Pathophysiology of the nervous system or Nervous System Disorders

The major functions of the nervous system are to detect, analyze, and transmit information.

Information is gathered by sensory systems, integrated by the brain, and used to generate signals to motor and autonomic pathways for control of movement and of visceral and endocrine functions. These actions are controlled by neurons, which are interconnected to form signaling networks that compose motor and sensory systems. In addition to neurons, the nervous system contains neuroglial cells that serve a variety of immunologic and support functions and modulate the activity of neurons.

Understanding the pathophysiology of nervous system disease requires knowledge of neural and glial cell biology and the anatomy of neural networks.

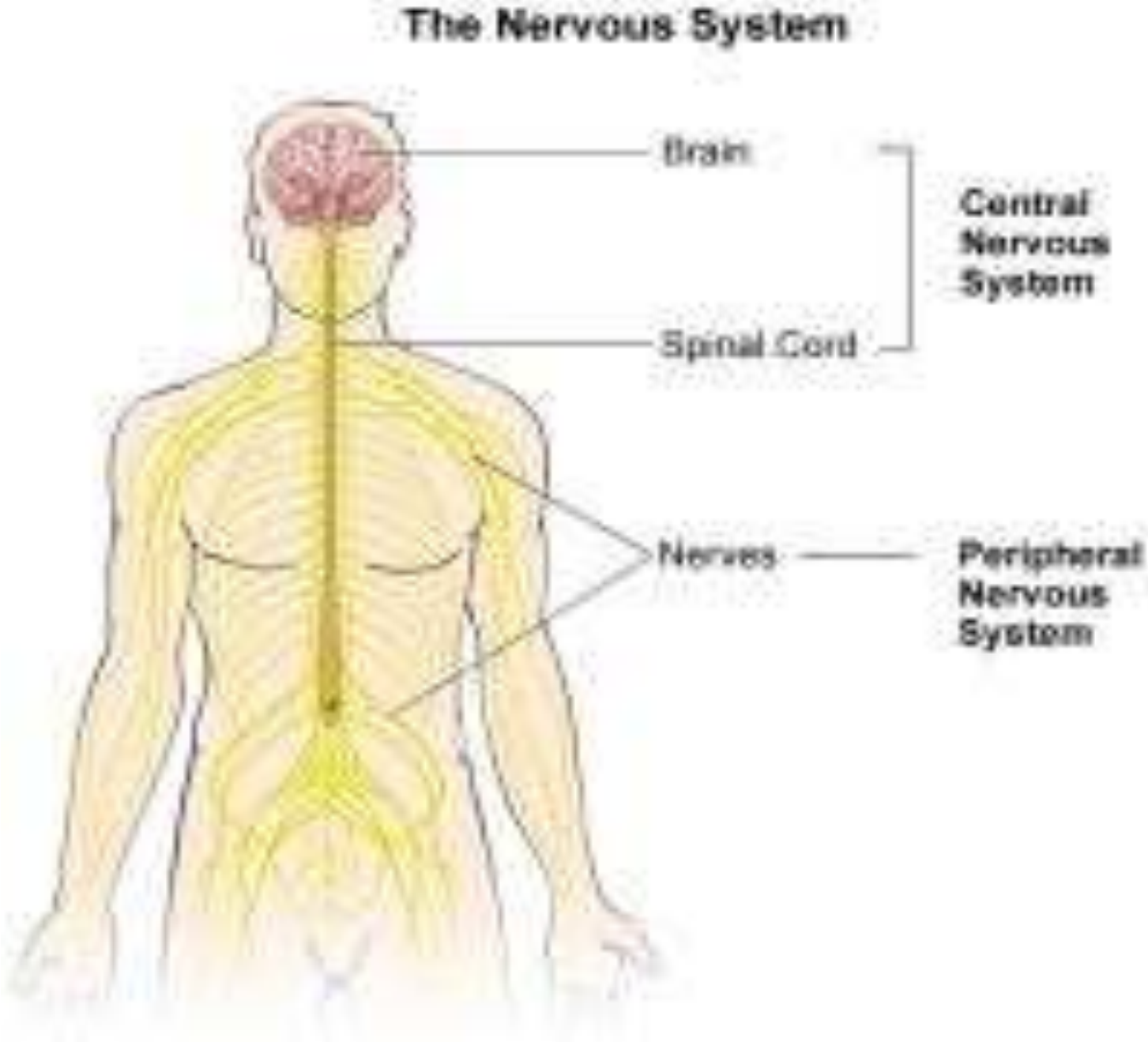
What is the nervous system?

The nervous system is a complex, sophisticated system that regulates and coordinates body activities. It is made up of two major divisions, including the following:

- **Central nervous system.** This consists of the brain and spinal cord.
- **Peripheral nervous system.** This consists of all other neural elements, including the peripheral nerves and the autonomic nerves

In addition to the brain and spinal cord, principal organs of the nervous system include the following:

- Eyes
- Ears
- Sensory organs of taste
- Sensory organs of smell
- Sensory receptors located in the skin, joints, muscles, and other parts of the body


The Nervous System
Brain
Spinal Cord
Central Nervous System
Nerves
Peripheral Nervous System

What are some disorders of the nervous system?

