

REVIEW ON MULTIPLE SCLEROSIS

Ammula Uhanjali¹*, Dhulipalla Surekha¹, Divi Manasa¹ and Venkata Rao Vutla²

¹Department of Pharmacy practice, Chalapathi Institute of Pharmaceutical Sciences, lam
Guntur

²Department of Pharmaceutical Chemistry, Chalapathi Institute of Pharmaceutical Sciences,
lam Guntur

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***Correspondence for
Author**

Ammula Uhanjali

Department of Pharmacy
practice, Chalapathi institute of
pharmaceutical sciences, lam
Guntur

ABSTRACT

Multiple Sclerosis (MS) is one of the most common neurological disorders especially in North America and in Europe. It affects 400,000 Americans at any one time. MS causes nerves of CNS to degenerate by inflammation of nerves which causes myelin to disappear. As a result CNS impulses that travel along the nerves decelerate causing interference in vision, speech, memory, and writing. Most common symptoms are blurring vision, dizziness, fatigue, weakness, numbness or tingling in arms or legs. MS is diagnosed by Magnetic resonance imaging (MRI). Scientists and doctors have not discovered a permanent cure but discovering out how to treat and manage MS based on his or her type of MS. Usually steroidal and antidepressant drugs are given

orally or through intravenously. A person is diagnosed with MS between 20 and 50 years of age, but MS has been diagnosed in children and elderly people. Cause of MS is still unknown. In last 20 years it was found that MS is progressive immunological mediated disease of brain and spinal cord (CNS). MS management draws on many disciplines, such as pharmacists, neurologists, speech therapists, nurses, physiotherapists, counselors.

KEY WORDS: Vision, speech, memory, and writing.

ANATOMY

Brain is the command center of the body. Brain and spinal cord together form the central nervous system (CNS). Brain receives the information and sends orders to different parts of the body through spinal cord. From spinal cord, the orders are sent to rest of body through

peripheral nerves. The nerves in rest of the body are called Peripheral nervous system. Different areas of brain control different specific functions like vision, motion, touch, and thinking. In general brain tissue is made of cells and those cells of brain and nerves are called Neurons. (Fig: 1)

Axons are the long fibers that are similar to electric wires. Though neurons are microscopic the axon extend from brain to hand .Through the axons neurons communicate with each other .EX: Nerve in the finger may sense the heat and send message to the brain through the axons then brain sends orders to muscles to move the finger .The voluntary muscles directly controlled by nerves. Protective layer around the axon is known as Myelin sheath. The major function of myelin sheath is to increase the conduction of impulses for communication between the neurons. In MS myelin sheath in certain parts of the brain and spinal cord (CNS), Which is destroyed but, scientists and doctors don't know why this is destroyed, (Fig:2)

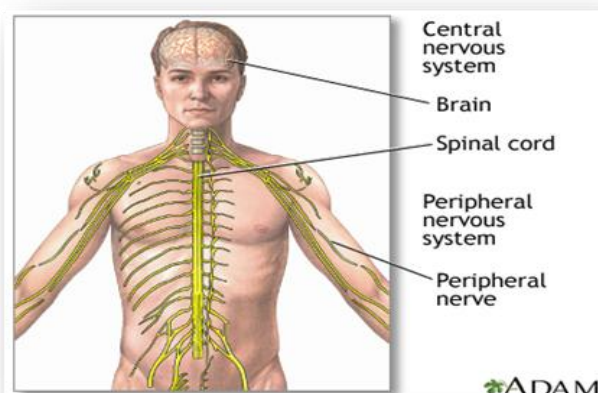


Fig: 1

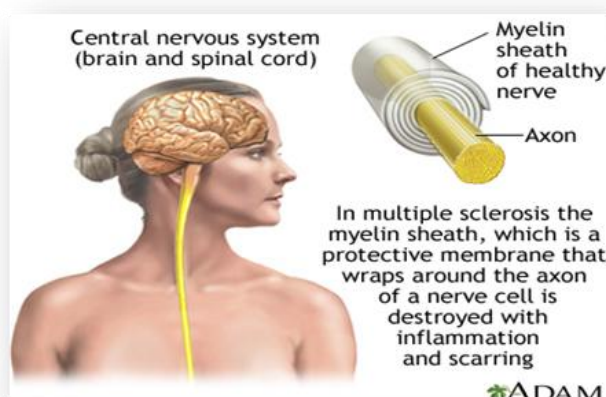


Fig: 2.

