

# MULTIPLE SCLEROSIS

## Abstract

Multiple sclerosis is a chronic, autoimmune disease that affects the nervous system. It is thought to be caused by an abnormal inflammatory process that is triggered in susceptible individuals by a combination of environmental, lifestyle, infectious, and genetic influences. The onset of multiple sclerosis is age related and affects women far more than it does men. It is a progressive disease and many people who develop MS will eventually have significant disabilities. The four categories of MS are discussed, including drug and non-drug treatment.

## Learning Objectives:

1. Identify the pathologic process that causes multiple sclerosis (MS).
2. Identify common signs and symptoms of MS.
3. Identify the presentation patterns of MS.
4. Identify medications that are used to treat MS.

## **Introduction**

Multiple sclerosis is a chronic disease of the nervous system. Multiple sclerosis causes inflammation and damage to the myelin sheaths, the protective coatings that cover nerve cells that make up the central nervous system. It is considered an autoimmune disease but despite extensive research, the exact cause or causes of MS are not known. Although most patients with MS have similar signs and symptoms, the progress and pattern of these differs from patient to patient. The signs and symptoms of MS may also vary in each person. There are also four distinct categories of MS that describe the clinical presentation and progression of the disease. There is no cure for MS and the signs and symptoms can be debilitating. Multiple sclerosis is a difficult disease to live with and many patients suffer significant disabilities and disruptions in their activities of daily living and their personal and social life. Supportive care and medications can make multiple sclerosis easier to tolerate.

### **Multiple Sclerosis and the Nervous System**

The nervous system is comprised of the brain, the spinal cord, the nerve fibers and nerve endings. The nervous system controls everything a person does. It controls the involuntary actions of the body, such as breathing, circulation, and digestion. These actions happen without conscious control. The nervous system also controls mobility and the higher conscious functions such as walking, talking, and thinking.

The nervous system functions by sending signals from the brain to the organs and tissues, and receiving signals back from the body, through

the nerve fibers. These signals are electrical impulses, and the nerve fibers could be described as the “wiring” of the nervous system.

In order for these signals to be transmitted effectively and quickly, the brain, spinal cord, and nerve fibers are covered with a protective sheath called *myelin*. Using the analogy of the nerve fibers as electrical wires, myelin is the insulation that surrounds the nerve fibers and other parts of the nervous system that are involved in sending and receiving signals. By doing so, the myelin makes sure these electrical signals traveling to and from brain are transmitted rapidly and effectively, but this process is irreversibly damaged by multiple sclerosis.

### **Cause of Multiple Sclerosis**

Multiple sclerosis is a condition in which the myelin sheaths that cover the nerve fibers is damaged. The term multiple sclerosis (MS) is an accurate description of this pathologic process and damage. Multiple sclerosis causes *multiple* areas of *sclerosis* to the myelin sheaths, sclerosis being a medical term that means scarring. Because the myelin sheaths are damaged, the nerve signals moving to and from the brain cannot be effectively transmitted, and this disruption in nerve signal transmission results in the typical signs and symptoms of MS.

This damage and scarring that is characteristic of MS are the result of *inflammation*. Inflammation is one of the ways the body’s immune system responds to trauma, injury, or infection. Mild and controlled inflammation is beneficial. Inflammation increases blood flow to the damaged or infected area and brings antibodies and other healing

blood components to where they are needed. The classic signs and symptoms of inflammation are pain, swelling, and heat and redness in the affected area. Inflammation is uncomfortable and painful but it is essentially a healing process and it is self-limiting; once the damage has been repaired, inflammation is stopped.

In multiple sclerosis, the myelin sheaths are damaged and the normal healing process of inflammation is initiated in response to this damage. Inflammation that is caused by MS is not self-limiting. It is chronic and it causes further damage or injury. Inflammation caused by MS is not beneficial because it is chronic, intense, and widespread.

The collateral damage caused by the inflammation in MS greatly contributes to the signs and symptoms and progression of the disease. Because of the damage to the myelin, the impulses and information that travel to and from our brains are not transmitted normally. The nerve transmission is slow, spasmodic, and erratic and this is the basis for the signs and symptoms of MS.

Multiple sclerosis is a disease that has been exhaustively studied in the search for a cause. There are strong suspicions that MS is a disease that is caused by several factors working together and like many diseases, MS probably begins when someone encounters a trigger that sets the disease in motion.

The most recent research suggests that MS is caused by a combination of the following factors.

