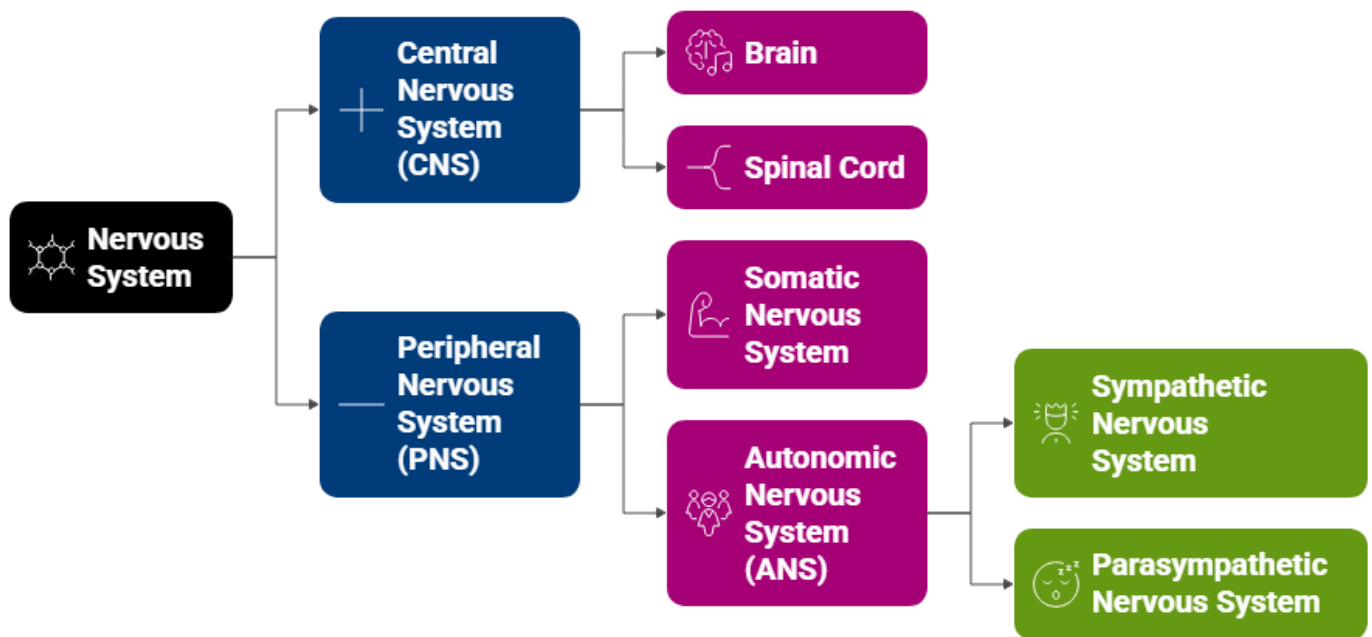


Nervous system

Definition & Classification of Nervous System

- The nervous system is a complex network of nerves, neurons, and supporting cells that coordinate and transmit information throughout the body.
- It is responsible for sensing and responding to various internal and external stimuli, enabling organisms to interact with their environment and maintain homeostasis.
- Each of these divisions has its own subdivisions and components, which work together to coordinate and control various functions in the body.



1. Central Nervous System (CNS):

A. Brain:

- The brain is the control center of the nervous system and is responsible for processing and integrating sensory information, generating thoughts and emotions, and coordinating voluntary and involuntary movements.
- It has several key parts, including the cerebrum, cerebellum, and brainstem.

B. Spinal Cord:

- The spinal cord is a long, cylindrical structure that extends from the base of the brain down the vertebral column.
- It serves as the primary communication pathway between the brain and the PNS, relaying sensory information to the brain and motor instructions from the brain to the rest of the body.

2. Peripheral Nervous System (PNS):

A. Somatic Nervous System:

- This subdivision of the PNS is responsible for voluntary movements and the perception of external sensations.
- It contains sensory neurons, which transmit information from the body to the CNS, and motor neurons, which carry instructions from the CNS to the skeletal muscles.

