AUTOIMMUNE DISEASE: When our immune system goes haywire

While many people are familiar with the term autoimmune disease, many don’t have a clear understanding of what that means. Perhaps much of the mystery and confusion behind diseases such as multiple sclerosis, rheumatoid arthritis and thyroiditis lies in the fact that the biological basis and the symptoms that accompany such debilitating illnesses may not be linked to a specific infection. Rather, autoimmune disorders occur when our very own immune system—a complex system to begin with—begins to attack our body.

Given that many different kinds of proteins and molecules comprise our immune system, it is often a challenge to understand how and why a crossed signal or miscommunication can lead to an autoimmune disease. Yet given the complexity of a healthy and properly functioning immune system, it is not so difficult to see why autoimmune diseases are so prevalent in our population.

There are many different scientific hypotheses to explain the cause of autoimmunity; among these include viral infection, bacterial infection, stress and genetic susceptibility.

Infection, whether viral or bacterial, is especially regarded as a culprit as it has been found to precede the onset of an autoimmune disease in many confirmed diagnoses.

Viruses and bacteria gain access into our bodies in the first place by devising methods to avoid detection. Normally our immune system reacts by recognizing antigens (foreign substances that reside on the surface of bacteria and viruses) and then creating antibodies (special proteins designed to destroy the foreign invaders). Yet our immune system is sometimes tricked into triggering an immune response that instead attacks our own organs and tissues, as well as the pathogens that cause infection. (See figure below.)

Our Immune System: The Basics

To better understand how these situations in which the “body attacks itself” can lead to an autoimmune disease, it helps to know some of the basics of immunology, such as the various organs, the cells they produce, and the roles these cells play in protecting us from illness.

Immunology basics include:

- **Bone marrow**: The location within our bones where immune cells are derived.
- **Thymus**: A flat, pinkish-gray gland, located in the upper

![Diagram of normal immune response and autoimmune disease]

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chest in front of the heart, where T-cells pass through and mature.

- **Lymphatic system:** Made up of lymph fluid, lymphatic vessels, bone marrow, lymph nodes, spleen and tonsils, the lymphatic system is critical in the elimination of toxic waste from tissues.

- **T-cells:** Considered the “warriors of the immune system,” these cells mature in the thymus enabling each individual T-cell to recognize only one of millions of antigens. T-cells then migrate into the lymphatic system and circulate in the blood.

- **B-cells:** Immune cells that are produced in the bone marrow and then secrete antibodies.

When discussing autoimmune diseases, the role played by T-cells is of great importance. As Lorna Vanderhaeghe and Dr. Patrick Bouic explain in their book *The Immune System Cure*, T-cells are taught to recognize the difference between invading cells (“nonself”) and our own cells (“self”). Normally, the immune system attacks only substances and infections that are thought of as foreigners, such as invaders from outside the body, or cancer cells made within the body; however, sometimes the immune system may be confused and attack healthy body cells.

### Examples of Autoimmune Diseases

Thyroid disease, lupus, multiple sclerosis, and rheumatoid arthritis are some of the most common autoimmune diseases that affect our population. The table on page 3 provides a more comprehensive list.

#### Thyroid Disease

There are two different autoimmune diseases that target the thyroid: Graves’ disease, which causes an overactive thyroid (hyperthyroidism), and Hashimoto’s disease, which causes an underactive thyroid (hypothyroidism). Both forms of thyroid disease are more common in women than men and are often first diagnosed in individuals between the ages of 20 and 30 years.

Because the thyroid gland controls the metabolic activity of our body, dysfunction of this gland affects our metabolism. In the case of Graves’ disease, the thyroid gland is attacked by the body’s antibodies, resulting in inflammation and swelling of the thyroid gland. This in turn leads to hyperthyroidism (an overactive metabolic state) whereby the body goes into overdrive, causing an increase in heart rate, blood pressure, and calorie burning rate.

Like Graves’ disease, Hashimoto’s thyroiditis is an autoimmune disorder whereby antibodies react against proteins on the thyroid; however, this disease is characterized by a gradual destruction of the gland itself and its ability to produce the thyroid hormones needed by the body. People in a hypothyroid state experience a lowered metabolic activity.

Treatments for Graves’ disease include radioactive iodine (RAI) treatment and surgical removal of the thyroid, which usually result in a disabling of the thyroid and eventual hypothyroidism. Thyroid hormone therapy may therefore be indicated. Similarly, for hypothyroidism caused by Hashimoto’s disease, doctors typically prescribe thyroid hormone therapy.

#### Systemic Lupus Erythematosus (SLE)

SLE (often referred to simply as “lupus”) is a chronic, autoimmune disease that affects various parts of the body, particularly the skin, blood, joints and kidneys, lungs, and heart. It is caused by an overactive immune system that produces antibodies that attack the body’s own organs, joints, and tendons. The result is the formation of immune cell complexes that build up in various tissues causing pain, inflammation and eventual injury or destruction.

