

Modern Solutions for the Prevention and Diagnosis of Multiple Sclerosis

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Received: 2024, 15, Dec

Accepted: 2024, 21, Dec

Published: 2025, 08, Jan

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Annotation: Multiple sclerosis is a chronic disease in which the immune system, which normally protects against pathogens (e.g., viruses, bacteria, fungi), mistakenly attacks and destroys the myelin sheath of neurons in the brain and spinal cord. The myelin sheath helps neurons transmit impulses quickly and correctly. If it is damaged, the impulse is transmitted incorrectly. As a result, important body functions controlled by the central nervous system (CNS) can be impaired: vision, speech, muscle tone, thinking, urination, defecation.

Keywords: Sclerosis, origin, diagnosis, prevention, treatment.

The word "diffuse" in the name of the disease indicates that the foci of inflammation appear in different parts of the nervous system (diffuse in space) and the neurological symptoms they cause, as a rule, manifest themselves episodically, with a significant time interval between such episodes (diffuse in time).

If not treated in a timely manner, multiple sclerosis can seriously reduce a person's quality of life and even lead to disability.

The myelin sheath serves the same purpose as the insulation of an electrical wire: disruptions in the transmission of electrical impulses can be compared to a current leak.

Multiple sclerosis affects about 2.5 million people worldwide, three times more women than men. Although the disease can occur at any age, it most often develops in young people between the ages of 20 and 40, and in 10% of cases, sclerosis is diagnosed in children under 18 years of age.

In recent years, scientists have observed an increasing trend in the spread of the disease.

In 5 years (data from 2008-2013), the global incidence of multiple sclerosis increased by 10%.

In the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10), multiple sclerosis is coded G35.

Symptoms of multiple sclerosis

The symptoms of multiple sclerosis can vary depending on which neurons are affected by the disease.

Localization of injury

Symptoms

Optic nerve

Pain when moving the eyeballs - only one (unilateral optic neuritis) or both (bilateral optic neuritis); papillary edema; changes in the fundus; sometimes - complete loss of vision

Cerebellum

Unsteadiness in walking, various disorders in coordination of movements; changes in handwriting - letters become abnormally large (megalographia); loss of smoothness and rhythm of speech (singing), stress in words (cerebellar dysarthria)

Brain stem

Disorders of horizontal eye movements, i.e. inability to look to the side (internuclear ophthalmoplegia), involuntary twitching of the eyes (nystagmus); inability to turn the eye outward (abducens nerve palsy); decreased sensitivity of one half of the face; less often - hearing loss, trigeminal neuralgia

Spine

Weakness of the muscles of one arm or leg, arms and legs on one side of the body or both legs together; Lhermitte's sign: when a patient with multiple sclerosis bends his head forward, he feels as if an electric current is passing through the spine; unbearable urge to urinate, urinary incontinence; impaired sensitivity in certain areas of the body; inability to hold stool; impaired coordination of movements and gait, in which the person seems to be hitting the surface with his legs - he bends them excessively at the joints and puts them on the ground with force (sensory ataxia)

Large hemispheres of the brain

Decreased memory, attention, speed of neuropsychological tests; fatigue or chronic fatigue; weakness of the muscles of the arms and legs on one side of the body; depression; less often - anxiety, euphoria

If the disease affects the optic nerve, scotomas may appear - blind spots in the field of vision, sometimes resembling flashing spots. Author: Kronos , CC BY-SA 3.0 , via Wikimedia Commons

Causes of multiple sclerosis

Scientists still don't know exactly why some people develop multiple sclerosis. It is believed that the disease is caused by three main factors: a malfunctioning immune system, genetic predisposition, and environmental factors.

Autoimmune inflammation

Currently, researchers do not have a consensus on how the autoimmune reaction that leads to inflammation in the central nervous system occurs.

The first hypothesis, which can be conventionally called "external", suggests that a certain type of activated lymphocytes - CD4⁺ T cells - appear outside the nervous system. They then cross the

blood-brain barrier (BBB) and begin to attack neurons. The BBB prevents pathogens, large molecules and immune cells from entering the central nervous system from the blood and damaging neurons. However, with multiple sclerosis, this protection does not work.

Endothelial cells, pericytes, and astrocytes together form a semipermeable membrane, the blood-brain barrier. It separates the central nervous system from the bloodstream.

Another hypothesis, the "inside-out" hypothesis, suggests that there is some abnormality within the central nervous system itself, leading to inflammation and damage to nerve cells.

Genetic predisposition

Multiple sclerosis has been found to occur in people who are genetically predisposed to it.

The risk of developing multiple sclerosis in a person whose relatives have suffered from this disease is from 35 to 75%.

No specific gene responsible for the onset of the disease has been identified. However, scientists have identified more than 200 genetic factors that influence susceptibility to the disease.

Environmental impact

If a person is exposed to negative environmental influences, genetic factors that lead to the development of the disease are activated. First of all, these are viral infections, especially those caused by retroviruses and Epstein-Barr virus. In addition, vitamin D deficiency, smoking from an early age, changes in the intestinal microbiome contribute to the development of the disease.