INTRODUCTION

MS is mainly caused due to damage of myelin sheath, the protective coverings around nerve cells. **(Fig: 3)** When this nerve covering is damaged nerve signals slow down or stop, Due to inflammation of white matter of central nervous system. The nerve damage is caused by inflammation. Inflammation occurs when the bodies own immune cells attack the nervous system. This can occur along any area of the brain, optic nerve, and spinal cord it is unknown what exactly causes this to happen. The most common thought is that virus or gene defects, or both, are to blame. Environmental factors may play a role. You are slightly more likely to get this condition if you have a family history of MS or live in a part of the world where MS is more common. MS affects women more than men. Inflammation occurs when bodies own immune cells attack the nervous system. This can be any part or area of brain and spinal cord. The meaning of multiple sclerosis is **multiple =many, sclerosis =scar**.

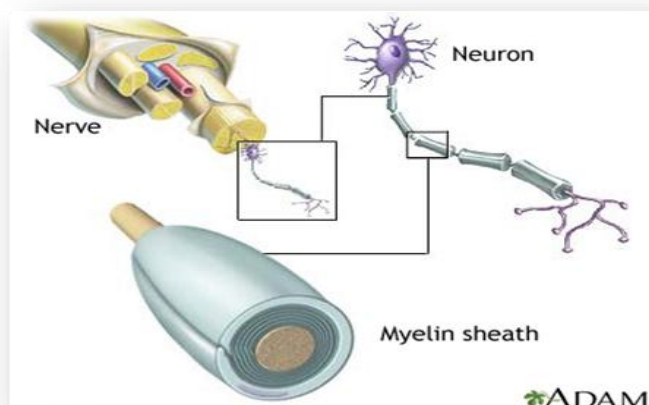


Fig: 3.

CAUSES

Gene, Environment, Combination of genes and environment. When the myelin is destroyed the neurons communicate less effectively, causing the symptoms of MS. EX: When myelin of vision is destroyed, vision is affected. If myelin of muscle is destroyed, the muscle gets weak. Some myelin destroyed repairs itself, which is why people improve after an attack of MS. However, myelin can become inflamed again at different times and in different places. MS usually starts in early adult life. Once present the disease never goes. There is no cure and the person lives with the diagnosis for life. MS can affect all aspects of their own life and that of their family. However, myelin become inflamed again in different times and in different places. MS is the disease that's not reversible.

Role of the Environment in MS

1. Viruses have been implicated in MS pathogenesis (measles, rubella, mumps, and the herpes viruses)
2. Bacterial infections, nutritional and dietary factors, exposure to animals, minerals, chemical agents, metals, organic solvents, and various occupational hazards.

Role of the Genes in MS

1. Monozygotic twin concordance rate of ~30% compared to dizygotic twin concordance rate of ~5%
2. Multiple sclerosis seems to be genuinely polygenic Chromosomes 1, 6, 10, 17, and 19.

RESULTS OF DEMYELINATION

1. Conduction block at the site of lesion
2. Slower conduction time along the affected nerve.

MS: Epidemiology

1. Multiple sclerosis (MS) was first described in 1868.
2. Affects mainly Caucasians (N. Europe)
3. Most common neurodegenerative disease of young adults (1 per 400)
4. Average age at onset 28(f)/30(m) years.
5. Female : male ratio = 2:1
6. Chronic illness with cumulative disability
7. Treatment expensive (>US\$10,000)
8. MS is a Complex genetic disease
9. Mediated by autoimmune processes – Clonally expansion of B cells and T cells
10. Inflammation of the central nervous system (CNS) (brain and spinal cord) white matter

SIGNS AND SYMTOMS

A person with MS can have almost any neurological symptom or sign; with autonomic, visual, motor, and sensory problems being the most common.

The specific symptoms are determined by the locations of the lesions within the nervous system, and may include loss of sensitivity or changes in sensation such as tingling, pins and needles or numbness, muscle weakness.

The main measure of disability and severity is the expanded disability status scale (EDSS), with other measures such as the multiple sclerosis functional composite being increasingly used in research.