- Environmental and lifestyle factors:

Cigarette smoking, the use of alcohol, and diet are possible causes, or contributing causes of MS. Lack of exposure is also correlated with MS, and the highest incidence of the disease is found in areas of the world that receive little sunlight for parts of the year. Vitamin D deficiency is also a possible cause of MS, and vitamin D deficiency may also worsen the disease process of MS once it has begun.

- Genetic factors:

Genes have been identified that may make someone more likely to develop MS but it is also likely that there are multiple genetic variations that would need to be combined to cause MS, and genetic transmission of MS is not considered to be a significant cause of the disease.

- Infection:

There has long been a strong suspicion that chronic infections may be the cause, or a contributing cause of MS. For example, the Epstein-Barr virus is a common virus, and it can cause diseases such as mononucleosis and rheumatoid arthritis. There is some evidence that the Epstein-Barr virus may be a cause of MS, perhaps acting as a trigger that initiates inflammation. However, there is no conclusive proof that viruses are a direct cause of MS, and infection with Epstein-Barr and other viruses probably contributes to a susceptibility to MS but is not a primary cause of the disease. Multiple sclerosis is not contagious.

The environmental or lifestyle issues, the genetic susceptibility, and viral infections are thought to be important risk factors in the development of MS. However, none of them is a primary cause of MS. Instead these risk factors are triggers that initiate a process called the *autoimmune response* that is considered to be the primary cause of MS.

Most sources consider MS to be an *autoimmune disease*. Autoimmune diseases happen when the body's immune system misidentifies normal body tissues and organs as foreign and organizes an immune response. Many common diseases such as type I diabetes mellitus, rheumatoid arthritis, and MS are autoimmune diseases.

The immune response that is triggered by MS risk factors is strong and enduring enough to permanently damage the myelin sheaths. As mentioned earlier, the inflammatory response is usually: 1) a normal defense mechanism against harmful microorganisms, 2) a normal healing mechanism when there is injury or trauma, and 3) self-limiting. In MS as with other autoimmune diseases, the inflammatory response attacks healthy tissues and organs and it is chronic: in MS, as with other autoimmune diseases, the inflammatory response continues for years.

### **Statistics on Multiple Sclerosis**

There are approximately 400,000 Americans who have MS and the disease affects approximately 1 million people worldwide. Prevalence of the disease varies from region to region. Multiple sclerosis is much more common in women than in men. The risk of developing MS is approximately three times greater for women, and women typically

develop MS at an earlier age than do men. However, the progression of the disease is much faster for men, they suffer more from cognitive impairment, and the prognosis for men is worse.

It is not clear why women are more likely than men to develop MS but differences in sex hormones are the most likely explanation. During puberty, for example, the risk for developing MS increases sharply, it decreases during the third trimester of pregnancy but the risk then increases in the first trimester post-partum.

### **Signs and Symptoms of Multiple Sclerosis**

Most cases of MS develop in people between the ages of 20 to 40, but the onset can be earlier or later. In some patients, the signs and symptoms are minor and very subtle. The onset of the disease is slow and, because of that, a patient may not seek medical attention. For other patients, MS begins suddenly and the signs and symptoms are dramatic. It is interesting to note that post-mortem examinations have found that there can be damage to the brain that indicates a patient had MS but he or she had no clinical evidence of the disease.

The clinical presentation of MS is quite variable but there are signs and symptoms that are common to almost everyone who has MS. Some of the typical signs and symptoms of the disease include:

- Ataxia
- Cognitive dysfunction
- Constipation
- Depression
- Dizziness
- Fatigue

- Fecal incontinence
- Heat intolerance
- Mobility and balance impairment
- Mood swings
- Muscle weakness
- Numbness in the extremities
- Optic neuritis
- Pain
- Sexual dysfunction
- Spasticity
- Tremors
- Urinary incontinence
- Weakness

This list emphasizes that the clinical presentation of MS can be complex and that the disease affects both physical and emotional well-being. Some people who have MS will have predominantly sensory signs and symptoms such as heat intolerance and numbness in the extremities and others will have emotional disturbances and cognitive dysfunction.

The presentation of MS can vary significantly from person to person, and it can also change for the individual, as well. Some people who have MS may experience signs and symptoms that are constant in nature while for others the clinical picture can change from time to time.