B. Autonomic Nervous System (ANS):

- This subdivision of the PNS regulates involuntary processes and the function of internal organs.
- The ANS has two further subdivisions:

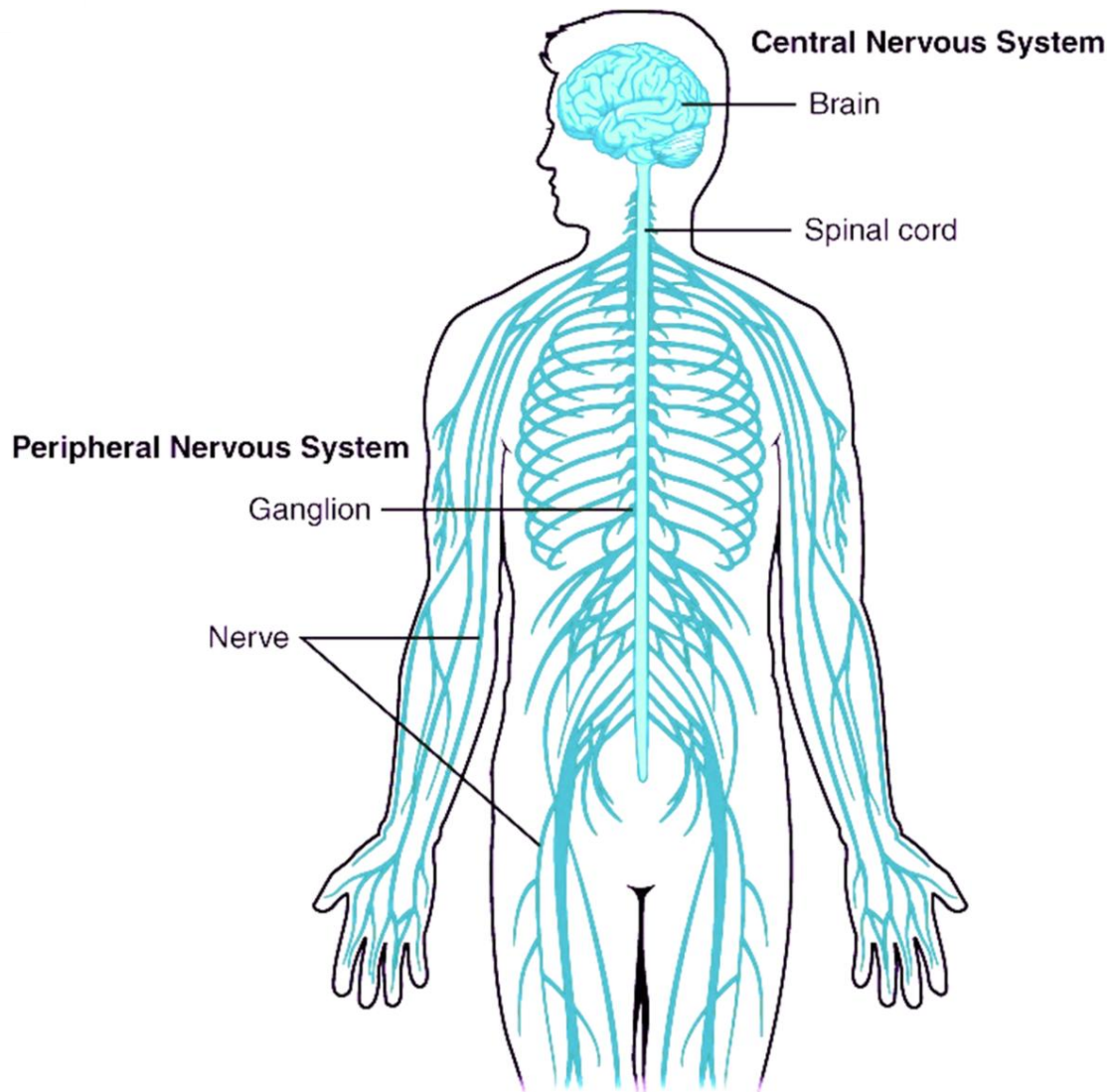
i. Sympathetic Nervous System:

- This part of the ANS prepares the body for action in times of stress, activating the "fight or flight" response.
- It increases heart rate, respiration, and blood flow to the muscles, among other effects

ii. Parasympathetic Nervous System:

- This part of the ANS supports the "rest and digest" state, helping the body relax and conserve energy.
 - It slows down the heart rate, increases digestion, and promotes other functions that help maintain homeostasis.
- The organization of the nervous system allows it to efficiently process information and coordinate the body's responses to various internal and external stimuli.
 - The CNS and PNS work together to maintain homeostasis, regulate bodily functions, and enable the body to interact with its environment.

Introduction - Central Nervous System



- The central nervous system (CNS) is one of the two main components of the nervous system, the other being the peripheral nervous system (PNS).
- The CNS consists of the brain and spinal cord, which are protected by various layers of connective tissue and bone (the skull and vertebral column).
- The main functions of the CNS are to receive, process, and transmit information from the rest of the body.
- It plays a crucial role in controlling and coordinating various bodily functions, such as movement, sensation, cognition, memory, and emotion.

The brain is divided into several regions, each responsible for specific functions:

1. Cerebrum:

- The largest part of the brain, it is responsible for higher cognitive functions like thought, memory, language, and learning.
- The cerebrum is further divided into two hemispheres (left and right) and four lobes (frontal, parietal, temporal, and occipital).

