

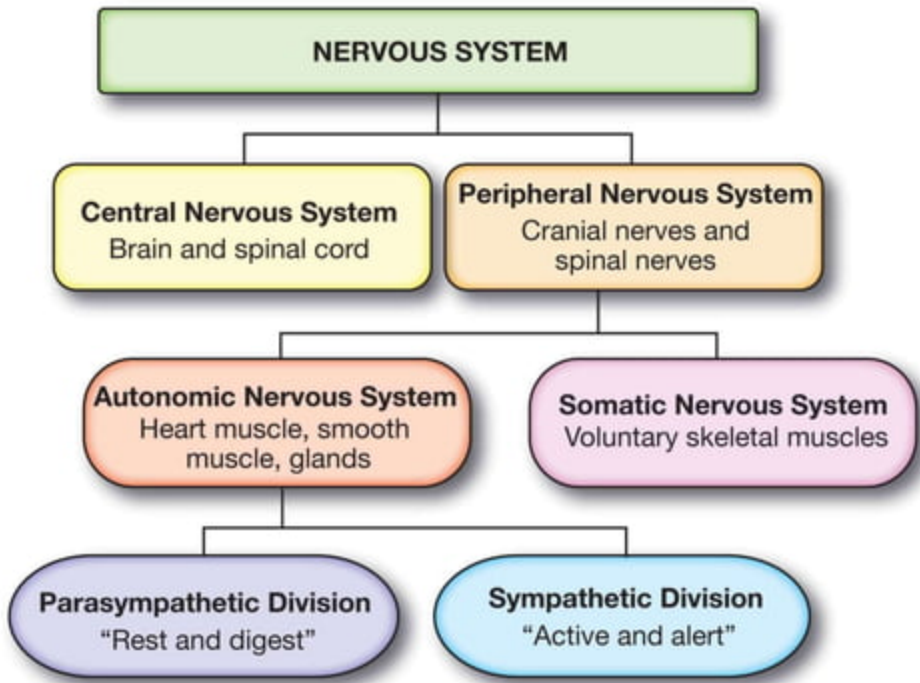
NERVOUS SYSTEM

CLASS: ADP (I)

SUBJECT: APPLIED PSYCHOLOGY

Govt. Associate College(W),
Gawalmandi, Rawalpindi





NERVOUS SYSTEM

The Nervous system is a complex network of nerves and cells that transmit signals between different parts of the body. It is divided into two main parts: the **Central Nervous System (CNS)**, which includes the **Brain** and **Spinal cord**, and the **Peripheral Nervous System (PNS)**, consisting of nerves that connect the CNS to the rest of the body. The nervous system plays a crucial role in coordinating and regulating bodily functions. It allows for the transmission of electrical impulses, known as nerve impulses or action potentials, which enable communication between different cells and tissues.

CENTRAL NERVOUS SYSTEM

The **Central Nervous System (CNS)** is a major division of the nervous system and comprises the **Brain** and **Spinal cord**. It serves as the central processing unit for the entire nervous system. The brain is responsible for processing and interpreting sensory information, coordinating voluntary and involuntary motor functions, and facilitating cognitive processes such as memory, learning, and emotion. The spinal cord, an extension of the brain, runs through the vertebral column and serves as a communication pathway between the brain and the peripheral nervous system.

DIVISION OF CENTRAL NERVOUS SYSTEM

The **Central Nervous System** is divided into 2 divisions: 1. Brain 2. Spinal Cord

The Brain is divided into 3 parts.

1. Fore Brain
2. Mid Brain
3. Hind Brain

1. Fore Brain

*The **Forebrain** is the largest and most complex part of the brain, consisting of several key structures that play crucial roles in various higher-order functions. It is divided into following main parts:*

1) Thalamus:

Thalamus acts as a relay station for sensory information, directing signals to the appropriate areas of the cerebral cortex. It plays a vital role in sensory perception and awareness

II) Hypothalamus

Hypothalamus regulates essential physiological processes, including body temperature, hunger, thirst, and the sleep-wake cycle. It also controls the endocrine system through the pituitary gland.

