

Multiple Sclerosis:

A disorder that hits the Central Nervous System

An unpredictable disease of the central nervous system, multiple sclerosis (MS) can range from relatively benign to somewhat disabling to devastating, as communication between the brain and other parts of the body is disrupted. Many investigators believe MS to be an autoimmune disease – one in which the body, through its immune system, launches a defensive attack against its own tissues. In the case of MS, it is the nerve-insulating myelin that comes under assault. Such assaults may be linked to an unknown environmental trigger, perhaps a virus.

The exact cause is not known, but MS is believed to result from damage to the myelin sheath, the protective material which surrounds nerve cells. It is a progressive disease, meaning the damage gets worse over time.

Inflammation destroys the myelin, leaving multiple areas of scar tissue (sclerosis). The inflammation occurs when the body's own immune cells attack the nervous system.

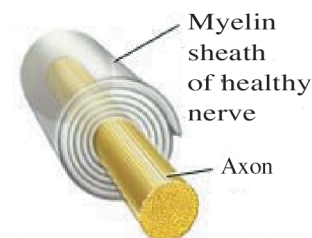
The inflammation causes nerve impulses to slow down or become blocked, leading to the symptoms of MS. Repeated episodes, or flare ups, of inflammation can

Multiple sclerosis is an autoimmune disease that affects the central nervous system (the brain and spinal cord).

occur along any area of the brain and spinal cord.

Recurrence (relapse) is common although non-stop progression without periods of remission may also occur.

Researchers are not sure what triggers an attack. Patients with MS typically have a higher number of immune cells than a healthy person, which suggests that



In multiple sclerosis the myelin sheath, which is a single cell whose membrane wraps around the axon, is destroyed with inflammation and scarring

Multiple Sclerosis is a disease of the central nervous system. The central nervous system consists of the brain, spinal cord, and the optic nerves. Surrounding and protecting the nerve fibers (or axons) of the central nervous system is a fatty tissue called myelin, which helps nerve fibers conduct electrical impulses.

In MS, myelin is lost in multiple areas, leaving scar tissue called sclerosis. These damaged areas are also known as plaques or lesions. Sometimes the underlying nerve fiber (or axon) is also damaged or broken.

When myelin or the nerve fiber is destroyed or damaged, the ability of the nerves to conduct electrical impulses to and from the brain is disrupted, and this produces the various symptoms of MS.

an immune response might play a role.

Symptoms

Most people experience their first symptoms of MS between the ages of 20 and 40; the initial symptom of MS is often blurred or double vision, red-green color distortion, or even blindness in one eye. Most MS patients experience muscle weakness in their extremities and difficulty with coordination and balance. These symptoms may be

severe enough to impair walking or even standing. In the worst cases, MS can produce partial or complete paralysis. Most people with MS also exhibit paresthesias, transitory abnormal sensory feelings such as numbness, prickling, or "pins and needles" sensations. Some may also experience pain. Speech impediments, tremors, and dizziness are other frequent complaints. Occasionally, people with MS have hearing loss. Approximately half of all people with MS experience cognitive impairments such as difficulties with concentration, attention, memory, and poor judgment, but such symptoms are usually mild and are frequently overlooked.

Signs and Tests

Symptoms of MS may mimic many other neurologic disorders. Diagnosis is made by ruling out other conditions.

Examination by the health care provider may show focal neurologic deficits (localized decreases in function). This may include decreased or abnormal sensation, decreased ability to move a part of the body, speech or vision changes, or other loss of neurologic functions. The type of neurologic deficits usually indicates the location of the damage to the nerves.

Eye examination may show abnormal pupil responses, changes in the visual fields or eye movements, nystagmus (rapid eye movements) triggered by movement of the eye, decreased visual acuity,

Possible Symptoms of Multiple Sclerosis

- Muscle weakness
- Spasticity (a condition that primarily affects the lower limbs)
- Impairment of pain, temperature, touch senses
- Pain (moderate to severe)
- Ataxia
- Tremor
- Speech disturbances
- Vision disturbances
- Vertigo
- Bladder dysfunction
- Bowel dysfunction
- Sexual dysfunction
- Depression
- Euphoria
- Cognitive abnormalities
- Fatigue

or abnormal findings on a funduscopy (an examination of the internal structures of the eye).

There is no single test that unequivocally detects MS. When faced with a patient whose symptoms, neurologic exam results, and medical



history suggest MS, physicians use a variety of tools to rule out other possible disorders and perform a series of laboratory tests which, if positive, confirm the diagnosis.

Imaging technologies such as MRI can help locate central nervous system lesions resulting from myelin loss. MRI is painless, noninvasive, and does not expose the body to radiation. It is often used in conjunction with the contrast agent gadolinium, which helps distinguish new plaques from old. However, since these lesions can also occur in several other neurological disorders, they are not absolute evidence of MS.

Several new MRI techniques may help quantify and characterize MS lesions that are too subtle to be detected using conventional MRI scans. While standard MRI provides an anatomical picture of lesions, magnetic resonance spectroscopy (MRS) yields information about the brain's biochemistry; specifically, it can measure the brain chemical N-acetyl aspartate. Decreased levels of this chemical can indicate nerve damage.

Treatment

There is no known cure for multiple sclerosis at this time. However, there are promising therapies that may slow the disease. The goal of treatment is to control symptoms and maintain a normal quality of life. Types of treatment include:

- Immune modulators.

Patients with a relapsing-remitting course of the disease are often placed on an immune modulating therapy. This requires injection under the skin or in the muscle once or several times a week.

- Steroids. Steroids are given to decrease the severity of attacks when they occur. These shut the immune system down to stop cells from causing inflammation.
- Medicines may be used to reduce muscle spasticity.
- Cholinergic medications to reduce urinary problems.
- Antidepressants for mood or behavior symptoms.
- Physical therapy, speech therapy, occupational therapy, and support groups can help improve the person's outlook, reduce depression, maximize function, and improve coping skills.
- Exercise. A planned exercise program early in the course of the disorder can help maintain muscle tone.

A healthy lifestyle is encouraged, including good general nutrition. Adequate rest and relaxation can help maintain energy levels. Attempts should be made to avoid fatigue, stress, temperature extremes, and illness to reduce factors that may trigger an MS attack.

Expectations

The outcome is variable and unpredictable. Although the disorder is chronic and incurable, life expectancy can be normal or nearly so. Most people with MS continue to

walk and function at work with minimal disability for 20 or more years.

What research is being done?

The National Institute of Neurological Disorders and Stroke (NINDS) and other institutes of the National Institutes of Health (NIH) conduct research in laboratories at the NIH. Scientists continue their extensive efforts to create new and better therapies for MS. One of the most promising MS research areas involves naturally occurring antiviral proteins known as interferons. Beta interferon has been shown to reduce the number of exacerbations and may slow the progression of physical disability. When attacks do occur, they tend to be shorter and less severe. In addition, there are a number of treatments under investigation that may curtail attacks or improve function. Over a dozen clinical trials testing potential therapies are underway, and additional new treatments are being devised and tested in animal models.

Citations:

- Multiple sclerosis updated by: A.D.A.M. editorial. Previously reviewed by Joseph V. Campellone, M.D., Division of Neurology, Cooper Hospital/University Medical Center, Camden, NJ. Review provided by VeriMed Healthcare Network.
- Multiple Sclerosis: Hope through Research by the Office of Communications and Public Liaison, National Institute of Neurological Disorders and Stroke, National Institutes of Health.