2. Cerebellum:

- Located at the back of the brain, the cerebellum is responsible for coordinating muscle movements, maintaining balance, and processing information related to movement.

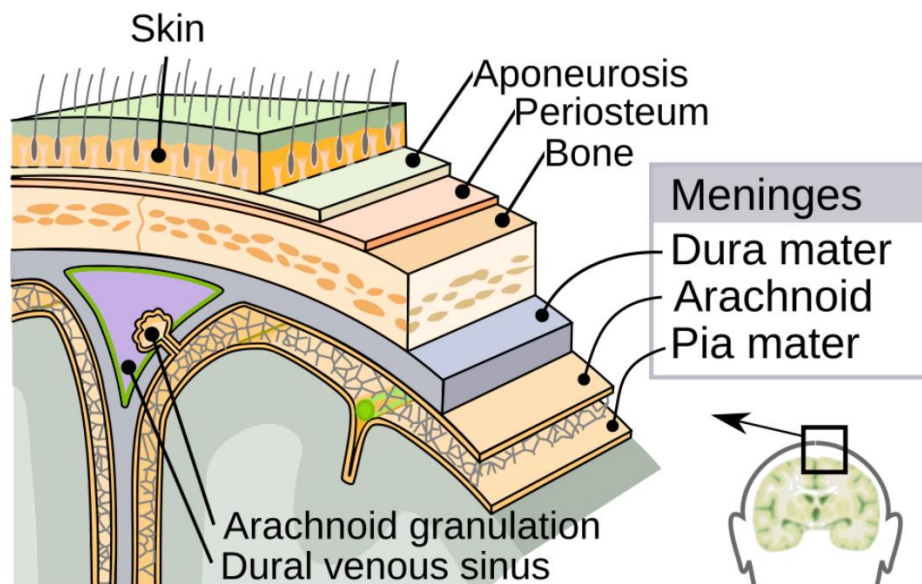
3. Brainstem:

- Connecting the brain to the spinal cord, the brainstem is responsible for basic life-sustaining functions, such as breathing, heart rate, and blood pressure.
- It also plays a role in sleep and arousal.
- The spinal cord, a long bundle of nerve fibers, runs from the brainstem to the lower back. It serves as a conduit for signals between the brain and the rest of the body.
- The spinal cord is also responsible for certain reflexes that do not require input from the brain.

Meninges

- The meninges are three protective layers of connective tissue that surround and protect the central nervous system (CNS), which includes the brain and spinal cord.
- These layers serve several important functions, such as providing physical protection, supporting the CNS, and containing the cerebrospinal fluid (CSF) that cushions the brain and spinal cord.

There are three layers of meninges, from the outermost to the innermost:



1. Dura mater:

- The tough, outermost layer that provides strength and durability, composed of two sub-layers (periosteal and meningeal) and responsible for creating protective folds in the brain.

2. Arachnoid mater:

- The middle, web-like layer that contains the cerebrospinal fluid-filled subarachnoid space, arachnoid trabeculae for support, and arachnoid granulations for CSF reabsorption.

3. Pia mater:

- The delicate, innermost layer that closely follows the contours of the CNS, supplies blood to neural tissue, and contributes to the production of cerebrospinal fluid via the choroid plexus.

Ventricles of Brain & Cerebrospinal Fluid

- The ventricles of the brain are interconnected, fluid-filled cavities within the brain that produce and circulate cerebrospinal fluid (CSF).

There are four ventricles in total:

1. Two lateral ventricles (one in each hemisphere):

- These C-shaped ventricles are the largest and are located in the cerebral hemispheres.
- Each lateral ventricle has a central body and three extensions, called horns (anterior, posterior, and inferior).

2. Third ventricle:

- A narrow, slit-like cavity located in the midline of the brain, between the two thalami.
- It connects to the lateral ventricles through the interventricular foramen (also known as the foramen of Monro).

3. Fourth ventricle:

- A tent-shaped cavity located between the cerebellum and the brainstem.
 - It connects to the third ventricle through the cerebral aqueduct (also known as the aqueduct of Sylvius).
- Cerebrospinal fluid (CSF) is a clear, colorless fluid produced primarily by the choroid plexus, a network of blood vessels and specialized cells found within the ventricles.

The choroid plexus filters blood plasma and secretes CSF, which has several important functions:

1. Buoyancy:

- CSF provides a cushioning effect that reduces the effective weight of the brain and spinal cord, protecting them from physical injury.

2. Protection:

- The fluid acts as a shock absorber, protecting the delicate neural tissues from sudden movements or impacts.

3. Chemical stability:



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