III) Cerebrum(Cerebral Cortex)

The **Cerebral cortex** is divided into 2 hemispheres ,I) **right hemisphere** II) **left hemisphere**. The Right hemisphere controls the left part of the body and Left hemisphere controls the right side of the body. Cerebral cortex is **3 mm** thick layer and responsible for higher cognitive functions. Each hemisphere is further divided into four lobes—**frontal, parietal, temporal, and occipital**—each with specific functions related to motor control, sensory perception, language, and visual processing.

Brain Lobes

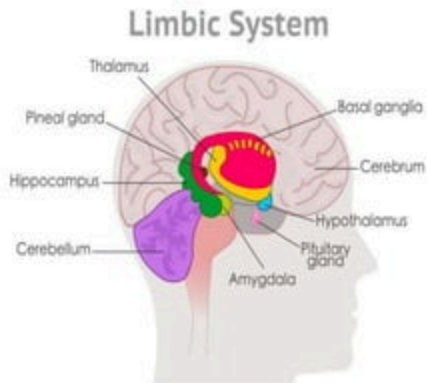


IV) Basal Ganglia

Basal Ganglia is Involved in the coordination of voluntary movements, procedural learning, and routine behaviors.

V) Limbic System

Limbic System Includes structures like the **amygdala** and **hippocampus**. It plays a crucial role in emotions, memory formation, and regulation of the **autonomic nervous system**.

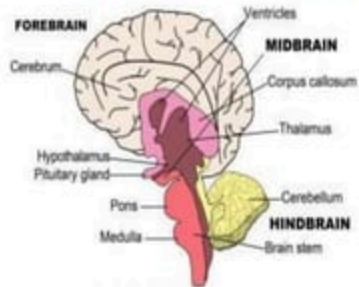


2) Mid Brain

The **Midbrain**, also known as the mesencephalon, is a small but essential part of the brain located between the Forebrain and Hindbrain. It plays a crucial role in sensory and motor functions, as well as the regulation of sleep and wake cycles.

3) Hind Brain

The hindbrain, or rhombencephalon, is the posterior part of the brain and is primarily responsible for essential functions such as involuntary physiological processes and coordination of motor activities. It consists of three main structures: **the medulla oblongata**, **the pons**, and **the cerebellum**.



i) Medulla Oblongata

Medulla oblongata is located at the base of the brainstem, the medulla oblongata is essential for vital autonomic functions, including heartbeat, breathing, and blood pressure regulation. It serves as a relay station for nerve signals passing between the spinal cord and the higher brain centers.

ii) Pons

Pons is situated above the medulla, the pons acts as a bridge connecting different parts of the brain with the help of **corpus callosum**. It is involved in functions like sleep, facial movements, and certain sensory and motor pathways.

iii) Cerebellum

Cerebellum is positioned at the back of the brain, the cerebellum is crucial for coordination, precision of voluntary movements, and maintaining balance and posture. It receives input from sensory systems and the cerebral cortex to fine-tune motor activities. The hindbrain, along with the midbrain and forebrain, forms the brainstem, which plays a vital role in regulating basic life functions and facilitating communication between different parts of the nervous system.

2. Spinal Cord

The spinal cord is a long, tubular structure that extends from the base of the brain (medulla oblongata) down the vertebral column. It serves as a vital part of the central nervous system (CNS) and acts as a communication pathway between the brain and the rest of the body.

Functions

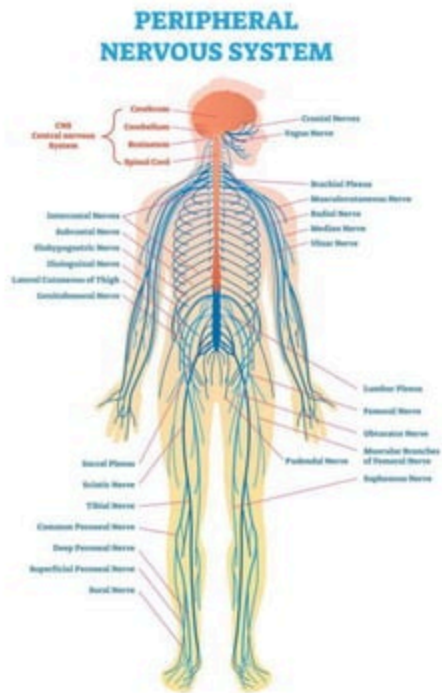
1. It plays a crucial role in reflex actions.
2. The spinal cord is divided into segments, each associated with a specific region of the body.
3. The spinal cord is a critical component of the central nervous system, playing a pivotal role in transmitting information that governs voluntary and involuntary bodily functions.