The nervous system is vulnerable to various disorders. It can be damaged by the following:

- **Trauma**
- **Infections** such as meningitis, encephalitis, polio, and epidural abscess
- **Degeneration**, such as Parkinson disease, multiple sclerosis, amyotrophic lateral sclerosis (ALS), Huntington chorea, and Alzheimer disease
- **Structural defects**, such as brain or spinal cord injury, Bell's palsy, cervical spondylosis, carpal tunnel syndrome, brain or spinal cord tumors, peripheral neuropathy, and Guillain-Barré syndrome
- **Blood flow disruption** or **Vascular disorders**, such as stroke, transient ischemic attack (TIA), subarachnoid hemorrhage, subdural hemorrhage and hematoma, and extradural hemorrhage
- **Functional disorders**, such as headache, epilepsy, dizziness, and neuralgia
- **Tumors**
- **Autoimmune disorders**

Signs and symptoms of nervous system disorders

The following are the most common general signs and symptoms of a nervous system disorder. However, each individual may experience symptoms differently. Symptoms may include:

- Persistent or sudden onset of a headache
- A headache that changes or is different
- Loss of feeling or tingling
- Weakness or loss of muscle strength
- Loss of sight or double vision
- Memory loss
- Impaired mental ability
- Lack of coordination
- Muscle rigidity
- Tremors and seizures
- Back pain which radiates to the feet, toes, or other parts of the body
- Muscle wasting and slurred speech
- New language impairment (expression or comprehension)

Nervous system diseases

- Alzheimer's disease. Alzheimer's disease affects your brain function, memory and behavior. .. Alzheimer's disease is the most common type of dementia. It is a progressive disease beginning with mild memory loss and possibly leading to loss of the ability to carry on a conversation and respond to the environment. Alzheimer's disease involves parts of the brain that control thought, memory, and language..

- Bell's palsy. Bell's palsy is a neurological disorder that causes paralysis or weakness on one side of the face. One of the nerves that controls muscles in your face becomes injured or stops working properly. Symptoms include: Sudden weakness or paralysis on one side of your face. A drooping eyebrow and mouth....

- Cerebral palsy. Cerebral palsy (CP) is a group of disorders that affect a person's ability to move and maintain balance and posture. CP is the most common motor disability in childhood. Cerebral means having to do with the brain. Palsy means weakness or problems with using the muscles...

- Epilepsy. Epilepsy is a common condition that affects the brain and causes frequent seizures. Seizures are bursts of electrical activity in the brain that temporarily affect how it works. They can cause a wide range of symptoms. Epilepsy can start at any age, but usually starts either in childhood or in people over 60....

- Motor neuron disease (MND) . Motor neuron disease (MND) is a rare condition that progressively damages parts of the nervous system. This leads to muscle weakness, often with visible wasting. Amyotrophic lateral sclerosis (ALS) is the most common form of MND...

Multiple sclerosis (MS) . Multiple sclerosis (MS) is a potentially disabling disease of the brain and spinal cord (central nervous system).

In MS, the immune system attacks the protective sheath (myelin) that covers nerve fibers and causes communication problems between your brain and the rest of your body. Eventually, the disease can cause permanent damage or deterioration of the nerve fibers.

Signs and symptoms of MS vary widely between patients and depend on the location and severity of nerve fiber damage in the central nervous system. Some people with severe MS may lose the ability to walk independently or ambulate at all. Other individuals may experience long periods of remission without any new symptoms depending on the type of MS they have.

There's no cure for multiple sclerosis. However, there are treatments to help speed the recovery from attacks, modify the course of the disease and manage symptoms...

- Neurofibromatosis. Neurofibromatosis (NF), a type of phacomatosis or syndrome with neurological and cutaneous manifestations, is a rare genetic disorder that typically causes benign tumors of the nerves and growths in other parts of the body, including the skin...

- Parkinson's disease. Parkinson's disease is a brain disorder that causes unintended or uncontrollable movements, such as shaking, stiffness, and difficulty with balance and coordination. Symptoms usually begin gradually and worsen over time. As the disease progresses, people may have difficulty walking and talking.

Healthcare providers who treat nervous system disorders

The best way to manage nervous system disorders is with the help of a team of healthcare providers. You may not need all members of the team at any given time. But it's good to know who they are and how they can help. Here is a list of some of the healthcare providers that may be involved in treating nervous system disorders:

- **Neurologist.** The medical healthcare providers who diagnose and treat nervous system disorders are called neurologists. Some neurologists treat acute strokes and cerebral aneurysms using endovascular techniques.
- **Neurosurgeon.** Surgeons who operate as a treatment team for nervous system disorders are called neurological surgeons or neurosurgeons.
- **Neuroradiologist and interventional radiologist.** This is a radiologist who specializes in diagnosing nervous system conditions using imaging and in treating nervous system conditions such as cerebral aneurysms, acute strokes, and vertebral fractures. This provider also does biopsies of certain tumors.

- **Psychologist.** Emotional problems such as anxiety, depression, mood swings, and irritability are common in nervous system disorders. Your psychologist can help. Psychologists may do testing to find out how much your disorder is affecting the way you think and feel. Psychologists also do talk therapy (counseling) to help you deal with the emotional effects caused by nervous system disorders.
- **Psychiatrist.** Like your psychologist, this team member deals with emotional and behavior symptoms caused by nervous system disorders. In most cases, talk therapy works best for these problems. But if you need medicines to treat symptoms such as depression or anxiety, this doctor can help.
- **Physiatrist.** Healthcare providers who work with people in the rehab (rehabilitation) process are called physiatrists.
- **Physical therapist.** This is a movement specialist who can help you move and walk well. In physical therapy, you can also work on painful or stiff muscles and joints.
- **Occupational therapist.** This provider helps you learn to handle your day-to-day activities. For example, you might have trouble doing tasks you need to do at work or at home. Your occupational therapist will help you find ways to adjust to any changes in your physical abilities.
- **Speech/language pathologist.** This provider specializes in communication, including cognitive communication. They also diagnose and treat swallowing problems.