

One type of mistake is called *autoimmunity*. This is when the immune system for some reason *attacks your own body* in the same way it would normally attack an antigen. Juvenile-onset diabetes is caused by the immune system attacking the cells in the pancreas that produce insulin. Rheumatoid arthritis is caused by the immune system attacking tissues inside joints. Multiple sclerosis is caused by the immune system attacking the myelin sheaths that surround nerve cells. In each of these cases, white blood cells called T cells are unable to recognize cells of one's own body, and end up treating cells of the body as foreign invaders. What causes autoimmunity is not completely understood; but bacteria, viruses, toxins, and some drugs may play a role in triggering an autoimmune process in someone who *already* has a genetic (inherited) predisposition to develop such a disorder. The ability to develop an autoimmune disease is determined by a *dominant genetic trait* that is very common (20 percent of the population). The genetic predisposition alone does not cause the development of autoimmune diseases. It is theorized that the *inflammation initiated by unknown pathogens* somehow provokes a defense reaction in the body. Other less understood influences affecting the immune system and the course of autoimmune diseases include aging, chronic stress, hormones, and pregnancy. Autoimmune diseases are often chronic, requiring lifelong care even when the person may look or feel well. *Treatment presents challenges*, because it may require suppressing the immune system, making the patient susceptible to other diseases.

Allergies are the result of a *hypersensitive immune system*. There is no actual pathogen involved—the body is responding to *allergens*, molecules on the outside of harmless substances. *In a properly functioning immune system the genes of white blood cells enable them to distinguish between threatening and non-threatening proteins.* But an allergic person's white blood cells can't tell that the protein in a peanut (or latex, ragweed pollen, etc) isn't *invading* the body. The *sensitizing exposure* is how someone becomes sensitive to the allergen for the first time: B-cells-- "misinformed" at the genetic level -- cause the production of *large quantities of antibodies*—these *excess antibodies actually attach themselves to the mast cells* and WBCs responsible for inflammation. This takes about a week to 10 days. If the allergen comes along *again* it triggers a destructive domino effect called *the allergic cascade*:

1. The antibodies recognize the surface molecules of the allergen.
2. The antibodies bind to the allergen *while remaining attached* to the mast or white blood cell.
3. The antibodies destroy the allergen *but also destroy the mast cell or white blood cell.*
4. When mast cells and WBCs are destroyed, *their stores of histamine and other chemicals are released into the surrounding tissues and blood.*

Thus, the result of the allergic cascade is *severe inflammation due to histamine*: blood vessels dilate, blood pressure drops, the spaces between surrounding cells fill with fluid. Depending on the allergen or the part of the body involved, this brings on the various *allergy symptoms*: itching (body, eyes, nose), hives, sneezing, nausea, diarrhea, vomiting. *In some cases the reaction can involve the entire body*: in a mild case of *anaphalaxis*, you may only have mild itching or swelling throughout the body. In a severe reaction you may suddenly develop hives over large areas and have breathing difficulties (this is accompanied by a rapid and severe drop in blood pressure). Also, in a severe reaction, thinking becomes muddled as the brain and other vital organs become oxygen-starved. The brain and kidneys are especially vulnerable in this type of reaction and may be permanently damaged even if the victim survives. Cell fluids dumped into the tissues of the throat can cause the throat to swell shut, leading to death in as little as three or four minutes after exposure to the antigen or the onset

of symptoms. Hundreds of people die annually from anaphylactic shock in the United States alone.