There are many signs and symptoms associated with MS as listed above but the following ones that will be discussed are relatively

common, distressing to the patient, and particularly disruptive in terms of the activities of daily living:

### **Cognitive Dysfunction**

Cognitive dysfunction refers to abnormalities or changes in intellectual functioning. People who have MS may, at times, have difficulty with abstract thinking and problem-solving. Their attention span may be unusually short and they cannot focus on an issue or an idea. The ability to understand or use speech can be affected. Cognitive dysfunction is a common complication of MS. It is typically not serious enough to interfere with day-to-day functioning but the loss of intellectual ability can be very upsetting for the patient.

### **Depression**

Depression affects approximately 50% of patients who has MS and depression is greater in MS patients when they are compared to the general population. The suicide rate for people with MS is almost 8 times higher than that of the population without MS. Depression in patients who have MS has been associated with increased levels of cognitive dysfunction, increased levels of fatigue, poor compliance with medication regimens, sexual dysfunction, and an increased risk of suicide. The physical signs and symptoms of MS are obvious to focus on as they are easily seen.

### **Fatigue**

Fatigue is an almost universal complaint of people who have MS. Fatigue in MS is different in several important ways than merely being

tired from lack of sleep or from over-exertion. The fatigue of MS is far more debilitating. Patients who have MS describe their fatigue as an overwhelming lack of energy, and fatigue is a significant reason why people who have MS cannot work. Fatigue for the MS patient is also a regular occurrence, and it often begins in the morning, even after a full night's sleep, and it gets worse as the day progresses. Patients who have MS often report that their fatigue is aggravated by heat and humidity, and the depression and sleep disturbances that often accompany MS certainly worsen the intensity of fatigue.

### **Heat Intolerance**

Heat intolerance is common in people who have MS. Exposure to hot, humid conditions, overheating while exercising, or simply lying in the sun will tend to worsen the signs and symptoms of MS. Fortunately this effect is temporary and does not affect the progression of MS.

### **Incontinence**

Fecal and urinary incontinence is common in people who have MS. Urinary tract dysfunctions occur in more than 90% of all people who have MS. People who have MS may have urinary frequency, urgency, and sleep disruptions caused by the need to urinate. Fecal incontinence is less common. These symptoms also cause distress and embarrassment for patients with MS.

### **Mobility and/or Balance Impairment**

Within 10-15 years of the diagnosis of MS, approximately 80% of all patients who have the disease will have some form of mobility or

balance impairment. As the disease progresses these problems become worse; walking becomes difficult or impossible, and falls are common. Ataxia, defined as an inability to coordinate movement, is also very common in people who have MS and contributes to mobility problems.

### **Optic Neuritis**

Optic neuritis is defined as inflammation of the nerves supplying the eyes. Optic neuritis in someone who has MS is characterized by blurred vision, double vision, decreased ability to distinguish colors, pain that is aggravated by moving the eyes, and decreased clarity of vision. The heat intolerance that is common in MS patients may worsen some of these vision problems.

### **Pain**

Pain affects approximately two-thirds of people who have MS. Many people who have MS feel that aside from fatigue, pain is the most distressing and challenging symptom with which they must cope. It is associated with increased levels of anxiety, depression, disability, and interference with activities of daily living. Pain associated with MS can occur almost anywhere but headache, extremity pain, and back pain are the most common. Pain can be a direct result of MS or it can be secondary and caused by spasticity.

### **Sexual Dysfunction**

Sexual dysfunction in people who have MS can be a direct result of nerve damage caused by MS. Sexual dysfunction can also be

psychological in nature, or it can be due to physical impairments of MS such as bowel and bladder dysfunction, pain, spasticity, or fatigue that affect sexual response and intimacy. Up to 80% of people who have MS experience some form of sexual dysfunction, and it is one of the more psychologically traumatic aspects of the disease.

### **Spasticity**

Spasticity affects up to 90% of people who have MS and many people who have MS have spasticity that is classified as moderate to severe. Spasticity in people who have MS is characterized by sudden and involuntary muscle movements and/or muscle movements that are stiff, awkward, and uncoordinated. Spasticity in this patient population can affect a single body part, a specific area of the body, or it can be generalized. Spasticity in MS is unpredictable, it causes pain, it increases the level of fatigue and this part of the disease, along with fatigue and mobility and balance impairment, significantly reduces the patient's ability to ambulate, work, and participate in other activities of daily living.

These signs and symptoms are experienced by many people who have MS. It is also quite common for these signs and symptoms to wax and wane, and a *pattern* of having good days and bad days is one of the hallmarks of the disease. When someone with MS is having an attack, it is very difficult for that person to function normally. Moving and walking can be painful and unsafe, and they may have difficulty with their vision. The patient will feel tired and depressed, and their moods may be variable.

