according to a 2001 survey by the Autoimmune Diseases Association, over 45 percent of patients with autoimmune diseases have been labeled chronic complainers in the earliest stages of their illness. Diagnosis is difficult because a patient’s symptoms are likely to be vague with a tendency to fluctuate in the beginning. Thus, a typical patient usually undergoes a series of tests before a correct diagnosis is made, which can sometimes take years. (7)

**Conclusions**

Considering the prevalence of autoimmune disorders in America, both the scientific community and the public must recognize the urgency of the autoimmune epidemic. Today’s practicing physicians must be aware of the
rising epidemic of autoimmune disease and be able to diagnose their symptoms properly and accurately before irreversible damage occurs. In addition, since the patients afflicted with autoimmune disorders are predominantly women, these disorders should be discussed as an issue relevant to women’s health.

Due to the vast number of autoimmune diseases, further research is unlikely to pinpoint a single cause for autoimmunity. Rather, research should be focused on defining varied common triggers, including environmental pollution and specific pathological agents.

References


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