Psychosomatics of multiple sclerosis

In the first half of the 20th century, a list of psychosomatic illnesses, known as the "Chicago Seven," was created. Its author, American physician and psychoanalyst Franz Alexander, believed that the causes of seven common illnesses were unresolved internal conflicts and the stress associated with them.

The "Chicago Seven" of psychosomatic diseases:

- a. hypertension,
- b. stomach and duodenal ulcers,
- c. nonspecific ulcerative colitis,
- d. asthma,
- e. thyrotoxicosis,
- f. rheumatoid arthritis,
- g. atopic dermatitis.

Currently, the nature of these diseases is explained in different ways. For example, in the majority of patients with gastric ulcers (60% of cases) and duodenal ulcers (80% of cases), the disease develops due to infection with the bacterium *Helicobacter pylori*.

As for multiple sclerosis, it was never included in this list.

Currently, psychosomatic diseases are called diseases in which disorders in the functioning of various organs and systems arise from a person's mental state.

An example of such a disease is irritable bowel syndrome, which usually develops against the background of severe stress. In this case, the work of the intestines is disrupted, and the person experiences dull aching pain in the lower abdomen (usually on the left), constipation is replaced by diarrhea, flatulence, nausea and vomiting, itching and weakness.

Examples of other psychosomatic illnesses:

functional gastric dyspepsia - pain and heaviness in the upper abdomen;

fibromyalgia - muscle pain not associated with inflammation;

Hyperventilation syndrome - a feeling of lack of air, which prompts a person to breathe rapidly and shallowly, which causes dizziness and panic.

What these painful conditions have in common is that they can occur against a background of severe emotional shock.

However, the International Statistical Classification of Diseases and Related Health Problems, Tenth Revision (ICD-10) does not use the term "psychosomatic disorders." Instead, the term "neurotic, stress-related and somatoform disorders" is used. It covers a group of disorders designated by codes F40 - F48.

Multiple sclerosis is not caused by stress, it is triggered by several factors at once, the main one being genetic predisposition. Thus, this disease cannot be classified as psychosomatic.

Multiple sclerosis is also not included in the group of somatoform disorders (F40 - F48 in ICD-10).

Louise Hay on the psychosomatics of multiple sclerosis

Louise Hay is an American author and motivational speaker. Her most famous book is *Heal Your Life*, in which Hay links illness to negative thinking.

Louise Hay is a successful author: her books have sold tens of millions of copies. At the same time, she has been criticized several times for pseudoscience. Author: Heiko Antoni, CC BY-SA 3.0, via Wikimedia Commons

According to Hay, it is possible to recover even from diseases for which official medicine has not yet found a cure. To achieve this result, the patient must understand what incorrect judgments control his life and replace them with correct ones. In her book, Louise Hay cites the main negative attitudes that, in her opinion, are the cause of the disease, and affirms that it is necessary to repeat them in order to change the habitual way of thinking.

The basis of multiple sclerosis, according to Hay, is rigidity of thinking, hardness of heart, iron will, inflexibility and fear. Accordingly, in order to recover, the author suggests that patients convince themselves that they are safe and think only of pleasant and joyful thoughts.

This approach to explaining the causes of disease and methods of its treatment does not stand up to criticism from the point of view of modern medicine and is pseudoscientific.

Liz Burbo on the psychosomatics of multiple sclerosis

The psychosomatics of diseases was also studied by Canadian writer Liz Burbo.

Like Louise Hay, Burbo considers the wrong attitude to be the cause of the disease and identifies them. Thus, she believes that the emotional cause of multiple sclerosis is the unwillingness to suffer. According to Liz Burbo, such a person seems to be trying to build protective armor, which is why he first loses flexibility in communication, and then the flexibility of his body. Another cause of multiple sclerosis is the unwillingness to develop, as well as the desire for perfection in everything.

The cure, according to Liz Bourbo, can be self-forgiveness: a person must allow himself to be gentle, to be dependent on other people, to be imperfect.

Liz Bourbo's approach to finding and treating the causes of diseases is also pseudopsychological and pseudoscientific.

Classification of multiple sclerosis

The disease manifests itself differently in different people: symptoms may come and go or last for a long time. That is why multiple sclerosis is classified according to the type of course.

Types of multiple sclerosis:

Relapsing-remitting multiple sclerosis (RRMS) is a form of the disease in which periods of worsening of symptoms (remissions) alternate with periods of no symptoms (remissions). In this case, remissions can be both short-term and long-term. This is the most common type of disease at the onset of the disease;

Primary progressive multiple sclerosis (PPMS) is a form of the disease in which a person's condition gradually worsens from the moment the first symptoms of the disease appear. PPMS occurs if the disease lasts for more than 1 year;

Secondary progressive multiple sclerosis (SPMS) is a type of disease in which relapses begin to occur frequently after a long period of RRMS and PPMS, and neurological symptoms persist or progress even after a period of remission.

A clinically isolated syndrome is distinguished by symptoms characteristic of multiple sclerosis (usually episodic) and deviations in the neurological status, but at the same time, MRI does not reveal reliable changes in the central nervous system that would allow confirming the diagnosis of "multiple sclerosis". They appear later, therefore, in doubtful cases, it is recommended to repeat MRI of the brain and cervical spine after 3-4 months.