In her book *Living Well with Autoimmune Disease*, Mary Shomon writes: “For most, lupus is considered a mild
condition, affecting only a few organs. For others however, it may not take such a simple course and may trigger serious, even life-threatening, conditions.” Lupus can occur at any age, and while it is found in both men and women, the disease is 10-15 times more common in women.

Medical studies have investigated the use of DHEA (dehydroepiandrosterone), a hormone produced by the adrenal gland, and have found it to improve the health of people with lupus. DHEA is a major precursor, or building block, to the sex steroids (androgens and estrogens). Because studies have shown that some lupus patients have low levels of DHEA and that this may contribute to the onset of the disease, it is thought that increasing the level of androgens may help.

In a scientific review titled DHEA For Lupus, Dr. Kay Shaver concludes that the use of DHEA may provide lupus patients with several benefits including the potential to provide relief from symptoms, a decrease in the frequency of disease flare-ups, and possibly even sparing of the destructive effect on the bone.

**Multiple Sclerosis (MS)**

Multiple sclerosis is another chronic inflammatory autoimmune disease, but this one targets the central nervous system, affecting the brain and spinal cord.

In MS, the body overproduces antibodies that specifically attack myelin (the protective sheath that covers our nerves) and can result in a variety of neurological problems. These problems include cognitive and psychological changes, weakness or paralysis of limbs, numbness, vision problems, speech difficulties, problems with walking and motor skills, and sexual dysfunction.

MS is the most common acquired neurological disease in young adults and, while it can affect anyone, it is most often diagnosed in individuals between ages 20 and 40. Like all of the autoimmune diseases already discussed, MS is much more prevalent (twice) in women than in men.

Interestingly, repeated observations that women with MS show a significant improvement in their symptoms and a decrease in their relapses or flare-ups upon becoming pregnant, led to the design of some important studies. The effects of oral hormonal treatment for MS were tested by Dr. Nancy Sicotte and colleagues. They showed that estriol, a pregnancy hormone, when given to nonpregnant women with MS, helped to decrease MS symptoms. More extensive trials in animals with MS confirmed that various doses of estriol work to stabilize and even improve symptoms in this debilitating disease.

The role of another hormone—progesterone—has also been implicated in the possible treatment of MS. Dr. Herbert Koenig and colleagues showed in a laboratory study that progesterone may be involved in the process of myelination, or the formation of myelin to protect nerve cells. Their work suggests that the administration of progesterone may be a valuable therapeutic approach for initiating myelin repair in MS patients.

**Rheumatoid Arthritis (RA)**

RA is a widespread and disabling autoimmune disease that affects the joints and muscles. Most frequently the

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**Some of the Known Autoimmune Diseases**

<table>
<thead>
<tr>
<th>Autoimmune Disease</th>
<th>Affected area</th>
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<tbody>
<tr>
<td>Rheumatoid arthritis</td>
<td>Cartilage and joint linings</td>
</tr>
<tr>
<td>Multiple sclerosis</td>
<td>Brain and spinal cord</td>
</tr>
<tr>
<td>Systemic lupus erythematosus</td>
<td>Most tissues, DNA, platelets</td>
</tr>
<tr>
<td>Graves’ disease</td>
<td>Thyroid</td>
</tr>
<tr>
<td>Hashimoto’s thyroiditis</td>
<td>Thyroid</td>
</tr>
<tr>
<td>Myasthenia gravis</td>
<td>Nerves and muscles</td>
</tr>
<tr>
<td>Crohn’s disease</td>
<td>Gut</td>
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<tr>
<td>Insulin-dependent diabetes mellitus</td>
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<tr>
<td>Juvenile diabetes</td>
<td>Cells that secrete insulin</td>
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<tr>
<td>Psoriasis</td>
<td>Skin</td>
</tr>
<tr>
<td>Autoimmune hemolytic anemia</td>
<td>Red blood cell membranes</td>
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<tr>
<td>Ankylosing spondylitis</td>
<td>Spine</td>
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* Adapted from The Immune System Cure
free-moving joints—such as the small joints of the hands, knees, ankles, hips, elbows, wrists and shoulders—are targeted.

In RA, our body launches an autoimmune attack on the synovial membranes (the tissue that lines and cushions the joints) leading to inflammation, thickening and pain. As this process continues the pain and swelling increase, and ultimately can result in destruction and deformity of the bones.

The condition usually starts between the ages 25 and 50, and perhaps because it is so common, the symptoms are often mistaken as a normal part of aging. RA affects females two to four more times frequently than males. For most patients, RA is progressive, despite treatment. The objective of treatment is primarily to control inflammation, prevent or slow joint damage, and ultimately ease the condition into remission.

