

CONTROL AND CO-ORDINATION

CENTRAL NERVOUS SYSTEM

Spinal cord is also surrounded by membranes called meninges. As many as 31 pairs of nerves arise from the spinal cord. The spinal cord is concerned with spinal reflex actions and the conduction of nerve impulses to and from the brain.

Spinal cord: Spinal cord is a cylindrical structure. The spinal cord begins in continuation with medulla and extends downwards. It is enclosed in a bony cage called vertebral column.

Central Nervous System consists of the brain and the spinal cord.

(A) BRAIN

- Brain is the most important part of human body.
- Brain is situated in a cranial box (cranium) which is made of bones.

Meninges(Meninx) : Brain is covered by three membranes of connective tissue, termed as meninges.

(i) **Dura Mater :** It is the first and the outermost membrane which is thick, very strong and nonelastic.

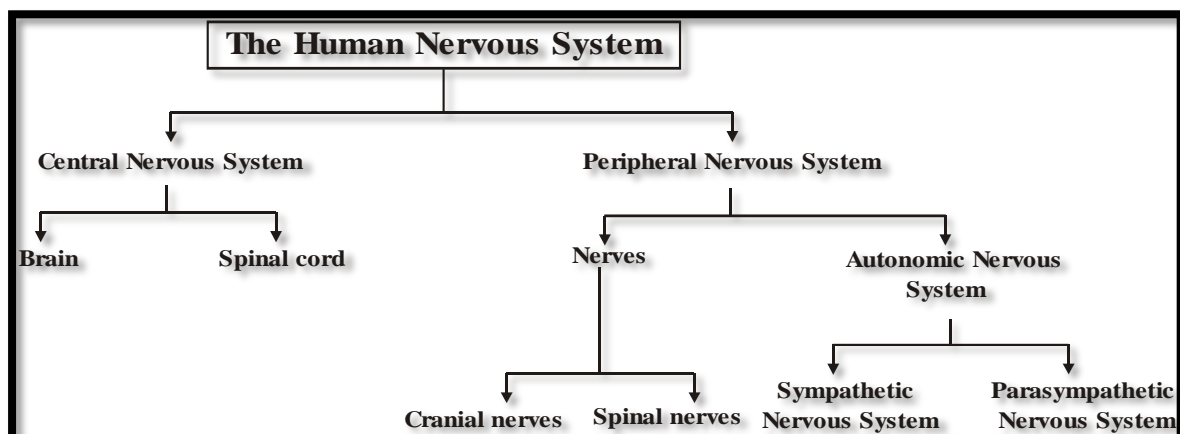
(ii) **Arachnoid Mater :** It is middle, thin, delicate and non-vascular membrane found only in mammals.

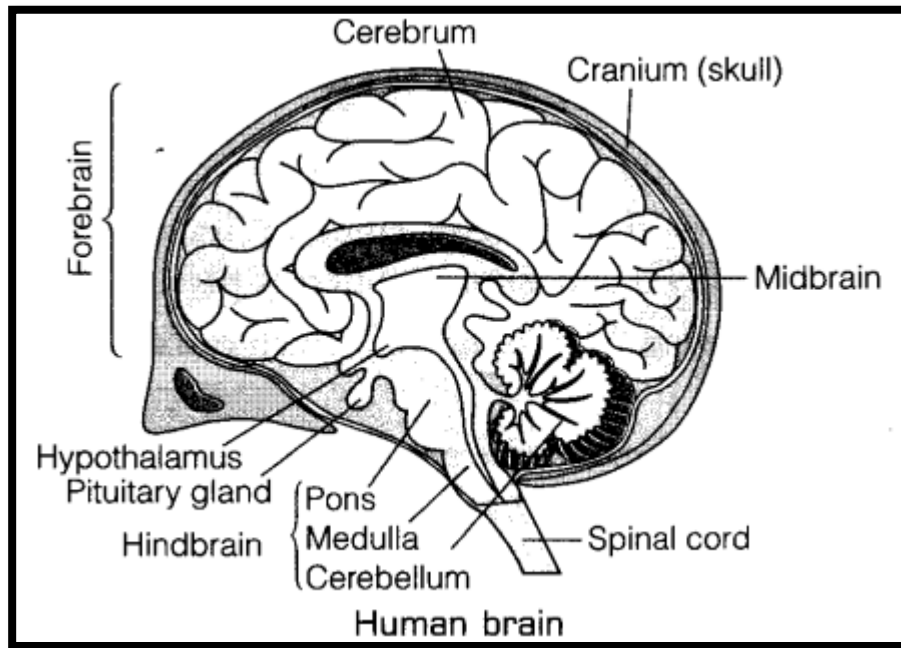
(iii) **Pia Mater :** It is innermost, most vascular, thin and transparent membrane.

The space between the arachnoid and pia mater is filled with a fluid called cerebrospinal fluid (CSF). It protects the brain from mechanical shocks.

Meningitis: Any inflammation of meninges is called meningitis.

Weight of brain: In adult male 1400 gm, female 1250 gm.





1. **Fore brain** : It consists of olfactory lobes, cerebrum and diencephalon.

Olfactory lobes : These are a pair of small, solid, cube shaped bodies. They are fully covered by cerebrum. They receive impulse for smell.

Cerebrum : It is the largest part of the brain.

- It consists of two cerebral hemispheres joined by a band of nerve fibres called corpus callosum.
- Surface of cerebral hemisphere is made up of grey matter, called cerebral cortex.
- It becomes highly folded to increase area for accommodation of more neurons.

Each cerebral hemisphere into four lobes

- ◆ Occipital lobe : Region for visual perception
- ◆ Frontal lobe : For muscular activities
- ◆ Parietal lobe : For touch, smell, temperature and conscious association.
- ◆ Temporal lobe : For auditory reception.

Cerebrum has sensory areas where impulses are received from sense organs (receptors). Similarly it has a general motor area from where impulses are sent to effector organs (Muscles & glands).

Diencephalon: It encloses a cavity called third ventricle. It consists of thalamus and hypothalamus.

- Thalamus serves as a relay centre for sensory and motor impulses from spinal cord & medulla oblongata to cerebrum.
- It recognizes sensory impulses of heat, cold, pain, light & pressure.
- Floor of third ventricle is called hypothalamus.

- It possesses control centres for hunger, thirst, thermoregulation, sleep, sex, stress etc.

2. Mid brain: It consists of two parts:

Cerebral peduncles (**Corpora Quadrigemina**)

- It consists of two heavy fibre tracts called Crura cerebri.
- These tracts connect fore brain to the hind brain.

Optic lobes: These are the centres for control of eye movement and hearing responses.

3. Hind brain: It is divided into three parts.

(a) Pons:

It is small, spherical projection, which is situated below the mid brain and upper side of medulla oblongata. It regulates the breathing action.

(b) Cerebellum:

- It is made up of 3 lobes (2 lateral lobes and 1 vermis).
- Lateral lobes are also called cerebellar hemisphere.

Function: To maintain body balance & posture. It is responsible for precision of voluntary actions.

(c) Medulla oblongata:

- It is the posterior-most, tubular and cylindrical part of brain.
- The lower end medulla extends in the form of spinal cord.

Functions:

- (i) It controls all the involuntary activities of the body. e.g. – heart beats, respiration, blood pressure salivation.
- (ii) It also concerned with some reflexes- sneezing reflex, coughing reflex, vomiting reflex, yawning reflex.