Very pronounced reflexes, muscle spasms, or difficulty in moving; difficulties with coordination and balance (ataxia); problems with speech or swallowing, visual problems (nystagmus, optic neuritis or double vision), feeling tired, acute or chronic pain, and bladder and bowel difficulties, among others. Uhthoff's phenomenon, a worsening of symptoms due to exposure to higher than usual temperatures, and Lhermitte's sign, an electrical sensation that runs down the back when bending the neck, are particularly characteristic of MS.(Fig:4)

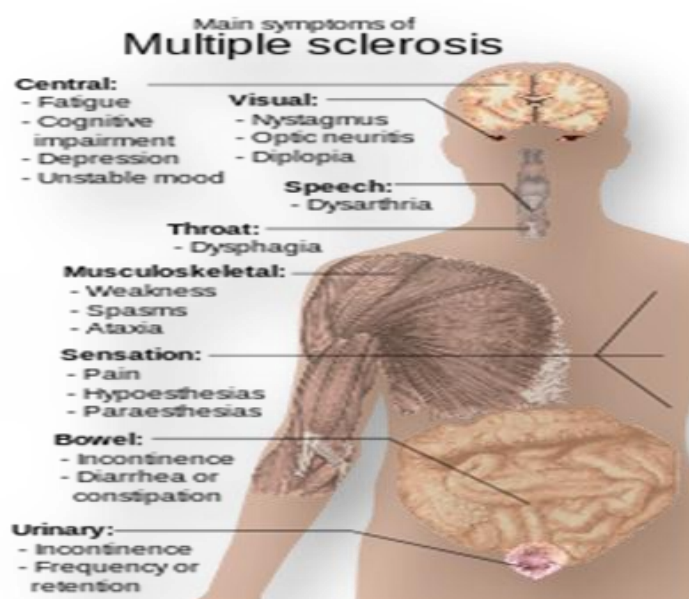


Fig: 4.

TESTS

1. MS is diagnosed by ruling out other medications.
2. Generally people who have MS have relapsing –remitting attacks, separated by a period of reduced or no symptoms.
3. The doctor may suspect MS if there are decreases in the function of two different parts of the central nervous system (such as abnormal reflexes) at two different times.

4. Nervous system may show reduced nerve function in one area of the body. Or it may be spread over many parts of the body. This may include:
5. Abnormal nerve reflexes
6. Decreased ability to move a part of the body
7. Decreased or abnormal sensation
8. Other loss of nervous system functions
9. An eye examination may show:
10. Abnormal pupil responses
11. Changes in the visual fields or eye movements
12. Problems with the inside parts of the eye
13. Rapid eye movements triggered when the eye moves

Tests to diagnose multiple sclerosis include

1. Blood tests to rule out other conditions similar to MS
2. Lumbar puncture (spinal tap) for cerebrospinal fluid tests, including CSF oligoclonal banding
3. MRI scan of the brain and MRI scan of the spine are important to help diagnose and follow MS.
4. Nerve function study (evoked potential test, such as brainstem auditory evoked response)

Diagnosis-Mri

Typical MRI characteristics .white matter abnormalities –95% of patients. White lesions indicate areas of fresh inflammation and open BBB. Brain atrophy with widened Lateral ventricles and cortical sulci.

Diagnosis-Spinalfluid

Cerebrospinal fluid protein electrophoresis shows oligoclonal IgG bands in more than 90% of MS cases (underlying inflammatory pathology) .Testing of CSF can provide evidence of chronic inflammation of the CNS.

Diagnosis-Veps

Visual evoked potentials(VEPs) and somato sensory evoked potentials(SEPs) -an electrical potential recorded following presentation of a stimulus The brain of a person with MS often responds less actively to stimulation of the visual(optic nerve), auditory, and somatosensory

nerves. Decreased activity on either test can reveal demyelination which may be otherwise asymptomatic. (**Fig: 5**)

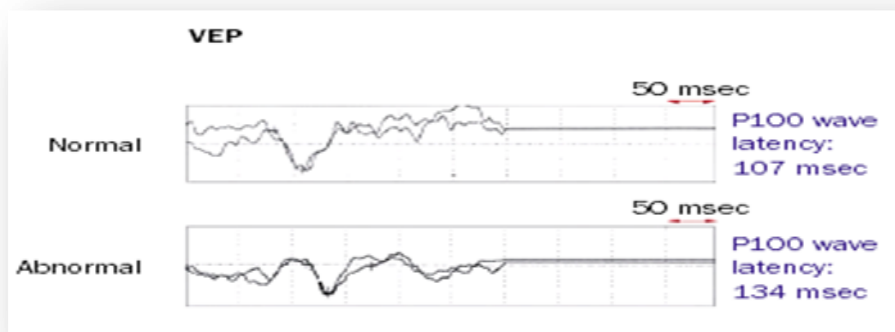


Fig:5

Types of MS

1. Benign
2. Relapsing-Remitting
3. Secondary Progressive
4. Primary Progressive

BENIGN

10-20% of people have a “benign” type of MS, Symptoms progress very little over the course of their lives. Return to normal between attacks. (**Fig: 6**)