Radiologically isolated syndrome is also considered separately. This is indicated by the detection of two or more lesions of the myelin sheath of neurons of the central nervous system on MRI, but the patient does not have symptoms characteristic of an acute demyelinating episode or the symptoms of the disease reported by the patient are not characteristic of multiple sclerosis.

Also in 2013, a new classification of multiple sclerosis by type of course was introduced. According to it, there are inactive multiple sclerosis (no periods of exacerbations, no signs of disease activity according to MRI results), active sclerosis (there are exacerbations or there are signs of disease activity according to MRI results), multiple sclerosis with progressive and multiple sclerosis without progression.

In addition, there are special forms of multiple sclerosis that are not included in any of the described classifications.

Special forms of multiple sclerosis:

Malignant multiple sclerosis (Marburg disease) is a severe form of the disease, in which the patient's disability increases very rapidly (sometimes within a few months of the onset of the disease) and leads to death. This type of multiple sclerosis is very rare and does not exceed 5% of all cases;

Rapidly progressive multiple sclerosis is a form of the disease that develops if a person does not receive treatment for multiple sclerosis. In this case, within a year, a person may have two or more exacerbations, with progressive disability, or MRI results revealing new foci of the disease;

pseudotumor form of multiple sclerosis - a type of disease in which, according to MRI data, one or more large foci of neuronal damage are detected in the brain, which are accompanied by swelling of the surrounding tissues (similar in appearance to a tumor process);

Highly active multiple sclerosis (HAMS) is a type of disease in which, despite treatment, the doctor notes the development of symptoms or the picture of the disease according to MRI, despite therapy aimed at modifying the course of the disease. , and decides to prescribe stronger drugs to the patient.

In addition, some other conditions in which the myelin sheath of neurons in the central nervous

system is also destroyed were previously considered types of multiple sclerosis, but are now considered by many experts to be independent diseases. These include Balo's concentric sclerosis and Schilder's disease, as well as Devic's optic myelitis.

Concentric sclerosis of the brain is a rare neurological syndrome in which concentric areas of damaged myelin sheaths of nerve fibers in the white matter of the brain are replaced by healthy areas.

Schilder's disease (Schilder's leukoencephalitis) is a rare disease of the central nervous system, characterized by massive destruction of the white matter of the brain, which leads to partial or complete disruption of the conduction of nerve impulses.

Devic's neuromyelitis optica was also previously considered a variant of multiple sclerosis. However, when this condition was studied, it was found to be caused by other causes, so Devic's optic myelitis is now considered a separate disease.

Stages of multiple sclerosis

Many forms of multiple sclerosis involve alternating phases of exacerbation and remission.

An exacerbation is the appearance of new neurological symptoms or worsening of previous manifestations of the disease that lasts at least one day.

If new or worsening symptoms appear within 24 hours to 30 days of the first symptom, they are called an exacerbation episode. If the patient's condition is stable or improves for at least a month between the first and subsequent symptoms, we are talking about two exacerbation episodes.

Clinical remission is when a patient has had no exacerbations, no worsening or worsening of symptoms for 30 days or more.

Functional stages of multiple sclerosis:

proven progression of disability - a steady increase in the patient's neurological disorders outside the period of exacerbation, not associated with a previous exacerbation;

proven increase in disability - a steady deterioration of neurological disorders after the end of the exacerbation;

Proven reduction in disability - a sustained reduction in neurological impairment compared to baseline.

Complications of multiple sclerosis

The danger of multiple sclerosis is that without adequate treatment, started in a timely manner, a person can become disabled.

Almost half of untreated patients have difficulty working 10 years after the onset of the disease, moving after 15 years, and caring for themselves after 20 years.

In addition, neurological disorders can accumulate and gradually worsen after each relapse of the disease, leading to the development of complications.

The main complications of multiple sclerosis are:

mobility impairment - develops with a long course of the disease;

chronic diplopia - double vision;

chronic dizziness;

chronic dysphagia - difficulty swallowing, which can cause the patient to constantly choke on food;

tremor of the hands and feet;

frequent urinary tract infections - develop due to bladder dysfunction due to the disease;
frequent constipation;
erectile dysfunction;
cognitive impairment, mood disorders, constant fatigue.

Double vision or diplopia in multiple sclerosis develops due to damage to the brainstem

Which doctor should I see if I suspect multiple sclerosis?

The symptoms of multiple sclerosis vary greatly depending on which parts of the central nervous system are affected, making it difficult to diagnose the disease.

If a young person (usually the disease manifests itself in people under 40 years of age) suddenly begins to see double, there are disturbances in movement, sensitivity and instability, you should be wary. If suspicious symptoms appear, adults should contact a neurologist, and it is important to show the child to a pediatrician.

During the appointment, the doctor will ask in detail whether the person has previously experienced episodic deterioration of health accompanied by similar symptoms. The doctor will also conduct a complete neurological examination to assess the state of the nervous system to determine the neurological status.

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