2. Peripheral Nervous System

The Nervous system is divided into two parts: the Central Nervous system and the Peripheral Nervous system. The central Nervous system (CNS) includes the Brain and Spinal cord, while the Peripheral Nervous System includes all of the nerves that branch out from the brain and spinal cord and extend to other parts of the body, including muscles and organs.

The primary role of the PNS is to connect the CNS to the organs, limbs, and skin. The nerves of the PNS extend from the central nervous system to the outermost areas of the body. The peripheral system allows the brain and spinal cord to receive and send information to other areas of the body, which allows us to react to stimuli in our environment.



2. Divisions of Peripheral Nervous System

The peripheral nervous system itself is divided into two parts: the Somatic nervous system and the Autonomic nervous system. Each of these components plays a critical role in how the peripheral nervous system operates.

i. Somatic Nervous System

Somatic nervous system is a subdivision of your peripheral nervous system that stretches throughout nearly every part of your body. The nerves in this system deliver information from your senses to your brain. They also carry commands from your brain to your muscles so you can move around.

Somatic Nervous System Location

The somatic nervous system includes all of the nerves that extend from the brain and spinal cord. There are two types of somatic nerves: *cranial* and *spinal*.

Cranial Nerves

The somatic nerves that extend from the brain are known as *cranial nerves* and are located on the back of the head and neck.

Somatic Nervous System

Spinal Nerves

The somatic nerves that extend from the spinal column are known as *spinal nerves*. There are 31 pairs of spinal nerves

Neurons

Neurons are the fundamental unit of the nervous system specialized to transmit information to different parts of the body.

A neuron varies in shape and size depending on its function and location. All neurons have three different parts – dendrites, cell body and axon.

Neurons Parts

Following are the different parts of a neuron:

Dendrites

These are branch-like structures that receive messages from other neurons and allow the transmission of messages to the cell body.

Cell Body

Each neuron has a cell body with a nucleus, Golgi body, endoplasmic reticulum, mitochondria and other components.

Neurons

Axon is a tube-like structure that carries electrical impulse from the cell body to the axon terminals that pass the impulse to another neuron.

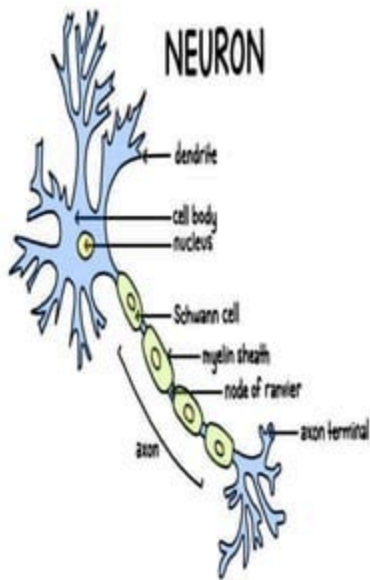
Synapse

It is the chemical junction between the terminal of one neuron and the dendrites of another neuron.

Types of Neurons

Sensory Neurons

The sensory neurons convert signals from the external environment into corresponding internal stimuli.



Motor Neuron

This is the most common type of neuron and transmits information from the brain to the muscles of the body.

Inter Neuron

They are multipolar in structure. Their axons connect only to the nearby sensory and motor neurons. They help in passing signals between two neurons.

2. Autonomic Nervous System

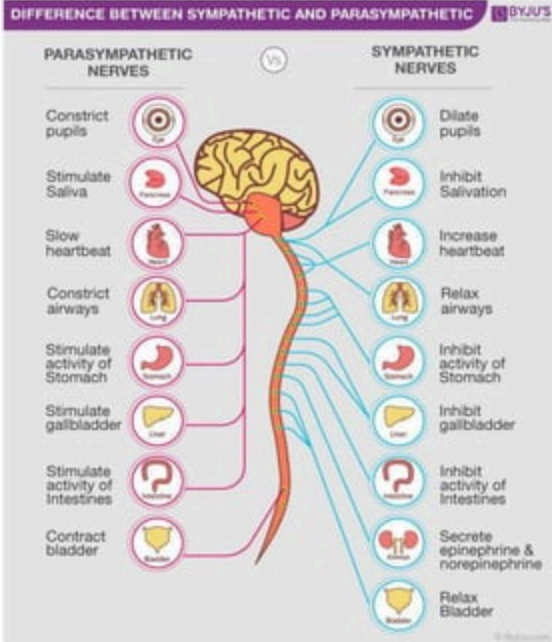
The [Autonomic nervous system](#) is a network of nerves that regulates unconscious body processes. The autonomic system is the part of the peripheral nervous system responsible for regulating involuntary body functions, such as heartbeat, blood flow, breathing, and digestion. This system is further divided into two branches.

