

Brain stem

The brain stem is about the size of a thumb in diameter and approximately 3 inches long. **Structures.** Its structures are the **midbrain**, **pons**, and the **medulla oblongata**.

Mid brain: It is situated around the cerebral aqueduct between the cerebrum above and the Pons varolli below. It consists of groups of nerve cells and nerve fibres. It connects the cerebrum with lower parts of the brain and the spinal cord. The nerve cells act as relay stations for the ascending and descending nerve fibres.

Pons varolli: It is situated in front of the cerebellum, below the midbrain and above the medulla oblongata. It consists of nerve fibres forming a bridge between the two hemispheres of the cerebellum, and of fibres passing between the higher levels of the brain and the spinal cord. Few groups of cells within the Pons act as relay stations. Some of them are associated with the cranial nerves. The nerve cells in the Pons lie deep and the nerve fibres are on the surface.

Medulla oblongata: It extends from the Pons varolli above and is continuous with the spinal cord below. It is shaped like a pyramid with its base upwards and it lies within the cranium above the foramen magnum. Its anterior and posterior surfaces are marked by central fissures. Some cells of medulla oblongata constitute relay stations for sensory nerves passing from the spinal cord to the cerebrum. Following vital centers which are associated with autonomic reflex activity lie in its deeper structure.

- Cardiac center
- Respiratory center Vasomotor center
- Reflex centers of vomiting, coughing, sneezing and swallowing. Medulla oblongata has the following special features:

Reticular Formation: It is collection of neurons in the core of the brainstem, surrounded by neural pathways which pass nerve impulses between the brain and the spinal cord. It constantly receives information from the brain and the spinal cord and transmits it in descending and ascending tracts. It has the following functions:

- Co-ordination of skeletal muscle activity associated with voluntary motor movement and the maintenance of balance.
- Co-ordination of activity control by the autonomic system, e.g., cardiovascular, respiratory and gastrointestinal activity. nervous

- Selective awareness functions through the Reticular Activating System (RAS). This can selectively block or pass sensory information to the cerebral cortex.

Cerebellum

The cerebellum is the second largest part of the brain, located in the posterior portion of the medulla and pons. The cerebellum and cerebrum are separated by cerebellar tentorium and transverse fissure. Cortex is the outer surface of the cerebellum, and its parallel ridges are called the folia. Apart from this, the cerebellum has the cerebellar peduncles, cerebellar nuclei, anterior and posterior lobes. The cerebellum consists of two hemispheres, the outer grey cortex and the inner white medulla. It is mainly responsible for coordinating and maintaining the body balance during walking, running, riding, swimming, and precision control of the voluntary movements. The main functions of the cerebellum include:

1. It senses equilibrium.
2. Transfers information.
3. Coordinates eye movement.
4. It enables precision control of the voluntary body movements.
5. Predicts the future position of the body during a particular movement.
6. Both anterior and posterior lobes are concerned with the skeletal movements.
7. The cerebellum is also essential for making fine adjustments to motor actions.
8. Coordinates and maintains body balance and posture during walking, running, riding, swimming.