National Institute of Environmental Health Sciences
Your Environment. Your Health.

Autoimmune Diseases and Your Environment

A healthy immune system defends the body against disease and infection. But if the immune system malfunctions, it mistakenly attacks healthy cells, tissues, and organs. Called autoimmune disease, these attacks can affect any part of the body, weakening bodily function and even turning life-threatening.

Scientists know about more than 100 autoimmune diseases. Some are well known, such as Type 1 diabetes, multiple sclerosis, lupus, and rheumatoid arthritis, while others are rare and difficult to diagnose. With unusual autoimmune diseases, patients may suffer years before getting a proper diagnosis. Most of these diseases have no cure. Some require lifelong treatment to ease symptoms.

Autoimmune diseases are on the rise

Collectively, these diseases affect 5-9% of the population and create considerable personal and public health burdens. Race, ethnicity, and sex are genetic characteristics linked to the chance of developing an autoimmune disease. These diseases afflict women more than men, and are among the leading causes of death for young and middle-aged women.[1]

Autoimmune diseases appear to be increasing throughout the world, yet the reasons are unexplained.[2] The prevalence of antinuclear antibodies, the most common indicator of autoimmunity in human cells, increased substantially over a recent 25-year span in the U.S.[3]

Research increasingly suggests that autoimmune diseases likely result from the interactions of environmental and genetic risk factors. Autoimmune diseases seem more common when people are in contact with certain environmental exposures, as described below.

What is NIEHS Doing?

For decades, NIEHS has researched how the environment may affect development of autoimmune diseases.

In 2010, the institute gathered an interdisciplinary panel of 40 experts to evaluate the state of the science in this area. Among many conclusions, the panel stated:

- Solvent exposure, from working with products such as paint thinners and cleaners, is linked to systemic sclerosis.
- Crystalline silica exposure, from working with quartz or granite, for example, can contribute to the development of several autoimmune diseases.
- Smoking can contribute to the development of seropositive rheumatoid arthritis.

Unraveling the genetic and environmental underpinnings of autoimmune disease remains a focus at NIEHS and the National Toxicology Program (NTP). Research progress leads to discoveries such as:

- **Added risk from ultraviolet (UV) radiation –** Short-term ultraviolet radiation exposure, as from outdoor sunlight, may affect the onset of juvenile dermatomyositis, an illness with muscle weakness and skin rashes. The chance of illness increased as the UV index increased to its highest levels in the month before symptoms began.[4]
- **Links to childhood poverty –** Childhood in a household with lower socioeconomic status and education levels is linked to rheumatoid arthritis in adulthood.[5]
- **Agricultural chemical association –** Exposure to some pesticides may play a role in the development of rheumatoid arthritis in male farmers.[6]

  The same study shows that in farm wives, an increased chance of developing rheumatoid arthritis was associated with other types of farm-related exposures, such as painting and using solvents. More research is needed on these and other potential risk and protective factors.[7]
- **Genetic factors in autoimmune muscle disease –** Using DNA samples from myositis patients of European ancestry, NIEHS researchers identified primary genetic risk factors associated with this autoimmune muscle disease.[8]

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- **Insight into genetic link to rheumatoid arthritis –** NIEHS-funded researchers are closer to explaining why a genetic risk that increases the chance of developing rheumatoid arthritis is amplified by environmental pollutants like cigarette smoke.[9]
- **Role of nutrition –** Vitamin D may help prevent immune dysfunction in older populations.[10] For lupus patients, NIEHS-funded researchers found that dietary micronutrients—choline, folate, and vitamin B12—may improve symptoms, but more research is needed.[11]

NIEHS is conducting these clinical studies:

- Immunity Cells in Blood studies how immune cells in the bloodstream may, under certain circumstances, contribute to inflammation.
- Adult and Juvenile Myositis investigates the causes, immune system changes, and medical problems associated with myositis, an inflammatory muscle disease that can damage muscles and other organs, resulting in significant disability.
- Myositis in Military Personnel compares people who developed myositis during active duty to military personnel without autoimmune diseases, to assess risk factors for myositis.
- Calcinosis Study examines the development of painful calcium deposits in people with dermatomyositis, a form of myositis associated with a skin rash, muscle weakness, and inflamed muscles.
- MYORISK Study seeks to understand the environmental factors that may result in dermatomyositis or polymyositis, a form of myositis that causes muscle weakness on both sides of the body.
- Rheumatic Disorders in Siblings identifies genetic and environmental factors by studying families with siblings or twins in which one of them has developed an autoimmune disease while the others have not.

To volunteer for a study on the causes of, and possible treatments for, autoimmune diseases, visit www.clinicaltrials.gov.

For more information on the National Institute of Environmental Health Sciences, go to **www.niehs.nih.gov**.

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