## **Disease Patterns of Multiple Sclerosis**

Multiple sclerosis is classified into four categories. Each category describes a pattern of how the disease progresses, the prognosis for the patient, the frequency of the attacks, and the patient's condition between attacks. These four categories are relapsing-remitting, primary-progressive, secondary-progressive, and progressive-relapsing.

### **Relapsing-remitting**

The relapsing-remitting form of MS is the most common type of MS. In the relapsing-remitting form of the disease the patient will have symptomatic episodes of MS that evolve over weeks or months. These symptomatic episodes are followed by periods of remission in which the signs and symptoms are absent - there is a full recovery - or there will be some mild functional deficits but the patient is essentially stable.

Remission, as with the symptomatic periods, take weeks and months to evolve. The symptomatic periods may be separated by months or years; the average frequency of an MS attack in this form of the disease is once every two years. Most patients who have relapsing-remitting MS will eventually develop the secondary progressive type of MS.

### **Primary-progressive MS**

People who have primary-progressive MS do not return to their normal health status between attacks but become progressively disabled with each attack; that is, they do not remit or return to their normal level of functioning. Approximately 10% of people with MS have this form of

the disease. Primary progressive MS is more common in older adults and in men.

### **Secondary-progressive**

The secondary-progressive form of MS is always preceded by the relapsing-remitting form. Secondary-progressive MS is characterized a steady progression in the signs, symptoms, and disabilities. The symptomatic periods become more frequent and severe and the patient does not recover neurologic function during asymptomatic periods. Approximately 50% of people who have relapsing-remitting MS will develop secondary-progressive MS within 10 years, and 90% will develop secondary-progressive MS within 25 years.

### **Progressive-relapsing**

This form of MS is uncommon. The patient has relapses and between relapses the disease slowly worsens. This is the rarest form of MS. Progressive-relapsing MS and secondary-progressive MS differ in that progressive-relapsing MS is not preceded by the relapsing-remitting form of the disease.

Most people with MS have a normal or close to normal life span. Multiple sclerosis is typically not the direct cause of death for MS patients. Most people who have MS die of common diseases such as heart disease, stroke, and cancer, not from MS.

If a person with MS dies from the disease, it is usually because they are immobile and develop an overwhelming pneumonia or other infection. This is because patients with MS often suffer from fatigue, or pain and weakness in their arms or legs. Eventually, some patients

with MS are not able to walk without assistance. They may need a cane, a walker, or a motorized scooter to get around. Multiple sclerosis may not be a fatal disease but it is a crippling one. Eventually the disease may lead to the immobility that could lead to pneumonia or other infection.

### **Diagnosis of Multiple Sclerosis**

The signs and symptoms that are typical of MS are non-specific. They are common complaints that can be caused by many different medical problems. However, if someone has fatigue, heat intolerance, and numbness in the extremities and other typical signs and symptoms of MS and these signs and symptoms present in a pattern of waxing and waning, there should be a strong suspicion that the patient has MS.

There are no blood tests that can detect MS. The physician will perform a physical exam, and interview the patient. The physician will then confirm the diagnosis through several types of tests. A magnetic resonance imaging (MRI) test can be useful but some people with MS will have a normal MRI.

A lumbar puncture is another diagnostic test that can be used to confirm the presence of MS. A lumbar puncture is performed by inserting a needle into through the skin of the back and into the space adjacent to the spinal cord. Spinal fluid is removed and analyzed and in some patients with MS there will be characteristic abnormalities. However, like the MRI, there are a percentage of people who have MS and will have normal spinal fluid.

Finally, there is a test called a visual evoked potential test. In this exam, the response of the patient's nervous system is examined while

undergoing various types of stimulation such as visual or auditory. The response will be abnormal or slow in a patient with MS.

## **Treatments for Multiple Sclerosis**

There is no cure for MS. Most people have a normal life expectancy, but the disease can result in pain and fatigue; it can severely limit what someone is able to do, especially in terms of mobility. In addition, many people who have MS will eventually develop significant disabilities. However, the available treatments for MS can make a big difference in helping someone cope with the disease and these treatments can significantly improve quality of life.

Treatment basically focuses on three goals: modifying the course of the disease, treating the patient during the symptomatic attacks, and improving the patient's functional abilities.