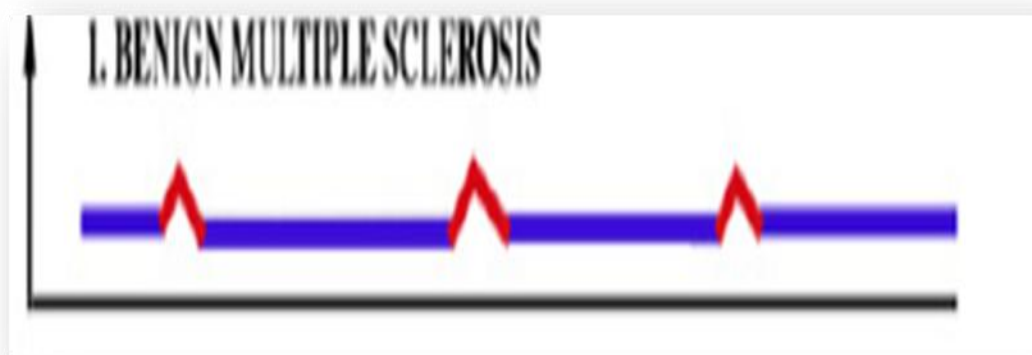


Fig:6

Relapsing-Remitting

85% to 90% of individuals with MS. Unpredictable attacks (relapses) lasting 24 hours or more followed by Periods of months to years of improvement (remission) with no new signs of disease activity the period between attacks may shrink Symptoms become more severe.(FIG:7)



Secondary progressive

80% of those with initial relapsing-remitting MS, who then begin to have neurological decline between their acute attacks without any definite periods of remission. This decline may include More severe neurological symptoms, worsening cognitive function or other deficits.(Fig:8)

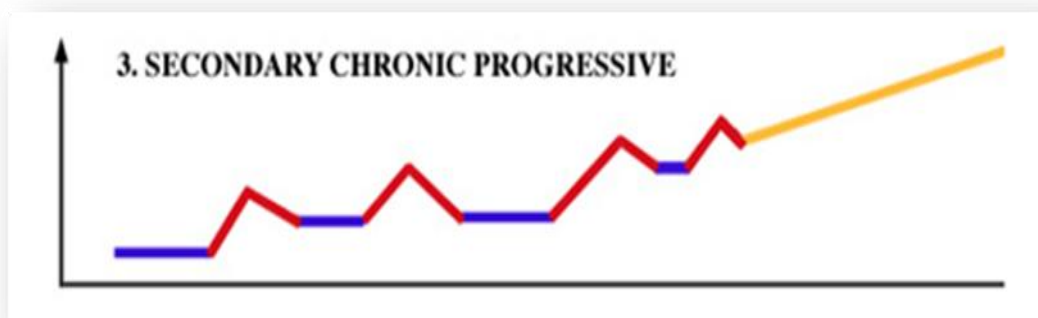
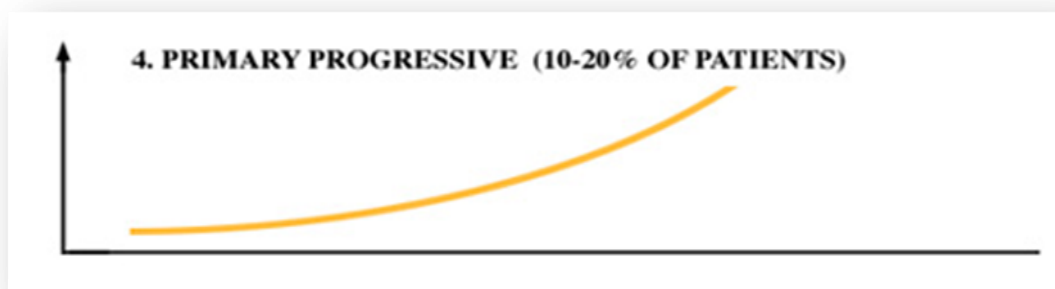