i: Sympathetic Nervous System

This division regulates the [flight-or-fight](#) responses. The sympathetic system also performs such tasks as relaxing the bladder, speeding up heart rate, and dilating eye pupils.

ii) Para Sympathetic Nervous System:

The parasympathetic nervous system is responsible for the body's rest and digestion response when the body is relaxed, resting, or feeding. It basically undoes the work of sympathetic division after a stressful situation. The parasympathetic nervous system decreases respiration and heart rate and increases digestion.



Endocrine Glands

Endocrine Glands secrete their respective substances directly into the bloodstream rather than through a duct. These endocrine glands belong to the body's control system and they produce hormones which help to regulate the functions of cells and tissues.

Major Endocrine Glands:

Major Endocrine Glands include:

1. Pituitary Glands

Enclosed deep within the skull, the pituitary gland is the size of a pea. It hangs on a stalk at the base of the [brain](#). It consists of an anterior portion that produces hormones and a posterior portion that has many neural links. This gland is regarded as the master gland as it controls the functions of all the other glands (such as the adrenal, thyroid glands) in the endocrine system. The pituitary gland stimulates the adrenal gland to secrete cortisol, a steroid hormone controls a range of activities from controlling the body's metabolism to stimulating blood pressure.

2. Pineal Glands

This is a tiny gland in your brain that's beneath the back part of your corpus callosum. It makes and releases the hormone melatonin.

3. Thyroid Gland

This is a small, butterfly-shaped gland at the front of your neck under your skin. It releases hormones that help control your metabolism.

4. Parathyroid Gland

These are four pea-sized glands that are typically behind your thyroid. Sometimes they exist along your esophagus or in your chest. They release parathyroid hormone (PTH), which controls the level of calcium in your blood.

5. Adrenal Glands

These are small, triangle-shaped glands on top of each of your two kidneys. They release several hormones that manage bodily processes, like metabolism, blood pressure and your stress response.

6. Pancreas

The pancreas performs two main functions: Exocrine function: Produces substances (enzymes) that help with digestion. Endocrine function: Sends out hormones that control the amount of sugar in your bloodstream

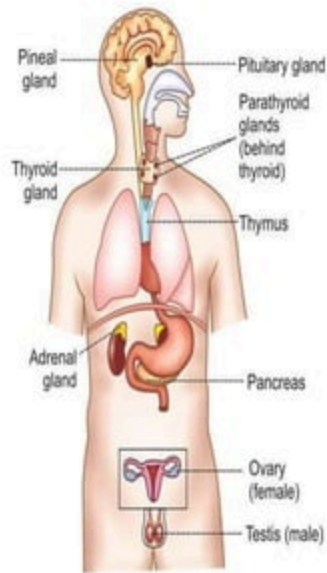
7. Gonads

Ovaries

The ovaries are a key part of the female reproductive system. Each woman has two ovaries. They are oval in shape, about four centimeters long and lie on either side of the womb (uterus) against the wall of the pelvis. The ovaries produce and release eggs into the female reproductive tract. They also produce the female hormones estrogen and progesterone and androgens.

Testes

The testes, also known as testicles or male gonads, lie behind the penis. The testes have two functions – to produce sperm and to produce hormones, particularly testosterone.





THANK

A decorative banner consisting of five pennants hanging from a black string. The pennants are colored red, green, dark blue, red, and green from left to right. Each pennant has a white letter on it, spelling out the word 'THANK'. The string is decorated with small gold circular ornaments.



YOU

A decorative banner consisting of three pennants hanging from a black string. The pennants are colored dark blue, red, and green from left to right. Each pennant has a white letter on it, spelling out the word 'YOU'. The string is decorated with small gold circular ornaments.