### **Disease Modification Therapy**

Modifying the course of the disease is accomplished with drug therapy. There are medications that can modify the course of the disease by decreasing the frequency of the attacks and by prolonging the asymptomatic periods between the attacks. These disease-modifying medications are not curative.

Disease modifying therapy is designed to decrease inflammation, to shorten the duration of relapses, to help stabilize the clinical course, and to decrease the frequency of relapses. There is a variety of medications that are used as disease modifying agents for MS but all of them work by their action on the immune system. The disease-

modifying medications can be helpful but as with any medical intervention, there are risks and benefits. The Certified Nursing Assistant (CNA) would not be required to know how to administer medication or be expected to understand benefits and risks, however a basic understanding of the drug types and symptoms treated is helpful, as these drugs must be used on a long-term basis. Many patients will not respond to drug treatment, and they are expensive and have side effects that make it difficult to adhere to the therapy regimen.

### **Corticosteroids**

The corticosteroids are drugs that are used to suppress the inflammation that is associated with MS. Two commonly prescribed corticosteroids are prednisone and methylprednisolone. These drugs are often used to treat acute and particularly severe MS relapses.

### **Immunomodulators**

Immunomodulators are helpful in treating MS because they decrease the number and intensity of relapses. The mechanisms of action of many of the immunomodulators are not completely understood but it is thought that they work by altering the abnormal immune response that is the basic cause of the inflammatory changes in MS.

Immunomodulators that are commonly used to treat MS are interferon beta-1a (trade name Avonex®) and glatiramer (trade name Copaxone®).

### **Immunosuppressive Drugs**

The immunosuppressive drugs are prescribed for people who will be having, or have had an organ transplant or who have an autoimmune disease. The immunosuppressants are similar to the immunomodulators but the immunomodulators typically target a specific part of the abnormal immune system response of MS while the immunosuppressants act in a general way to decrease immune system activity. Azathioprine and methotrexate are immunosuppressive drugs that are used to treat MS.

### **Chemotherapeutic Agents**

Chemotherapeutic agents are anti-cancer drugs. They have been used off-label to treat MS. Cyclophosphamide and mitoxantrone are typically used to treat various types of leukemia and other cancer. They have immunosuppressive properties and can be used to treat progressive forms of MS and relapsing-remitting MS that is particularly severe.

### **Symptom Management**

People who are having an exacerbation of their MS are often in a great deal of discomfort, and drug therapy can provide relief during these symptomatic periods. These medications help by affecting the pathologic process of MS and by relieving the signs and symptoms caused by that process. Again, these treatments provide relief, not a cure.

Many different classes of medications are used to provide the MS patient with symptomatic relief. These drugs are different than the disease-modifying agents because: 1) they do not act as anti-inflammatories or affect the immune system, and 2) they do not

change the number, frequency, or severity of relapses nor do they change the progress of MS. They are strictly intended to relieve symptoms. There are too many medications used for this purpose to list and describe them all, so some of the more commonly used ones are discussed below, classified according to the symptom they are intended to alleviate.

Spasticity can be treated with skeletal muscle relaxers such as baclofen, dantrolene, and tizanidine (trade name Zanaflex®), the neuromuscular blocker botulinum toxin, the anti-epileptic drug gabapentin (trade name Neurontin®) and benzodiazepines such as clonazepam (trade name Klonopin®) and diazepam (trade name Valium®).

Bladder dysfunction and urinary incontinence is treated with anti-spasmodic agents such as oxybutinin (trade name Ditropan®) or tolterodine (trade name Detrol®).

Cognitive dysfunction and fatigue can be treated with stimulants such as methylphenidate (trade name Ritalin®) modafinil (trade name Provigil®), and dextroamphetamine (trade name Dexedrine®). The anti-influenza drug amantadine (trade name Symmetrel®) is also used for this purpose. The stimulants, along with antidepressants, can also be used to treat the depression that is so common in patients who have MS.

Pain in MS can either be primary and related to inflammation or it can be secondary and related to poor posture and abnormal muscle movements caused by spasticity. The tricyclic antidepressants such as amitriptyline are the first-choice drug for primary pain of MS; anti-

epileptic drugs such as carbamazepine or gabapentin would be second-line choices. Treatment of secondary pain caused by MS can be treated with non-steroidal anti-inflammatories such as ibuprofen.

### **Functional Ability: Non-Pharmacologic Methods**

Improving the functional abilities of someone who has MS typically involves a multi-faceted approach involving physical therapy, occupational therapy, speech therapy, exercise, and other types of physical and psychological intervention. There are also many practical ways that someone who has MS can improve functional abilities and by doing so, the quality of life.