The role of the hormone progesterone in RA patients has also been investigated. Dr. Rossella Valentino and colleagues describe decreased levels of progesterone in women with RA, and their studies support the positive outcomes reported by Dr. Miguel Cuchacovich when using progesterone treatment in RA patients. Dr. Valentino also describes decreased levels of testosterone in such patients and has shown the positive effects in laboratory and clinical studies when testosterone is used as therapy.

The Endocrine System & Autoimmune Diseases

The endocrine system is a target for autoimmune diseases. As the body’s hormonal regulator, the endocrine system releases and then slows and/or stops the production of different hormones in response to various internal and external triggers.

The tightly controlled network of endocrine organs and glands (which includes the thyroid, pancreas, pituitary, adrenal, ovaries and testes) may be affected in cases of autoimmune disease. In cases of insulin-dependent diabetes, the pancreas comes under attack, while in Graves’ disease, as discussed earlier, the thyroid gland goes into overdrive in response to overproduction of antibodies.

Autoimmune disorders involving the endocrine system may also arise when a person produces antibodies to a particular hormone. Antibodies against naturally occurring hormones such as estradiol and progesterone can wreak havoc. When women make antibodies to such hormones, they may experience erratic ovulation or insufficient production of the uterine lining. These conditions can cause abnormal menstrual periods and even prevent successful implantation and pregnancy.

While autoimmune diseases certainly afflict men, it is virtually impossible to ignore the fact that they are much more prevalent in the opposite sex. In his book *Women and Autoimmune Disease*, Dr. Robert Lahita writes, “Why is there such a seemingly unfair preponderance of women associated with practically every one of the autoimmune diseases? As it turns out, one of the greatest

“An over abundance of estrogen or estrogen-dominance may be a factor in the prevalence of autoimmune conditions in women.”
The Role of Estrogen in the Immune System

Many scientists are focusing their research efforts on trying to understand precisely why it is that autoimmune diseases are more common in women than in men. The authors of *The Immune System Cure* offer the following explanation: “Scientists believe that the female hormone estrogen may be the reason for this. The hormone estrogen may interplay with certain immune factors that enhance the action of the inflammatory response, increasing antibodies that attack certain tissues in the body. An overabundance of estrogen or estrogen-dominance may be a factor in the prevalence of autoimmune conditions in women.”

Other studies have shown that during their reproductive years, when estrogen levels are higher, females tend to have a more vigorous immune response. It is during menopause, when estrogen levels decrease, that a woman’s immune system becomes more similar to that of a man’s. This lowered immune response is believed to be caused by changes in the function and activity of certain immune cells. And even more interesting evidence for the influence of estrogen on our immune system is provided by the observation that the incidence of many autoimmune diseases in women dramatically decreases following menopause.

Research continues to show that the decreased estrogen level associated with menopause can affect our immune system. In a review of various studies designed to better understand the relationship between sex hormones such as estrogens and the immune system, Dr. Sarit Aschkenazi and colleagues explain that sex hormones affect and modify the actions of different types of immune cells. The authors also point out that certain interactions between estrogen and cells of the immune system can also influence other organs of the body that are not directly related to immunity. For example, cardiovascular disease and osteoporosis—health issues that often affect women after menopause—are linked to a decrease in estrogen and a loss in estrogen’s ability to regulate the healthy functioning of other types of immune cells.

In their review, Dr. Aschkenazi and colleagues concluded that sex hormones, in particular the estrogens, play a role in the activity of immune cells. Furthermore, a deficiency in estrogen that occurs during menopause may result in a failure of estrogen to properly regulate the immune system. These changes, in turn, may play an important role in the development of menopausal symptoms and disease. The possible role of hormone therapy should be considered in cases of autoimmune disease.

Keeping Your Immune System Healthy

How do you keep the immune system active and healthy? All the books say essentially the same thing—simply by living well. And “living well” involves common sense practices such as eating a healthful diet, getting enough sleep, exercising, drinking alcohol only in moderation, and avoiding stress. A few additional tips for keeping the immune system healthy include:

- Avoid or prevent exposure to environmental toxins such as mercury, poisons and heavy metals.
- Avoid taking unnecessary drugs.
- Understand that diet can influence your immune system, and choose your foods wisely.
- Have sex. Sexual activity has been found to be good for the immune system because it activates the hormones that are regulated by the act of having sex and helps maintain a healthy hormone balance.
References

- Women and Autoimmune Disease by Robert G. Lahita, MD, PhD, ReganBooks; New York, NY; 2004.
- “DHEA for Lupus” by Kay Shaver, PharmD; Pharmacist’s Letter/Prescriber’s Letter, 2000.