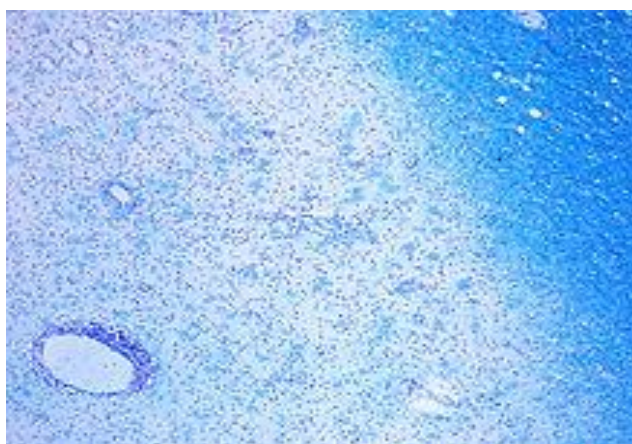
FIG: 8

Primary Progressive

Primary progressive describes the approximately 10% of individuals who **never have remission** after their initial MS symptoms. Decline occurs continuously without clear attacks. Affects people who are older at disease onset... (Fig: 9)

**Fig: 9.****Patho Physiology**

The three main characteristics of MS are the formation of lesions in the central nervous system (also called plaques), inflammation, and the destruction of myelin sheaths of neurons. Additionally MS is believed to be an immune-mediated disorder that develops from an interaction of the individual's genetics and as yet unidentified environmental causes. Damage is believed to be caused, at least in part, by attack on the nervous system by a person's own immune system. The name multiple sclerosis refers to the scars (sclera – better known as plaques or lesions) that form in the nervous system. Apart from demyelination, the other sign of the disease is inflammation. Fitting with an immunological explanation, the inflammatory process is caused by T cells, a kind of lymphocyte that plays an important role in the body's defenses. T cells gain entry into the brain via disruptions in the blood–brain barrier. The T cells recognize myelin as foreign and attack it, explaining why these cells are also called "auto reactive lymphocytes". (Fig: 10, 11)

**FIG: 10**

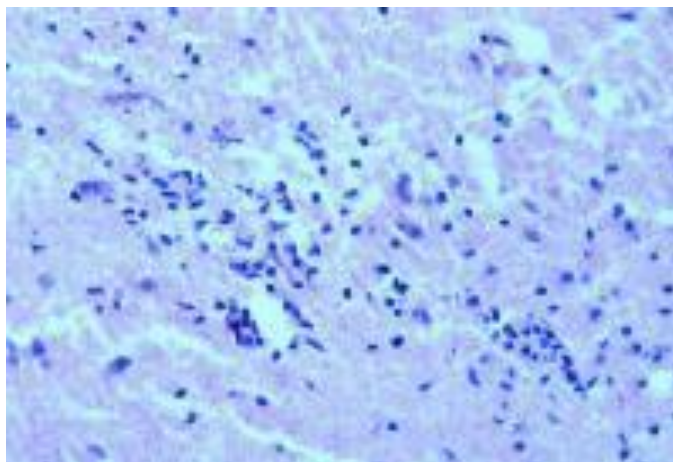


Fig: 11

Treatment

There is no known cure for multiple sclerosis at this time. But, there are treatments that may slow the disease. The goal of treatment is to control symptoms and help you maintain a normal quality of life.

Medicines are often taken long-term. These include:

1. Medicines to slow the disease
2. Steroids may be used to decrease the severity of attacks
3. Medicines to control symptoms such as muscle spasms, urinary problems, fatigue or mood problems
4. Rebif, Avonex, Betaseron is the three types of formulations approved by FDA.

Summary

Multiple sclerosis is the disease of brain and spinal cord .It is one of the most complex disease.However, most of the people with MS are able to lead a normal life like others. If you have the symptoms of MS, such as numbness, tingling in any part of the body, check with your doctor. Other symptoms include dizziness, fatigue, muscletremors, blindness; double vision.MS can be treated with medication. Some cases of MS are benign only need to be observed with out medication. Keeping healthy habits and stay close to friends, family are great ways to cope MS and limit the fatigue, stress it may place on the body.

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