Disease-modifying drug therapy and symptomatic drug therapy can contribute significantly to improving a patient's functional ability but medications, of course, have side effects and cost considerations. In addition, not all drugs are effective for all patients, and a patient may have to tolerate a trial and error period during which the appropriate drug and dose is discovered.

Non-pharmacological therapies are often used for symptomatic relief for patients with MS. These can include but are not limited to exercise, occupational therapy, psychotherapy, and physical therapy. Physical therapy and exercise can help the patient with MS stay strong and flexible. It can also help spasticity and improve coordination. The physical therapist or an exercise specialist can instruct the patient on ways to reduce energy expenditure and schedule activity. Occupational therapy can help the patient find strategies for managing aspects of day-to-day life such as dressing, transportation, etc. Patients can also benefit from speech therapy.

There are also many patient support groups and professional organizations that can provide practical tips for handling the challenges of MS. Several examples of this type of advice are listed here.

### *Heat Intolerance*

Activities should be scheduled for times of the day when the temperature is lowest and sun exposure would be minimal, *i.e.*, early morning or late evening. When outside activities are unavoidable, taking extra time to accomplish them should be planned, especially if the ambient temperature is high. Air conditioning should be used as much as possible and practical, and exposure to hot tubs, saunas, an excessively hot baths or showers should be avoided.

### *Fatigue*

The person who has MS should know that the fatigue associated with the disease has a physical basis; it is caused by the neurological damage that is part of MS and it is not psychological. Fatigue is a common symptom of MS, experienced by essentially everyone who has the disease; however, depression and pain can contribute to fatigue so addressing these problems can help alleviate fatigue.

Exercise can help to increase strength and endurance, and planning activities - and planning rest periods - to allow for the limiting effects of fatigue can be useful. Patients can also try and discern their pattern of fatigue and if fatigue occurs at a certain time of day, adjustments can be made.

### *Bladder Dysfunction/Incontinence*

The CNA can assist the patient to try and schedule times to void, even if the sensation to urinate is not there or particularly urgent. Avoiding natural diuretics such as coffee, and limiting fluid intake for several hours prior to going to bed is helpful. The latter will help prevent the need to wake up at night to urinate, maintaining a better sleep pattern.

### **Caring for a Patient with Multiple Sclerosis**

When a CNA works with a patient who has MS, there are four areas of care to focus on. These include the patient's activity status, safety concerns, skin care, and elimination patterns.

#### **Activity**

The patient with MS can be limited in what he or she can do. Limitations may be caused by fatigue. It can also be caused by pain, numbness, and spasticity. A CNA must determine an appropriate level of activity and how much assistance the patient will need. Remember that patients with MS often cannot tolerate hot temperatures.

#### **Safety**

Because of the activity limitations, the patient must be protected against falls. Hot showers or baths create situations where falls may occur, and heat intolerance can impair mobility further endangering the patient's safety.

#### **Skin Care**

Incontinence of stool or urine can cause skin breakdown. If the patient has limited mobility, the skin irritation and the inability to move may lead to pressure sores.

## **Elimination**

Constipation can also be a problem for the patient with MS. The CNA should encourage the patient to stay hydrated, and make sure to document the patient's pattern of elimination. Notify a supervisor if a patient is constipated or there is evidence that a patient may be constipated. The patient should also be monitored for bladder dysfunction and urinary incontinence.

## **Summary**

Multiple sclerosis is a chronic, autoimmune disease that affects the nervous system. It is thought to be caused by an abnormal inflammatory process that is triggered in susceptible individuals by a combination of environmental, lifestyle, infectious, and genetic influences. The onset of multiple sclerosis is age related and affects women far more than it does men. It is a progressive disease and many people who develop MS will eventually have significant disabilities. The four categories of MS have been discussed.

There is no cure for MS. Most people who have MS do not succumb to the disease but MS typically causes increasing levels of physical and psychological disabilities that profoundly affect normal activities of daily living. Treatment for MS is focused on increasing and maintaining the patient's functional abilities and maintaining a good quality of life. Drug therapy with anti-inflammatories, immunomodulators and

immunosuppressives are used to modify the course of the disease, and a wide variety of medications are used to provide symptomatic relief. Non-pharmacological treatments are used for symptomatic relief. They can include exercise, occupational therapy, physical therapy, and psychotherapy.