National Institutes of Health

Fact Sheet — *Multiple Sclerosis*

Thirty Years Ago

- Multiple sclerosis was first recognized as a disorder in the late nineteenth century, but it wasn't until the nineteen sixties that researchers began to understand some of the disease processes that cause symptoms and long-term disability in multiple sclerosis. These processes seemed to involve inflammation and the loss of myelin, a protective covering around nerve fibers.
- The first standard guidelines for the diagnosis of multiple sclerosis and a disability rating scale were also established in the nineteen sixties, setting the stage for controlled research to test new therapies.
- In the late sixties, the first controlled clinical trials for multiple sclerosis therapy showed that treatment with adrenocorticotropic hormone speeded recovery from an attack. While this therapy helped to reduce inflammation during the acute symptoms of an attack, it did not slow the progression of multiple sclerosis.

Today

- Today, multiple sclerosis is recognized as a chronic, inflammatory, demyelinating autoimmune disease of the central nervous system (CNS). The damage to the myelin covering and to the underlying nerve cell fibers leads to slowed or blocked transmission of signals, which results in reduced or lost functions. Improved imaging techniques show that damage to nerve fibers can happen even at very early stages of the disease.
- Today, several therapies are available that can ameliorate the symptoms and, in some cases, slow disease progression. These treatments include the beta interferons (Betaseron®, Rebif®, Avonex®), and copolymer 1 (Copaxone®, also called glatiramer acetate), a mixture of peptide fragments. The NIH supported the research that led to the development and approval of Avonex® and funded the basic research that led to the development of Copaxone®. For severe forms of relapsing remitting and secondary progressive MS, the FDA approved mitoxantrone (Novantrone®), an immunosuppressant. Most recently, the FDA approved natalizumab (Tysabri®), an antibody-based therapy that represents a new class of immunomodulatory agents, for a restricted population of patients with multiple sclerosis.
- Clinical trials sponsored by the NIH and private industry are underway to identify new therapies to test the effectiveness of different combination therapies, and to find predictive markers of treatment response. The NIH's ClinicalTrials.gov registry provides updated information about federally and privately supported clinical research on multiple sclerosis and many other conditions (www.clinicaltrials.gov).
- Although the cause of multiple sclerosis is still not clear, a complicated interplay of genetic and environmental factors appear to contribute to disease susceptibility. The NIH supports research to understand how these factors contribute to the onset and progression of the disease.

Tomorrow

Treatment for multiple sclerosis will become predictive, personalized, and preemptive.

- A better understanding of the genetic and environmental causes of multiple sclerosis will help identify those at higher risk for the disease. New diagnostic approaches will help to identify the onset of multiple sclerosis in individuals at high risk, before overt neurological deficits occur.
- For those with multiple sclerosis, a battery of predictive markers will help to select the most effective treatment strategy for that individual, avoiding a long trial-and-error period before the right medication and dose is found.
- Improved immunomodulatory therapies will effectively control relapses without causing undesirable side effects.
- Current research on neuro-immune interactions and the processes of neurodegeneration and repair will lead to a new generation of neuroprotective therapies that will complement immunomodulatory treatments. These neuroprotective agents will help to prevent or reduce the damage to nerve fibers that can cause long-term, progressive impairments.